



City of Yelm

EST. 1924

WASHINGTON

“Proudly Serving Our Community”

To: Yelm Planning Commission
From: Derek McCoy, Development Review Engineer
Date: November 7, 2019
Subj: Engineering Specifications and Standard Details Update

RECOMMENDATION

Forward Engineering Specifications and Standard Details Update to Yelm City Council with recommendation to adopt.

BACKGROUND

The City of Yelm Engineering Specifications and Standard Details (Standards) provides guidance for the design, detail, workmanship, and materials required for the installation of public infrastructure in the City of Yelm. The text in the standards include development regulations, and Municipal Code sections. It was last updated in 1999.

CURRENT SITUATION

In 2015, with the creation of the Unified Development Code, the Zoning, and Subdivision sections of the standards became obsolete, and any development regulation within the Standards were included in the Unified Development Code.

Many of the standard details for water and sewer infrastructure are out of date, and do not meet current infrastructure needs.

PROPOSED CHANGES

Changes to the Standards include:

Removing the obsolete Zoning and Subdivision Sections.

Removing text that already exists in the Yelm Municipal Code.

Removing regulations that exists in the Unified Development Code.

Updating the Water and Sewer text and details to meet current infrastructure needs.

YELM ENGINEERING SPECIFICATIONS AND STANDARD DETAILS

CHAPTER 1 – GENERAL PUBLIC WORKS CONSIDERATION

Table of Contents

CHAPTER 1.00 - GENERAL PUBLIC WORKS CONSIDERATIONS	2
1.00.010 STANDARD SPECIFICATIONS	2
1.00.015 SHORTENED DESIGNATION.....	3
1.00.020 APPLICABILITY	3
1.00.025 DEFINITIONS	3
1.00.030 CHANGES TO STANDARDS	10
1.00.035 SEVERABILITY	10
1.00.040 CONSTRUCTION CONTROL	10
1.00.045 INSPECTION	10
1.00.050 BONDING	11
1.00.055 UTILITY LOCATIONS	12
1.00.060 UNDERGROUND INSTALLATION REQUIRED	12
1.00.065 EASEMENTS FOR PUBLIC UTILITIES.....	13
1.00.070 OBSTRUCTION OF STREETS.....	14
1.00.075 RESTORATION OF WORK SURFACE	14
1.00.080 BOND REQUIRED	15
1.00.085 EASEMENTS	15
1.00.090 LATECOMERS AGREEMENTS	16
1.00.095 UTILITY EXTENSION	16
1.00.100 ANNEXATION REQUIREMENT.....	16
1.00.105 TRAFFIC CONTROL.....	16
1.00.110 CALL BEFORE YOU DIG.....	17

CHAPTER 1.00 - GENERAL PUBLIC WORKS CONSIDERATIONS

1.00.010 Standard Specifications

Design detail, workmanship, and materials shall be in accordance with the current edition of the "Standard Specifications for Road, Bridge and Municipal Construction", the "APWA Amendments to Division One", and the "Standard Plans for Road, Bridge and Municipal Construction", all written and promulgated by the Washington State Chapter of the American Public Works Association and the Washington State Department of Transportation, except where these standards provide otherwise.

The following specifications shall be applicable when pertinent, when specifically cited in the standards, or when required by a higher funding authority.

- A. Conditions and standards as set forth in the latest edition of the City of Yelm's Water System Plan.
- B. Conditions and standards as set forth in the latest edition of the City of Yelm's General Sewer Plan.
- C. Conditions and standards as set forth in the latest edition of the City of Yelm's Comprehensive Plan.
- D. Rules and regulations as adopted in the Yelm Municipal Code.
- E. Conditions and standards as set forth in the Thurston County Coordinated Water System Plan.
- F. American Association of State Highway and Transportation Officials (AASHTO) A Policy on Geometric Design of Highways and Streets, latest edition. More commonly known as the "AASHTO Green Book".
- G. Criteria set forth in the Local Agency Guidelines as amended and approved by Washington State Department of Transportation.
- H. City and County Design Standards for the Construction of Urban and Rural Arterial and Collector Roads Promulgated by the City Engineers Association of Washington, May 24, 1989.
- I. Conditions and standards as set forth in the WSDOT Design Manual as amended and approved by WSDOT.
- J. U.S. Department of Transportation Manual on Uniform Traffic Control Devices (MUTCD), as amended and approved by Washington State Department of Transportation.
- K. DOT Construction Manual as amended and approved by Washington State Department of Transportation.

- L. Rules and regulations of the State Board of Health regarding public water supplies, as published by the State Department of Health.
- M. Conditions and standards as set forth in the State of Washington Department of Ecology "Criteria for Sewage Works Design", most current edition.
- N. Conditions and standards as set forth by the State of Washington, Department of Labor and Industries.
- O. Design criteria of federal agencies including Department of Housing and Urban Development and the Federal Housing Administration.
- P. Other specifications not listed above as may apply when required by the City of Yelm.

1.00.015 Shortened Designation

These City of Yelm Engineering Specifications and Standard Details shall be cited routinely in the text as the "Standards".

1.00.020 Applicability

These standards shall govern all new construction and upgrading of facilities both in the Right-of-Way and on-site for transportation and transportation related facilities; storm drainage facilities; sewer and water improvements; and park, recreation, and open-space facilities.

1.00.025 Definitions

"Assess" means to establish an amount or rate for the value of required improvements, fees or charges that are due for services provided which may become a lien on the property receiving such improvements or services.

"As-Builts" or "Record Drawing" means a drawing showing the horizontal and vertical location of the improvements as actually constructed; showing invert elevations, slopes of pipes, location of the pipes, tanks, controls, valves, depths of cover, type of material and any other feature different than shown on the design drawing.

"Average Daily Traffic" or ADT means the average number of vehicles passing a specified point during a 24 hour period. Annual average daily traffic (AADT) denotes that daily traffic that is averaged over one calendar year.

"Base Flow" means the flow associated with an Equivalent Residential Unit.

"B.O.D." The abbreviation for biochemical oxygen demand which means the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedure in five days at 20 degrees centigrade, expressed in parts per million by weight. PROVIDED that, in the event an

alternative definition is utilized by or within the terms of a permit issued by a governmental agency under which the treatment system is required to operate, then such definition shall be deemed incorporated herein by reference.

"City Engineer" means the City Engineer or his duly authorized representative.

"City Standards" means the official design and engineering specifications of the City of Yelm adopted by the City Council and applying to the construction of facilities under the City's jurisdiction.

"Collection Lines" means a pressure or gravity sewage conveyance line and appurtenances as defined from time to time by the City Standards.

"Commercial Waste" See Industrial/Commercial waste.

"Cover" means the depth of earth material lying between the top of the sewer and the finished grade immediately above it.

"Developer" means any person, firm, partnership, association, joint venture, or corporation or any other entity responsible for a given project.

"Director of Public Works" The City of Yelm Public Works Director or his duly authorized representative.

"Down Spout" means the leader, whether pipe, chain, or otherwise, above ground which is installed to conduct water from the roof gutter.

"Drain" means any type of conduction of waste or surplus liquids.

"Easement" The right to use a defined area of property for specific purpose/purposes as set forth in the easement document, on a plat or short plat, or as required for purposes as set forth herein.

"Engineer" Any Washington State licensed professional engineer who represents the developer.

"Equivalent Residential Unit" or "ERU" means the unit of measurement determined by that quantity of flow associated with a single residential household, defined by the City of Yelm Municipal Code Chapter 13.04 as follows:

- A. E.R.U. measurement shall be an equivalent flow of 875 Cubic Feet, or less, per month, based on water meter in-flow, or sewer effluent meter when installed by owner with approval of Yelm Sewer Department.
- B. With respect to each residential structure, the number of E.R.U.'s and associated "base flow" will be based on Table 1A.

TABLE 1A

Type of Unit	ERUs/unit	Base Flow
Single Family Residence	1.00	875cf
Duplex Dwelling Unit	1.00	875cf
Triplex Dwelling Unit	0.90	788cf
Fourplex Dwelling Unit	0.80	700cf
Residential Structures > 4 Units	0.75	675cf

C. With respect to uses other than residential, one E.R.U. shall be designated for each eight hundred seventy five (875) cubic feet of water consumed per month or sewage discharged as measured at source.

“Facilities” May include any or all of the following:

- a. Water: Public water facilities constructed within the City or connected to the City water system(s).
- b. Sewer: Public sewage facilities constructed within the City or connected to the City sewerage system and/or discharging into or through the City’s sewage system(s).
- c. Drainage: Public drainage facilities constructed within the City or connected to the City drainage system and/or discharging into or through the City’s drainage system(s).
- d. Streets: Public streets constructed within the public Right-of-Way or public easements within the City.
- e. Curb, gutter and sidewalk: Public curb, gutter and sidewalk constructed within public Right-of-Way within the City.
- f. Lighting: Street lighting facilities constructed within public Right-of-Way within the City.
- g. Transit: Transit facilities such as stops, stop pads, shelter pads, shelters, and bus pull outs often constructed within public Right-of-Way within the City.
- h. Signals: Public traffic signals constructed within public Right-of-Way within the City and other traffic signals for which the City shall assume maintenance responsibility.
- i. Other: Any other public facilities within the City of facilities connected to a City system.

“Garbage” Means solid waste which includes, but is not limited to, matter originating from the preparation, cooking, and dispensing of food; from

handling, sale, and storing of produce; from public places or from private ownership.

"Half-Street" Street constructed along an edge of development utilizing half the regular width of the Right-of-Way and permitted as an interim facility pending construction of the other half of the street by the adjacent owner.

"Health Officer" Means the official responsible for the public health of the citizens of Yelm or his/her designee. See Director.

"House Drain" or "Building Drain" - Means the pipe used for conveying sewage from the building to the clean-out or to a point 2 1/2 feet beyond the outer line of any footing, piling, building support, or porch under which it may run; whether such drain consists of one line extending from the building or of two or more such lines.

"Industrial/Commercial Waste" Means the wastes from an industrial or commercial process, as distinguished from sanitary sewage.

"Inspection" The field verification and documentation by the City of the construction of any facility.

"Licensed Sewer Contractor" Means any contractor licensed by the State of Washington who is duly registered as a "specialty contractor" or a "general contractor," and as such is licensed to construct, install, repair, reconstruct or excavate any sewers and to connect any building sewer to such public sewers, and who possesses a valid City of Yelm Business License.

"Lot of Street Frontage" The distance between the two points where the lot lines intersect the boundary of public street Right-of-Way.

"Maintenance Manager" See Director.

"Municipal Sewer Service Area" or "Sewer Service Area" Means the geographic area identified in the City of Yelm's Comprehensive Sewer Plan in which sewer service is currently available and planned to be served with sewer service in the future.

"Municipal Sewer System" Means the City of Yelm's sewer system and includes collectively: the STEP system, collection lines, treatment plant, discharge piping and outfall piping.

"N.P.D.E.S." An abbreviation for National Pollution Discharge Elimination System which is a Federal wastewater discharge permitting system that establishes discharge limits for facilities discharging wastewater to waters of the United States of America.

"Occupant" Means any person in physical possession of the building or structure to which sewer service is available, whether the owner, tenant, or other person holding a possessory interest.

"Onsite" Means that the majority of the component parts of a wastewater collection or soil absorption system are located on the private property where the wastewater is generated.

"Owner" means any person who holds fee title to the subject property.

"Ph" Means the logarithm of the reciprocal of the weight of hydrogen ions in grams per liter of solution.

"Person" Means any individual, firm, company, association, society, corporation, or group.

"Plans" The plans, profiles, cross sections, elevations, details, and supplementary specifications, sign by a licensed professional engineer and approved by the Director of Public Works, which show the location, character, dimensions, and details of the work to be performed.

"Plan Checking" The process performed by the City to check the completeness and accuracy of any drawings, calculations and other information submitted for public works approval and to review and confirm the facility satisfies and meets the intent of all City and other requirements.

"Pretreatment Ordinance" Means an ordinance adopted by the City of Yelm addressing the type or level of treatment that may be required prior to the discharge of sanitary sewage into the STEP system.

"Primary Treated Waste Water" Means wastewater that has been treated by a STEP tank.

"Private Street" Private vehicular access provided for by an access tract, easement, or other legal means to serve property that is privately owned and maintained.

"Project" General term encompassing all phases of the work to be performed and is synonymous to the term "improvement" or "work".

"Public Right-of-Way" A general term noting public land, property, or interest therein (e.g., an easement) acquired for or devoted to roads, alleys, streets, avenues, arterials, bridges, tunnels, highways, and other publicly owned grounds and places used for the free passage of vehicular and pedestrian traffic and other services, including utilities.

"Public Place" or "Public Area" Means any space dedicated to or acquired for the use of the general public or utilized with the permission of the owner or occupant on a continuing basis by the general public.

"Sanitary Sewage" Means the combination of the water-carried wastes from residences, business buildings, institutions, commercial and industrial establishments, which wastes contain polluted matter subject to treatment at the sewage treatment plant, i.e., sanitary sewer.

"Sanitary Sewer System" Means an integrated system of piping, pumps, valving and related structures constructed for the purpose of collecting and conveying domestic wastewater from sources to points of treatment.

"Senior Citizen" Means a head of household over the age of 65 who is retired and is below the median income as established by the City.

"Septic Tank" Means a tank designed to provide primary treatment of the wastewater, and sized according to the City of Yelm's "Technical Specifications STEP Onsite System". See "STEP Tank".

"Sewer" Means a pipe or conduit for conveyance of wastewater; and may be either gravity or pressure flow.

"Sewer Collection System" see "Sanitary Sewer System".

"Sewer Service Area" see "Municipal Sewer Service Area".

"Sewer System" Means the treatment plant, outfall, collection lines and STEP system as defined herein.

"Shall - May" For purposes of this Code, "Shall" shall be deemed to be mandatory and "May" permissive, unless the circumstances of the utilization thereof mandate otherwise.

"Side Sewers" Means the sewer pipe from the building drain to the STEP or Septic tank serving the particular building, beginning at a single discharge point 2 1/2 feet outside the foundation wall, or at the clean-out if closer than 2 1/2 feet outside the foundation wall but still outside the foundation wall, and ending at the inlet to the STEP or Septic tank. Side sewer maint. shall be the responsibility of the property owner.

"Site Plot" or "Site Map" Means a map of the side sewer location retained by the City in conjunction with any permit; the site plot or site map shall serve as a record of all matters pertaining to said permit.

"Slug" Shall mean any discharge of water, sewage or commercial/industrial wastewater which, for any period longer than 15 minutes, has a flow rate or concentration of any given constituent that exceeds more than five (5) times the average twenty-four (24) hour flow rate or concentration of normal operation.

"Soil Absorption System" Means a system designed to percolate primary treated wastewater into soil through the use of a drainfield, mound system or other land disposal system approved by the Thurston County Health Department.

"Standard Participation Contract" Shall mean the form of contract required by this Code to be entered into before properties which have not yet been

connected to or assessed for sewers or do not otherwise qualify for sewer service may nevertheless use the public sewers of the City of Yelm.

"Standard Specifications" Shall mean the latest version of the Standard Specifications for Road, Bridge, and Municipal Construction, prepared by the Washington State Department of Transportation and the American Public Works Association, Washington State Chapter, including the Division 1 APWA supplement.

"STEP" Shall mean the Septic Tank Effluent Pump System defined in the latest version of the Department of Ecology Criteria for Sewage Works Design.

"STEP System" Means all facilities from the building drain to the sewer collection lines including: the STEP tank, pump, screens, controls, alarms, electrical breakers, the effluent line, including the pipe, valves and valve box, and all miscellaneous appurtenances from the STEP tank to the sewer collection line.

"STEP Tank" Means a Septic Tank Effluent Pump Tank and appurtenances as defined by the City Standards.

"Public Street" Publicly owned and maintained street.

"City of Yelm Department of Public Works" - or "Public Works" Means the sewer function of the City of Yelm and the rules, regulations, boundaries, etc., relating to such sewer function. See Director.

"Road" Used interchangeably with street.

"Street" Used interchangeably with road.

"Suspended Solids" Means solids that either float on the surface of or are in suspension in water, sewage, or other liquids, and which are removable by the application of a treatment process.

"Third submittal" The third and any subsequent submittal of construction drawings, specifications, drainage calculations, and/or other information that requires additional plan checking pertaining to the construction of City facilities.

"Treatment Plant" Means the structures, equipment, and facilities required to receive, treat, reclaim, wastewater, including the outfall piping and structures.

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

"Utility" A company providing public service including, but not limited to, gas, oil, electric power, street lighting, telephone, telegraph, water, sewer, or cable television, whether or not such company is privately owned or owned by a governmental entity.

"YDS" Yelm Engineering Specifications and Standard Details.

"YMC" Yelm Municipal Code.

1.00.030 Changes to Standards

From time to time, changes may be needed to add, delete, or modify the provisions of these Standards. These Standards may be changed and, upon approval of the Director of Public Works, shall become effective and shall be incorporated into the existing provisions.

1.00.035 Severability

If any part of these Standards as established by ordinance shall be found invalid, all other parts shall remain in effect.

1.00.040 Construction Control

Work performed for the construction or improvement of City roads and utilities whether by or for a private developer, by City forces, or by a City contractor, shall be done to the satisfaction of the City and in accordance with approved plans. It is emphasized that no work shall be started until such plans are approved. Any revision to such plans shall be approved by the City before being implemented. Failure to receive the City's approval can result in removal or modification of construction at the contractors or developers expense to bring it into conformance with approved plans.

1.00.045 Inspection

All work performed within the public Right-of-Way or easements, or as described in these standards, whether by or for a private developer, by City forces, or by a City contractor, shall be done to the satisfaction of the City and in accordance with the WSDOT/APWA Standard Specifications, any approved plans and these standards. Unless otherwise approved, any revision to construction plans must be approved by the City before being implemented.

It is the responsibility of the developer, contractor, or their agents to notify the City in advance of the commencement of any authorized work. A preconstruction meeting and/or field review shall be required before the commencement of work. Inspection fees shall be paid on or before the preconstruction meeting. Any necessary easements or dedications are required before plan approval.

It is the responsibility of the developer, contractor or their agents to have an approved set of plans and any necessary permits on the job site whenever work is being accomplished.

The City shall have authority to enforce these standards as well as other referenced or pertinent specifications. The City will appoint project engineers, assistants and inspectors as necessary to inspect the work and they will exercise such authority as the City may delegate.

All specific inspections, test measurements or actions required of all work and materials are set forth in their respective chapters herein. Tests shall be performed at the developer's or contractor's expense.

Failure to comply with the provisions of these standards may result in stop work orders, removal of work accomplished, or other penalties as established by ordinance.

A project is considered final when a letter of acceptance is issued by the City to the party responsible for the project.

No water meters shall be released for any lot or building served by a project until final acceptance has been granted.

1.00.050 Bonding

Bonds or other allowable securities may be required by the City to guarantee the performance of or maintenance of required work. The type and amount of security shall be per resolution, or, if not specified, be at the discretion of the City. Types of securities include but are not limited to a bond with a surety qualified to do a bonding business in this state, a cash deposit, an assigned savings account, or a set aside letter.

The following are the most frequent bonds required:

- A. Performance Bond. No building permit shall be issued until all public improvements are completed or, with the approval of the Director of Public Works, a performance bond with a surety qualified to do business in this state, a cash deposit, assigned savings account or other security acceptable to the City, in an amount equal to one hundred fifty percent of the cost of the public works improvements is posted with the City. No certificate of occupancy shall be issued until all public works improvements are completed and approved unless otherwise allowed by the Director of Public Works.
- B. Maintenance bond. Prior to the commencement of work, the permittee or the contractor for the permittee shall post with the City a maintenance bond for guarantee of such public works improvements with a surety qualified to do business in this state, a cash deposit, an assigned savings account or other security acceptable to the City in an amount equal to

twenty percent of the estimated cost of the public works improvements for a period of one year after the completed job is accepted by the City. Release of bond or other security will occur one year from City acceptance if all maintenance has been accepted by the City.

1.00.055 Utility Locations

- A. Utilities within a Right-of-Way or easement on new roads or in roadways where existing utilities are not in conflict, shall be located as shown in typical sections on Drawings 2-1 through 2-7. Where existing utilities are in place, new utilities shall conform to these standards as nearly as practical and yet be compatible with the existing installations. Deviations of location shall be approved by the Director of Public Works. Existing utilities shall be shown using the best information available. This verification may require exploration/excavation (potholing) if utilities are in conflict with proposed design.

The contractor/developer shall be responsible for utility locates in conjunction with their project until final Public Works approval is given.

- B. When practicable all new utilities other than those located on private property shall be installed underground by the utility owning said facility and new and existing facilities shall comply with provisions as set forth in franchise agreements between the City and utility, the Underground Communication Facilities and Easements for Public Utilities sections. Utilities converted from overhead to underground on existing roadways may be located within the Right-of-Way.

The term electrical or communication facilities includes facilities carrying any electrical energy, including but not limited to, electric power, telephone, telegraph and cable television; provided, however, that the terms shall not include the following facilities:

1. Electric utility substations, surface mounted transformers and switching facilities;
2. Electric transmission systems of a voltage of 55kv or more and equivalent communication facilities;
3. Street lighting standards;
4. Telephone pedestals and other equivalent communications facilities;
5. Police and fire sirens or any similar municipal equipment, including traffic control equipment.

1.00.060 Underground installation required

- A. Transmission Lines. All electrical and communication facilities other than electrical or communication services located on private property shall be

installed underground by the utility owning said facility in the following cases:

1. When it becomes necessary to remove existing overhead facilities for a distance of five hundred feet because of a roadway widening project or other similar reason;
2. When existing overhead facilities for a distance of over five hundred feet are to be replaced; provided, however, this provision shall not apply to replacements due solely to casualty damage nor to replacement of wire only;
3. When any electrical or communication facilities are extended beyond those facilities existing on the effective date of this chapter; provided, however, that this subsection shall not apply to the extension by a cable television utility of facilities by the use of existing overhead poles of another utility.
4. When another utility having facilities along the same street or easement places its facilities underground for a distance of over five hundred feet.

All undergrounding of facilities initiated by a utility company must have approval of the City Council or its representative prior to undertaking such project.

B. Services. All electrical and communications services located on private property shall be installed underground by the owner of the property in the following cases:

1. All new electrical and communication services from an overhead or underground facility to service connections of structures shall be installed underground;
2. All rebuilt or relocated electrical or communication service lines from an overhead or underground facility to service connections of structures shall be installed underground unless such rebuilding or relocation involves a change in the overhead service line only without a change in the corresponding service entrance facilities;
3. All existing electrical and communication services shall be converted to underground by the owner or owners of the property upon which said services are located within 90 days after notification by the City in accordance with Section 35.96.050 RCW that underground facilities are available.

1.00.065 Easements for Public Utilities

Easements for public utilities shall be provided on each side of all rear lot lines and side lot lines where necessary. Such easements shall not be less than five feet wide on the half-width that is reserved from the rear of each of the adjacent lots. Insofar as possible, the easements shall be continuous and aligned from block to block within the subdivision and with adjoining subdivisions. Easements for existing or future utility lines which do not lie along rear or side lot lines shall be at least ten feet wide.

Easements for unusual facilities such as high voltage electrical lines, shall be of such widths as is adequate for the purpose, including any necessary maintenance roads.

A Right-of-Way access permit is required of any utility, except City owned facilities and utilities who hold a franchise agreement with the City, for any work done within the Right-of-Way.

1.00.070 Obstruction of Streets

Permit Required. Whenever any person, firm or corporation, intends to obstruct, excavate or install any facility in the City Right-of-Way, including the extension of City utilities, they shall first obtain a Right-of-Way access permit. Typical facilities covered by this chapter are signposts, utility poles, culverts, underground utilities, curbs, sidewalks, bus shelters, fences, street lights or any manner of obstruction and/or construction which occupies the Right-of-Way.

Permit exemptions. A Right-of-Way access permit shall not be required under the following conditions:

- A. When City employees perform work on behalf of the City within the Right-of-Way;
- B. When a public utility, under franchise agreement when the City, performs normal maintenance as defined in the franchise agreement in order to protect the existing utility system;
- C. When normal disasters or other emergencies make it impossible to obtain a permit prior to commencing work. In such event, the Director of Public Works shall be notified as soon as possible.

1.00.075 Restoration of work surface

All work undertaken, including but not limited to excavation, backfilling, surface restoration, protection of utilities, traffic control, safety precautions, noise and dust control and clean up, shall be performed in accordance with standard specifications. All work shall require restoration of the surface to original or better condition in accordance with such specifications. The permittee shall guarantee the work and condition of the street, sidewalk or

Right-of-Way for a period of one year after the completed job is accepted by the City.

Rules of all Washington state departments having jurisdiction shall be strictly adhered to with respect to safety construction methods and other state requirements.

1.00.080 Bond Required

Prior to commencement of the work under a permit granted pursuant to this chapter, the permittee or the contractor for the permittee shall post with the City a bond with surety qualified to do a bonding business in this state, a cash deposit or an assigned savings account or other security acceptable to the City in an amount equal to one hundred fifty percent of the cost of the work as estimated by the Director of Public Works. Such bond, deposit or other security shall be conditioned upon the permittee or its contractor performing the work pursuant to the terms of this chapter, including the restoration and/or replacement of the street, sidewalk, or other Right-of-Way within the time specified by the Director of Public Works, and a maintenance bond guaranteeing such work and replacement at ten percent of the estimated cost of surface restoration for a period of one year after the completed job is accepted by the City. For those public utilities which hold a franchise agreement, a maintenance bond is not required.

1.00.085 Easements

- A. Where public utilities and/or their conveyance systems cross private lands, an easement must be granted to the City. The City will generally process, record and file all easements. If the property is platted the easement may be conveyed when the short plat or final plat is filed. All easements not shown on a plat must be prepared by a licensed land surveyor or engineering firm capable of performing such work.
- B. Easement widths shall be 15 feet for a single utility and 20 feet for dual utilities. Construction easements shall be 30 feet minimum in total width, including the permanent easement. When trench depths dictate or where pipe diameter or vault widths exceed four feet, a wider easement may be required by the City.
- C. Easements are required to be submitted in draft, unsigned for review and approval prior to plan approval. Signed copies are required prior to plan approval. Any change in design which places an amenity, i.e., water, sewer, sidewalk, etc., outside of the easement may necessitate stopping of construction until plans and easements can be resubmitted and approved. Plan review fee shall be based on the rate as established for third submittal fee. Easements will be filed by the City upon satisfactory completion of the work.

1.00.090 Latecomers Agreements

Any person who constructs a water or sewer main extension at the direction of the City, in excess of that which is required to meet minimum standards or which meets minimum standards and will benefit properties abutting the new main, may, with the approval of the Director of Public Works, enter into a contract with the City which will allow the developer to be reimbursed for that portion of the construction cost that benefits the adjoining properties and/or is in excess of the minimum standard. This contract is commonly termed a "Latecomers Agreement." Application procedures are located in Title 13, YMC.

1.00.095 Utility Extension

- A. Anyone who wishes to extend any City utility should contact the Department of Public Works for an Extension/Connection Fee Estimate and any special extension requirements.
- B. Utility mains shall be extended to and through the extremes of the property being developed for loop closures and/or future development as determined by the City.

1.00.100 Annexation Requirement

Owners of properties lying outside of, but contiguous to City boundaries must apply for annexation of their property to the City prior to being served by a City owned utility. Owners of properties lying outside of but not contiguous to the City must legally commit their property to eventual annexation prior to being served by the City's utility system. Section 13.08.020(H) YMC.

These annexation requirements will be applied to all extensions of the City's utility to areas outside the City limits. Anyone who desires to extend the City's utility system should contact the Department of Public Works for specific annexation requirements.

1.00.105 Traffic Control

- A. The developer/contractor shall be responsible for interim traffic control during construction on or along traveled roadways. Traffic control shall follow the guidelines of the WSDOT/APWA Standard Specifications. All barricades, signs and flagging shall conform to the requirements of the MUTCD.
- B. City utilities constructed within Thurston County Right-of-Way shall follow all traffic control requirements as set forth by Thurston County Department of Public Works and MUTCD.

- C. Signs must be legible and visible and should be removed at the end of each work day if not applicable after construction hours.
- D. When road closures and detours cannot be avoided the contractor/developer shall notify the Department of Public Works / Development Review Engineer. The City may require a detour plan to be prepared, submitted and approved prior to closing any portion of a City roadway.
- E. A Right-of-Way Access Permit may be required before work in the road can commence. See requirements in Title 18 YMC, Unified Development Code.

1.00.110 Call Before You Dig

All developers/contractors are responsible for timely notification of all utilities in advance of any construction in Right-of-Way or utility easements. The utilities one-call Underground Location Center phone number is 1-800-424-5555.

YELM ENGINEERING SPECIFICATIONS AND STANDARD DETAILS

CHAPTER 2 TRANSPORTATION

Table of Contents

CHAPTER 2.00	TRANSPORTATION	3
2.00.010	GENERAL CONSIDERATIONS.....	3
CHAPTER 2.10	STREETS.....	3
2.10.010	DESIGN	3
2.10.020	GENERAL NOTES (STREET CONSTRUCTION)	4
2.10.030	FUNCTIONAL CLASSIFICATION	5
2.10.040	NAMING.....	8
2.10.050	SIGNING	9
2.10.060	RIGHT-OF-WAY	9
2.10.070	MEDIANS.....	10
2.10.080	INTERSECTIONS	10
2.10.090	SIGHT OBSTRUCTION	11
2.10.100	DRIVEWAYS.....	11
2.10.110	SURFACING REQUIREMENTS	12
2.10.130	TEMPORARY STREET PATCHING.....	14
2.10.140	TRENCH - PAVEMENT RESTORATION	14
2.10.150	STAKING.....	15
2.10.160	TESTING	16
CHAPTER 2.20	SIDEWALKS, CURBS, AND GUTTERS	17
2.20.010	SIDEWALKS	17
2.20.020	CURB; CURB AND GUTTER; ROLLED CONCRETE CURB AND GUTTER.....	17
2.20.030	CURB RAMPS	17
2.20.040	STAKING.....	17
CHAPTER 2.30	BIKEWAYS	19
2.30.010	GENERAL	19
2.30.020	DESIGN STANDARDS.	19
2.30.030	STAKING AND TESTING	19
CHAPTER 2.40	ILLUMINATION	20
2.40.010	DESIGN STANDARDS	20
2.40.020	DESIGN CRITERIA.	20
GENERAL NOTES (STREET LIGHT CONSTRUCTION)	22	
2.40.030	STAKING.....	24
2.40.040	TESTING	25
CHAPTER 2.50	SIGNALS	26
2.50.010	GENERAL	26
2.50.020	DESIGN STANDARDS.	26
2.50.030	INDUCTION LOOPS.....	26
2.50.040	STAKING.....	26
2.50.050	TESTING.	26
2.50.060	CHECK-OUT PROCEDURE.....	27
CHAPTER 2.60	ROADSIDE FEATURES.....	28
2.60.010	GENERAL	28
2.60.020	DESIGN STANDARDS.	28
2.60.030	STAKING.....	28

2.60.040	TESTING.	28
2.60.050	SURVEY MONUMENTS.	28
2.60.060	GUARD RAILS	29
2.60.070	RETAINING WALLS.....	29
2.60.080	PARKING LOTS.....	30
TRANSPORTATION.....		33
LIST OF DRAWINGS.....		33
TITLE	DRAWING.....	33

CHAPTER 2.00 TRANSPORTATION

2.00.010 General Considerations

The overall goal of this chapter is to encourage the uniform development of an integrated, fully accessible public transportation system that will facilitate present and future travel demand with minimal environmental impact to the community as a whole.

This chapter provides minimum development standards supplementing the applicable standards as set forth in Section 1.00.010.

CHAPTER 2.10 STREETS

2.10.010 Design

Street design must provide for the maximum loading conditions anticipated. The width and grade of the pavement must conform to specific standards set forth herein for safety and uniformity.

- A. Design Standards. The design of streets and roads shall depend upon their type and usage. The design elements of City streets shall conform to City standards as set forth herein and current design practice as set forth in Section 1.00.010. Standard design structures are shown on drawing numbers 2-1 through 2-8 at the end of this chapter. A design exception may be granted by the City based on the following criteria:
1. Reduction of carrying capacity as demonstrated by a Traffic Impact Analysis;
 2. When alternative methods of stormwater conveyance and treatment (other than swales) are proposed and in compliance with the Stormwater Manual;
 3. Future expansions / extensions of the proposed roadway are improbable due to physical constraints; and
 4. Meets the intent of Transportation Chapter 2.00
 5. Alternate structures may be used based on the criteria as outlined in Section 2.10.110.
- B. Alignment. Alignment of major arterials, minor arterials and collectors shall conform as nearly as possible with that shown in the Comprehensive Plan.
- C. Grade. Street grade should conform closely to the natural contour of the land. In some cases a different grade may be required by the City. The minimum allowable grade shall be 0.5 percent. The

maximum allowable grade shall be 15 percent, depending upon the street classification.

- D. Width. The pavement and Right-of-Way width depend upon the street classification. The table of Minimum Street Design Standards show the minimum widths allowed.
- E. Street widths shall be measured from face of curb to face of curb on streets with cement concrete curb and gutter, and from flow line to flow line on streets with cement concrete rolled curb and gutter.

The following General Notes shall be included on any plans dealing with street design in addition to all applicable requirements in Section 1.00.010.

2.10.020 GENERAL NOTES (STREET CONSTRUCTION)

- A. All workmanship and materials shall be in accordance with City of Yelm standards, and the most current copy of the State of Washington Standard Specifications for Road, Bridge, and Municipal Construction.
- B. The contractor shall be responsible for all traffic control in accordance with MUTCD. Prior to disruption of any traffic, traffic control plans shall be prepared and submitted to the City for approval. No work shall commence until all approved traffic control is in place.
- C. All curb and gutter, street grades, sidewalk grades, and any other vertical and/or horizontal alignment shall be staked by an engineering or surveying firm capable of performing such work.
- D. Where new asphalt joins existing, the existing asphalt shall be cut to a neat vertical edge and tacked with Asphalt Emulsion type CSS-1 in accordance with the standard specifications. The new asphalt shall be feathered back over existing to provide for a seal at the saw cut location and the joint sealed with grade AR-4000W paving asphalt.
- E. Compaction of subgrade, rock, and asphalt shall be in accordance with the standard specifications.
- F. Subgrade inspection shall be performed by an approved testing firm and forms shall be inspected for line and grade by an engineer before pouring concrete.
- G. Certification as to conformance shall be provided to the City prior to acceptance of work.
- H. The Contractor/Developer shall furnish and install all permanent signing.

2.10.030 Functional Classification

City streets are divided into boulevards, major arterials, urban arterials, commercial and neighborhood collectors, local access commercial, and residential streets and alleys in accordance with regional transportation needs, the functional use of each serves and Transportation Policy No 11. Function is the controlling element for classification and shall govern Right-of-Way, road width, and road geometrics. The following list is provided to assist the developer in determining the classification of a particular street. Streets not listed are classified as residential local access streets. New streets will be classified by the City. The intersection commonly known as Five Corners is described as Yelm Ave. (SR 507)/Bald Hill Rd. SE/Morris Rd. SE/NE Creek St./SR 507.

Boulevard Swale or w/Central Island

Berry Valley Road SW (beyond commercial section through SW Yelm annexation area)

Major Arterials

First Street (from Y-1/Y-2 intersection to Yelm Avenue)

Killion Road extension (so. to Berry Valley Road to Boulevard section)

Y-1 (SR-510)

Y-2 (SR-507)

Urban Arterial

Yelm Avenue East and West

Bald Hills Road (Y-9 improvements)

Canal Road (including Y-3 improvements)

First Street (north of Yelm Avenue)

Grove Road (including Y-3 improvements)

Stevens-Coates Connector (Y-4 improvements)

Commercial Collectors

Creek Street SE

Edwards Street NW (from Yelm Avenue to Coates Street SE)

Killion Road NW (adjacent to commercially zoned areas)

Morris Road SE

N. P. Road NW

Rhoton Road NW (from NE First Street to NW Rhoton Court)

Stevens Avenue NW

West Road SE

103rd Street NE (from Yelm Avenue to NE Creek Street)

Neighborhood Collectors

Burnett Road SE

Clark Road SE
Coates Street SE
Crystal Springs Road (including Y-6 improvements-upon opening of Y-3 west)
Cullens Road
Killion Road NW
Middle Road SE
Mill Road SE
Mosman Avenue SE
Mosman Avenue SW
Mountain View Road NW
Ordway Drive
Railway Street SE
Rhoton Road NW (from NW Rhoton Court to Canal Rd. SE)
Southwest Access (Y-7 improvements)
Vancil Road SE
Wilkensen Road
93rd Avenue SE
105th Avenue

Local Access Commercial

Edwards Street SW (from Yelm Avenue to Mosman Avenue)
Jefferson Avenue NE
Jefferson Avenue NW
Jones Street SE
Longmire Street SW (to Jones Street)
Mckenzie Avenue SE (from SR 507 to Second Street)
Railroad Street NW
Rice Street SW (from Jones Street SE to NW Jefferson Avenue)
Solberg (Jefferson to Coates)
Van Trump Street
Second Street SE
Solberg Street SW (from Jones Street SE to NW Jefferson Avenue)
Third Street SE (from Jones Street SE to NE Jefferson Avenue)

Local Access Residential

Flume Road SE
Fourth Street SE
Longmire Street SW (to Jones Street)
100th Way SE
103rd Street NE (from NE Creek Street to Canal Road SE)
All remaining roadways within the Yelm UGA

MINIMUM STREET DESIGN STANDARDS

ROADWAY FEATURES	BOULEVARD	MAJOR ARTERIAL	URBAN ARTERIAL	COMMERCIAL COLLECTOR	NEIGHBORHOOD COLLECTOR	LOCAL ACCESS COMMERCIAL	PRIVATE ROADWAY LOCAL ACCESS RESIDENTIAL
ADT	500 MIN	15000 MIN	6000-15000	6000-15000	500-6000	2000 MAX	500 MAX
DESIGN LIMITATIONS	No superelevation. Access and intersections should be limited. No on-street parking.			No superelevation No on street parking	No superelevation No on street parking	No superelevation	No superelevation
MINIMAL STRUCTURAL DESIGN	Special Design	Special Design	Special Design	4' AC 2' C.S.T.C. 8' Ballast	3' AC 2' C.S.T.C. 8' Ballast	4' AC 2' C.S.T.C. 8' Ballast	2' AC 2' C.S.T.C. 8' Ballast
MINIMUM RIGHT-OF-WAY	84' – 106'	94'	72'	56'	56'	58'	58'
PARKING LANE	NOT ALLOWED					Both Sides	Both Sides
MINIMUM MAXIMUM PROFILE GRADE	0.5% - 8.0%	0.5% - 8.0%	0.5% - 8.0%	0.5% - 10.0%	0.5% -12.0%	0.5% - 15.0%	0.5% - 15.0%
CURB	Curb	Curb & Gutter	Curb & Gutter	Curb & Gutter	Curb & Gutter	Curb & Gutter	Rolled Curb & Gutter
PLANTER STRIP	Two sides – 7'	Two sides – 8'	Two sides – 8'	Two sides – 7'	Two sides – 7'	Two sides – 6'	Two sides – 6'
SIDEWALKS	Two sides - 5'	Two sides - 6'	Two sides - 6'	Two sides - 5'	Two sides - 5'	Two sides - 5'	One side - 5'
CUL-DE-SAC RADIUS (PAVEMENT WIDTH)	Not applicable					50'	38' (or 47' with landscaped island radius of 17')
INTERSECTION CURB RADIUS	35'	35'	35'	35'	35'	35'	25'
DESIGN SPEED (MPH)	40	40	40	30	30	30	25
MINIMUM CENTERLINE RADIUS	Per AASHTO			150'	150'	150'	100'

2.10.040 Naming

Streets and roads shall be named according to specific criteria. All street addresses within the City shall be suffixed by the name of the quadrant within which the same is located. The City is divided into four districts as determined by the base lines described as follows:

- A. North-South Base Line. Commencing on the centerline of State Highway 507 where said centerline first intercepts the southerly limits of the urban growth boundary; thence continuing northeasterly along said centerline of State Highway 507 within the corporate limits of the City where the same becomes the centerline of First Street NE; thence continuing northeasterly along said centerline of First Street NE through the City to the point where the same joins the centerline of Rhoton Road NW; thence continuing northerly along the centerline of Rhoton Road NW to the most northerly corporate limit of the City;
- B. East-West Base Line. Commencing on the centerline of State Highway 510 where the same intercepts the westerly corporate limits of the City; thence proceeding southeasterly along said centerline of State Highway 510 into the City where the same becomes the centerline of Yelm Avenue; thence continuing southeasterly along the centerline of State Highway 507 (Yelm Avenue extended) lies adjacent to the corporate limits of the City. Section 12.20.050 YMC

The districts are described as follows:

- 1. Northeast (NE) shall indicate that portion of the City lying northerly of the east-west base line and easterly of the north-south base line;
 - 2. Northwest (NW) shall indicate that portion of the City lying northerly of the east-west base line and westerly of the north-south base line;
 - 3. Southeast (SE) shall indicate that portion of the City lying southerly of the east-west base line and easterly of the north-south base line;
 - 4. Southwest (SW) shall indicate that portion of the City lying southerly of the east-west base line and westerly of the north-south base line.
- C. The following street designations shall apply to public ways, street and road signs and addresses:
 - 1. "Avenues" shall indicate public ways (excluding alleys) running generally easterly and westerly;
 - 2. "Courts" shall indicate public ways in the form of a cul-de-sac,

which cannot be extended. Court shall be named or numbered and the address numbers thereon shall follow the address number of the street from which the court extends;

3. "Drives" shall indicate irregular or diagonal public ways (excluding alleys) not conforming to the grid pattern and not exceeding four City blocks in length;
4. "Lanes" shall indicate private ways in a private street subdivision;
5. "Loops" shall indicate a short loop-type public way which shall carry the name of the public way from which it originates;
6. "Places" shall indicate public ways (excluding alleys) running generally northerly and southerly, parallel to, but between streets and not connecting to avenues;
7. "Roads" shall indicate irregular or diagonal public ways not conforming to the grid pattern and exceeding four City blocks in length, which are arterial public ways;
8. "Streets" shall indicate public ways (excluding alleys) running generally northerly and southerly; and
9. "Ways" shall indicate public ways (excluding alleys) running generally easterly and westerly parallel to but between avenues and not connecting through streets. Section 12.20.070 YMC

An address number will be assigned to all new buildings at the time the building permit is issued. It is then the owner's responsibility to see that the house numbers are placed clearly and visibly at the main entrance to the property or at the principal place of ingress.

The developer must check with the Building Official regarding the naming of streets. This should be done at the time the preliminary land division is submitted and again upon approval of the final land division. The Building Official will insure that the name assigned to a new street is consistent with policies of the City.

2.10.050 Signing

The developer shall furnish and install all signage. All permanent signing shall comply with the provisions as established by the MUTCD, WSDOT Standard Specifications for Road, Bridge, and Municipal Construction and the WSDOT Sign Fabrication Manual. Street designation signs will display the street name as determined in Section 2.10.040 YDS.

2.10.060 Right-of-Way

Right-of-Way is determined by the functional classification of a street. See drawing numbers 2-1 through 2-8 for specific widths. See "Minimum Street Design Standards Table" Section 2.10.030 YDS for radius requirements at cul-de-sac "bulb". Right-of-Way at "bulb" shall be increased accordingly.

Right-of-Way requirements may be increased if additional lanes, pockets, transit lanes, bus loading zones, operational speed, bike lanes, utilities, schools or other factors are required as determined by the City.

Right-of-Way shall be conveyed to the City on a recorded land division map or by a Right-of-Way dedication deed.

2.10.070 Medians

A median shall be in addition to, not part of, the specified roadway width except on a road classed as a boulevard. Medians shall be designed so as not to limit turning radius or sight distance at intersections. Pedestrian access, landscaping, and irrigation shall be installed when directed by the City.

2.10.080 Intersections

Traffic control will be as specified in the Manual on Uniform Traffic Control Devices (MUTCD), or as modified by the City as a result of appropriate traffic engineering studies.

Street intersections shall be laid out so as to intersect as nearly as possible at right angles (within 15 degrees).

For safe design, the following types of intersection features should be avoided:

Intersections with more than four intersecting streets;

"Y" type intersections where streets meet at acute angles;

Intersections adjacent to bridges and other sight obstructions.

Spacing between adjacent intersecting streets, whether crossing or "T" should be as follows:

<u>When highest classification involved is</u>	<u>Minimum Centerline offset should be</u>
Major Arterial/Boulevard	350
Urban Arterial	300
Commercial Collector	200
Neighborhood Collector	200

Local Access	150
Private Roadway	150

When different class streets intersect, the higher standard shall apply on curb radii. Deviations to this may be allowed at the direction of the City.

On sloping approaches at an intersection, landings shall be provided with grade not to exceed one foot difference in elevation for a distance of 30 feet approaching any arterial or 20 feet approaching a collector or local access street, measured from nearest Right-of-Way line (extended) of intersecting street.

2.10.090 Sight Obstruction

Sight distance at intersections and road approaches shall be in conformance with the most current WSDOT Design Manual and the AASHTO Green Book.

Within the sight triangle, cut slopes, hedges, fences, trees, signs, utility poles, or anything large enough to constitute a sight obstruction should be removed or lowered. Parking should also be eliminated and signs offset so sight distance is not obstructed.

Sight obstructions that may be excluded from these requirements include: existing utility poles, regulatory signs, trees trimmed from the base to a height of 10 feet above the street, and preexisting buildings.

A sight distance maintenance easement must be granted to the City for all improvements including commercial and residential development, and land divisions. The sight distance maintenance easement is based upon the sight distance triangle calculations in the most current WSDOT Design Manual and the latest edition of the AASHTO Green Book.

2.10.100 Driveways

- A. All abandoned driveway areas shall be removed and the curbing and sidewalk or shoulder and ditch section shall be properly restored.
- B. All driveways constructed within street right of ways shall be constructed of Portland Cement Concrete and shall be subject to the same testing and inspection requirements as curb, gutter, and sidewalk construction.
- C. Grade breaks, including the tie to the roadway, shall be a maximum 8 percent on a crest and 12 percent in a sag.

- D. Road approach type accesses shall only be allowed when justified through an accepted traffic analysis and report, and approved by the City.
- E. Spacing criteria seek to achieve several objectives. One is to clearly identify which property the driveway is serving. Another is to leave a usable island between driveways for utility poles and traffic control devices.
- F. An additional factor concerns the spacing of high-volume driveways where deceleration or acceleration lanes are required. Examples would include driveways into community and regional shopping centers as well as those into major industrial, commercial, and apartment complexes. At least several hundred feet between major driveways is desirable. Factors to be considered include the speeds and volumes of entering and leaving traffic, the speeds of through traffic, and the resultant merging movements upstream and downstream.
- G. It is important that driveways be designed for the particular traffic characteristics anticipated and that upstream and downstream factors affecting a driveway location be considered in each instance. Drawing number 2-25 contains minimum spacing recommendations. All driveway spacing must be approved by the City.
- H. Driveways giving direct access onto arterials may be denied if alternate access is available. Deviations of these standards may be permitted by the City.

2.10.110 Surfacing Requirements

The following are the surfacing requirements for each application listed.

A. Boulevard and Arterial Streets

The engineer will provide a pavement design. The design of the pavement shall include a study of the native soils, their behavior under load, and the design of a structural section to carry the anticipated loads under all climate conditions. In no event shall the structural section be less than the minimums shown below:

Surfacing:	0.33' Class B Asphalt Concrete
Top Course:	0.17' Crushed Surfacing Top Course
Base:	1.00' Gravel Base

One soil sample per each 500 LF of centerline with 3 minimum per project representative of the roadway subgrade shall be taken to determine a statistical representation of the existing soil conditions at design grade.

The pavement design, signed and stamped by an engineer licensed by the State of Washington, shall be based on actual soils tests and submitted with the plans.

The following structural section may be used in lieu of a pavement design. The use of this section is subject to City approval of prepared subgrade.

B. Commercial Collector Streets

Surfacing: 0.33' Class B Asphalt Concrete
Top Course: 0.17' Crushed Surfacing Top Course
Base: 0.67' Gravel Base
Alternate
Surfacing: 0.33' Class B Asphalt Concrete
Base: 0.67' Asphalt Treated Base

C. Neighborhood Collector Streets

Surfacing: 0.25' Class B Asphalt Concrete
Top Course: 0.17' Crushed Surfacing Top Course
Base: 0.67' Gravel Base
Alternate
Surfacing: 0.25' Class B Asphalt Concrete
Base: 0.50' Asphalt Treated Base

D. Local Access Street

Surfacing: 0.17' Class B Asphalt Concrete
Top Course: 0.17' Crushed Surfacing Top Course
Base: 0.67' Gravel Base
Alternate
Surfacing: 0.17' Class B Asphalt Concrete
Base: 0.50' Asphalt Treated Base

E. Sidewalks

Surfacing: 4" Concrete Class 3000
Base: 1" Crushed Surfacing Top Course or well graded sand
Asphalt sidewalks will not be permitted unless specifically approved by the City.
Base may be omitted subject to City approval of prepared subgrade.

F. Driveway

Surfacing: 6" Concrete Class 3000
Base: 1" Crushed Surfacing Top Course or well graded sand
Base may be omitted subject to City approval of prepared subgrade.

G. Class I Bike Path

Surfacing:	4" Concrete Class 3000
Base:	1" Crushed Surfacing Top Course
Alternate:	
Surfacing:	2 1/2" Class B Asphalt Concrete
Base:	4" Gravel Base

2.10.130 Temporary Street Patching

Temporary restoration of trenches shall be accomplished by using 2" Class B Asphalt Concrete Pavement when available or 2" medium-curing (MC-250) Liquid Asphalt (cold mix), 2" Asphalt Treated Base (ATB), or steel plates.

ATB used for temporary restoration may be dumped directly into the trench, bladed and rolled. After rolling, the trench must be filled flush with ATB to provide a smooth riding surface.

All temporary patches shall be maintained by the contractor until such time as the permanent pavement patch is in place.

If the contractor is unable to maintain a patch for whatever reason, the City will patch it and the developer will be billed for actual cost of labor and materials plus overhead.

2.10.140 Trench - Pavement Restoration

Trench restoration shall be either by a patch or patch plus overlay as required by the City.

- A. All trench and pavement cuts shall be made by spade bladed jackhammer or sawcuts. The cuts shall be a minimum of 1 foot outside the trench width.
- B. All trenching shall be backfilled with crushed surfacing materials conforming to Section 4-04 of the WSDOT/APWA Standard Specifications. The trench shall be compacted to 95 percent maximum density, as described in Section 2-03 of the WSDOT/APWA Standard Specifications.

Replacement of the asphalt concrete or Portland Cement Concrete shall be of existing depth plus 1 inch or 3 inches, whichever is greater.

- C. Tack shall be applied to the existing pavement and edge of cut and shall be emulsified asphalt grade CSS-1 as specified in Section 9-02.1(6) of the WSDOT/APWA Standard Specifications. Tack coat shall be applied as specified in Section 5-04 of the WSDOT/APWA Standard Specifications.
- D. Asphalt concrete Class B shall be placed on the prepared surface in accordance with the applicable requirements of Section 5-04 of the

WSDOT/APWA Standard Specifications, except that longitudinal joints between successive layers of asphalt concrete shall be displaced laterally a minimum of 12 inches unless otherwise approved by the City. Fine and coarse aggregate shall be in accordance with Section 9-03.8 of the WSDOT/APWA Standard Specifications. Asphalt concrete over 2 inches thick shall be placed in equal lifts not to exceed 2 inches each.

All street surfaces, walks or driveways within the street trenching areas affected by the trenching shall be feathered and shimmed to an extent that provides a smooth-riding connection and expeditious drainage flow for the newly paved surface. Shimming and feathering as required by the City shall be accomplished by raking out the oversized aggregates from the Class B mix as appropriate.

Surface smoothness shall be per Section 5-04.3(13) of the WSDOT/APWA Standard Specifications. The paving shall be corrected by removal and repaving of the trench only.

- E. All joints shall be sealed using AR4000W.
- F. When trenching within the roadway shoulder(s), the shoulder shall be restored to its original or better condition.
- G. The final patch shall be completed as soon as possible and shall be completed within 30 days after first opening the trench. This time frame may be adjusted if delays are due to inclement paving weather, or other adverse conditions that may exist. However, delaying of final patch of overlay work is allowable only subject to the City's approval. The City may deem it necessary to complete the work within the 30 days' time frame and not allow any time extension. If this occurs, the Contractor shall perform the necessary work as directed by the City.

2.10.150 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

The minimum staking of streets shall be as directed by the City or as follows:

- A. Stake centerline every 50 feet in tangent sections and 25 feet in curved sections plus grade breaks, PVCs, PVTs, high points and low points, with cut and/or fill to subgrade.
- B. Stake top of ballast and top of crushed surfacing at centerline and edge of pavement at the above-described intervals.

- C. Stake top back of curb at the above-described intervals with cut or fill to finished grade.

2.10.160 Testing

Testing shall be required at the developers or contractors expense. The testing shall be ordered by the developer or contractor and chosen testing lab shall be approved by the City. Testing shall be done on all materials and construction as specified in the WSDOT/APWA Standard Specifications.

In addition, the City shall be notified before each phase that street construction commences (i.e. staking, grading, subgrade, ballast, base, top course, and surfacing).

CHAPTER 2.20 SIDEWALKS, CURBS, AND GUTTERS

2.20.010 Sidewalks

Sidewalks shall be constructed of Concrete Class 3000 4 inches thick. Sidewalks along streets with rolled curb and gutter shall be 6 inches thick. When the sidewalk, curb, and gutter are contiguous, the width of the sidewalk shall be measured from back of curb to back of sidewalk.

- A. See "Minimum Street Design Standards Table" Section 2.10.030 YDS for sidewalk requirements.
- B. The design and construction of all sidewalks, curbs, gutters, and walkways shall meet the following minimum standards:

The width of sidewalks shall be as shown in the street design drawings. Those sidewalks designated in the comprehensive bike plan of the City as bike paths shall, in addition, meet the minimum width requirements established for said bike paths. The City shall require that the design of all sidewalks provides for a gradual rather than an abrupt transition between sidewalks of different widths or alignments.

- C. Monolithic pour of curb and sidewalk will not be allowed.
- D. For driveway requirements, see Section 2.10.140 YDS.

2.20.020 Curb; Curb and Gutter; Rolled Concrete Curb and Gutter

Cement concrete curb, cement concrete curb and gutter, or rolled concrete curb and gutter (see standard road sections) shall be used for all street edges unless otherwise approved by the City. All curbs, gutters, and rolled concrete curb and gutter shall be constructed of concrete Class 3000 as shown on drawing number 2-13.

Form and subgrade inspection by the City are required before curb and gutter are poured as part of public roadways.

2.20.030 Curb Ramps

All sidewalks must be constructed to provide for curb ramps in accordance with the standards of state law.

Curb Ramps shall be constructed of concrete Class 3000. Form and subgrade inspection by the City are required before curb ramp is poured.

2.20.040 Staking

All surveying and staking shall be performed by an engineering, or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

The minimum staking of curb, gutter, and sidewalk shall be as follows:

- A. Stake top back of curb every 50 feet in tangent sections and 25 feet in curved sections plus grade breaks, PVCs, PVTs, high point and low points, with cut or fill to finished grade.
- B. The developer shall provide additional staking if necessary in order to construct curb, gutter, sidewalk, or other concrete items to minimum standards.

CHAPTER 2.30 BIKEWAYS

2.30.010 General

Bikeway or Urban Trail construction is required in conjunction with any new development, redevelopment, or land division approval, when the need for such a bikeway is indicated. See drawing numbers 2-14 and 2-15 for bike routes and classifications.

2.30.020 Design Standards.

The design of bicycle paths shall depend upon their type and usage. Bikeway surfacing shall be as outlined in section 2.10.160 YDS.

All minimum design standards as set forth in Section 1.00.010 YDS shall apply.

Normally, bikeways are shared with other transportation modes, although they may be provided exclusively for bicycle use. Bikeways are categorized in the WSDOT Design Manual, Section 1020.02.

Class I, II, III or IV Bikeways, as appropriate, shall be provided:

- A. Wherever called for in the Future Bikeways map (drawing number 2-14) located in the back of this Chapter, or
- B. When traffic analysis or traffic planning indicates substantial bicycle usage which would benefit from a designated bicycle facility as determined by the City except where noted herein.

2.30.030 Staking and Testing

Staking and testing shall be done in accordance with street staking and testing as outlined in sections 2.10.190 and 2.10.200 YDS.

CHAPTER 2.40 ILLUMINATION

2.40.010 Design Standards

A street lighting plan submitted by the applicant and approved by the City shall be required for all street light installations. Type of installation shall be as set forth in WSDOT/APWA/IES Standard Specifications, and as directed by the City except where noted herein.

All public street light designs shall be prepared by an engineering firm capable of performing such work. The engineer shall be licensed by the State of Washington. All developments shall submit the lighting plan. Line loss, spacing, and uniformity ratio calculations shall also be submitted. The calculations shall be performed following the methodology outlined in the latest edition of the WSDOT Traffic Manual. After the system is completed and approved, a set of "as built" Mylar's shall be submitted to the City as a permanent record.

Intersections and cul-de-sacs within new residential developments will be illuminated with one 100-watt high pressure sodium lamp mounted on a 30-foot pole. No other illumination is required. Concrete poles may be used inside subdivisions and shall be set plumb and have a consistent mounting height. Intersections with any street designated other than a local access residential will be illuminated according to the requirement of that higher street classification.

Luminaire pole spacing, uniformity ratio, and line loss calculations will be determined by using the following design criteria:

2.40.020 Design Criteria.

AVERAGE MAINTAINED HORIZONTAL ILLUMINATION (FOOT CANDLES)			
AREA CLASS			
Road Class	Residential	Industrial	Commercial
Local	0.4	0.8	1.0
Collector	0.6	1.0	1.2
Arterial	0.8	1.4	1.6
Boulevard	0.8	1.4	1.6
Uniformity ratio: 6:1 average: minimum for local 4:1 average: minimum for collector 3:1 average: minimum for arterial and boulevard			

Dirt Factor (DF)=0.85, Lamp Lumen Depreciation Factor (LF) = 0.73 Maintenance Factor (MF) = DF x LF = 0.62 Lamp Load Factor (LLF) = 1.2 Minimum Weak Point Light = 0.2fc except residential local street Average illumination at intersections 1.5 times the illumination required on the more highly illuminated street except on local access residential streets. Poles shall be located using a "staggered spacing" pattern across the roadway or the "same side of the roadway spacing" pattern.			
Mounting Height:			
Local	30 feet		
Collector	35 feet		
Arterial	40 feet		
Boulevard	40 feet		
Lumens			
400 Watt initial lamp lumens = 50,000			
200 Watt initial lamp lumens = 22,000			
150 Watt initial lamp lumens = 16,000			
100 Watt initial lamp lumens = 9,500			

Line loss calculations shall show that no more than five percent voltage drop occurs in any circuit. Lamps shall be high pressure sodium. Pole foundations shall be installed per WSDOT Standard Plans J-1b.

The pole mast arm shall be designed to place luminaire over the near edge of traveled way. The luminaire mast arm shall be Type I (See WSDOT Standard Plans J-1a) or City approved equal. Poles shall be manufactured by one of the following companies: General Electric, Lexington, HapCo, or Valmont.

All luminaires will be flat lens, medium cut off, IES Type III distribution, General Electric Power Door, or City approved equal.

All street light electrical installations including wiring conduit, and power connections shall be located underground.

The General Notes on the following page need to be included on any plans dealing with street light design in addition to all applicable requirements as set forth in Section 1.00.010.

GENERAL NOTES (STREET LIGHT CONSTRUCTION)

1. All workmanship, materials, and testing shall be in accordance with the most current Washington State Department of Transportation/American Public Work Association Standard Specifications for Road, Bridge, and Municipal Construction, National Electrical Code, and City of Yelm Engineering Specifications and Standard Details unless otherwise specified below. In cases of conflict the most stringent guideline shall apply. When the most stringent guideline is not clear, the City will make the determination. The Electrical Contractor shall be familiar with all above stated publications and guidelines as they will be strictly enforced by the City.
2. All safety standards and requirements shall be complied with as set forth by the State of Washington, Department of Labor and Industries.
3. The contractor shall be responsible for all traffic control in accordance with the Manual on Uniform Traffic Control Devices. Prior to disruption of any traffic, traffic control plans shall be prepared and submitted to the City for approval. No work shall commence until all approved traffic control is in place.
4. A pre-construction meeting shall be held with the City and Electrical Inspectors prior to the start of construction.
5. All approvals and permits required by the City shall be obtained by the contractor prior to the start of construction.
6. It shall be the responsibility of the contractor to have a copy of an approved set of plans on the construction site at all times.
7. All surveying and staking shall be done by a surveying or engineering firm licensed in the State of Washington.
8. Temporary erosion control/water pollution measures shall be required in accordance with section 1-07.15 of the WSDOT/APWA Standard Specifications and the Drainage Design and Erosion Control Manual for Thurston Region Washington. At no time will silts and debris be allowed to drain into an existing or newly installed facility.
9. If construction is to take place in the County Right-of-Way, the contractor shall notify the County and obtain all the required approvals and permits.
10. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility

locations prior to construction by calling the Underground Locate Line at 1-800-424-5555 a minimum of 48 hours prior to any excavation. The contractor will also be responsible for maintaining all locate marks once the utilities have been located.

11. Electrical permits and inspections are required for all street lighting installations within the City. The Contractor is responsible for obtaining said permits prior to any type of actual construction. These permits are available through Washington State Labor and Industries.

12. Prior to installation of any materials the Electrical Contractor shall submit for approval by the City two copies of material catalog cuts, specifications, shop drawings and/or wiring diagrams. Any materials purchased or labor performed prior to such approval shall be at the Contractor's risk. Mounting heights, arm length, power source, luminaire type and bolt patterns shall follow Section 2.40.020 YDS. Modifications of any portion of the lighting system will not be allowed without prior approval by the City.

13. A rated Service Disconnect shall be provided for every branch circuit. Light branch circuit breakers shall be 40-amp minimum. The location and installation of the disconnect shall conform to the National Electric Code (NEC) and City of Yelm Standards. The Service Disconnect shall be of a type equal to a "MYERS" MEUGL-M100C-UM or a "UNICORN" CPIIIB-0111A Service, 120/240 VAC, CALTRANS TYPE 3B or City approved equal, with two lighting relays, one three position test switch (Auto/Off/Manual) and one photocell. The photocell shall face north unless otherwise directed by the City.

14. Service Entrance Conductors shall be a minimum size of #6 copper. All lighting wire shall be stranded copper with a minimum size of #8 with insulation suitable for wet locations. Phasing Tape will not be allowed. All wire shall be installed in schedule 40 PVC conduit with a minimum diameter of 1-1/4 inches. All conduit shall be installed in the "Utility Ditch" or as otherwise directed by the City. A bushing or bell end shall be used at the end of every conduit. All splices shall be in the nearest junction box. Wire nuts will not be allowed. All splices will be made with Type C copper fittings, centered and encased in a 3-M Scotchcast epoxy kit, rated at 600 Volts, type 82-A1, 82-B1 or City approved equal. If more than one circuit passes through a Junction Box each is to have a PCV sleeve clearly identifying the circuit. (WSDOT Standard Specification 8-20.3). A 500-volt megger test will be performed by the City on each circuit between conductor and ground prior to acceptance of the lighting system. The insulation resistance shall not be less than 6 megaohms to ground 2,500 feet and over nor less than 8 megaohms under 2,500 feet. A functional test will be performed

by the City, in which it is demonstrated that each and every part of the system functions as specified or intended herein. (WSDOT Standard Specifications 8-20.3(11)).

15. Each luminaire pole shall have an in-line, fused, water tight electrical disconnect located at the base of the pole. Access to these fused disconnects shall be through the hand-hole on the pole. The hand-hole shall be facing away from on-coming traffic. Load side of in-line fuse to luminaire head shall be cable and pole bracket wire, 2 conductor, 19 strand copper #10 and shall be supported at the end of the luminaire arm by an approved means. Fuse size, disconnect installation and grounding in pole shall conform to WSDOT Standards.

16. City approved pull boxes or junction boxes shall be installed per WSDOT Standard Plan J-11a in all street lighting installations. Junction Boxes shall be incorporated into the back edge of sidewalk or as directed by City. A Junction Box shall be located within 10 feet of each luminaire pole and at every road crossing. No conduit shall be installed in the roadway except at designated road crossings. Conduit entering the Junction Box shall be perpendicular to the sides of the box and a minimum of 6 but no more than 8 inches below the lid. Boxes shall be clearly and indelibly marked as Lighting Boxes by the legend "L.T." or "LIGHTING". All J-Boxes shall be supported by a minimum 6-inch crushed gravel pad. A 3/8 inch expansion joint shall be installed between concrete sidewalk and Junction Box.

17. All lighting poles shall be as specified in section 2.40.020 YDS. In existing developed areas, the City may require the use of other poles to establish uniformity within the developed area. After installation and before acceptance by the City all poles shall be free of dents and marks. Sonotube shall be removed to below ground level. Pole bases shall be grouted and all luminaire heads shall be plumb and level.

18. Cement concrete bases shall follow WSDOT Standard Plan J-1b. Conduit shall extend between 3 and 6 inches above the concrete base.

19. Any modification to approved lighting plans shall be reviewed and approved by the City prior to installation. Any approved modifications shall be shown on a Mylar asbuilt supplied to the City after the lighting installation is completed and before final acceptance. It shall be the responsibility of the Electrical Contractor to ensure these as-builts are provided to the City.

2.40.030 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or

surveyor directing such work shall be licensed by the State of Washington.

The minimum staking of luminaires shall be as follows:

- A. Location and elevation to the center of every pole base.
- B. Location and elevation of each service disconnect.

2.40.040 Testing

All illumination systems shall be subject to an electrical inspection which shall include megger testing and functional test. Lamp, photocell and fixture shall be under warranty for a period of one year.

CHAPTER 2.50 SIGNALS

2.50.010 General

Signals shall be installed per the requirements set forth herein. This work shall consist of furnishing and installing a complete and functional traffic control system of controllers, signals and appurtenances as required by the City.

2.50.020 Design Standards.

Signal systems shall be designed in accordance with the specifications as set forth in the WSDOT Design Manual and the WSDOT/APWA Standard Specifications unless otherwise authorized by the City.

All public signal designs shall be prepared by an engineering firm capable of performing such work. The engineer shall be licensed by the State of Washington. All applicable requirements set forth in Section 1.00.010 shall be included.

2.50.030 Induction Loops.

Induction loops shall be constructed per WSDOT/APWA Standard Specification 8-20.3(14)C and Standard Plan J-8a.

2.50.040 Staking.

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed by the State of Washington.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of signals shall be as follows:

- A. Location, with cut or fill to center of all pole bases.
- B. Location of junction box.
- C. Location of all corners of controller base.
- D. Location of service disconnect.

2.50.050 Testing.

All signals shall be subject to any necessary electrical inspections as well as requirements as set forth in the WSDOT Design manual and the WSDOT/APWA Standard Specifications.

A signal system shall not be approved or accepted by the City until the signal has performed correctly to the City's satisfaction for a 30 day "check-out" period as outlined below.

Controller and cabinet shall be tested by WSDOT's Laboratory in Tumwater and/or the City. All specifications and material samples shall be submitted to the City for review and approval prior to installation.

2.50.060 Check-out Procedure

The contractor shall call for an intersection check-out after completing the controller cabinet installation along with all other signal equipment complete with wiring connections. All parts and workmanship shall be warranted for one year from date of acceptance.

New signals shall operate without any type of failure for a period of 30 days. The contractor shall have a person available to respond to system failure within 24 hours during the 30-day "check-out" period.

Failure of any control equipment or hardware within the "check-out" period shall restart the 30-day "check-out" period.

CHAPTER 2.60 ROADSIDE FEATURES

2.60.010 General

Miscellaneous features included herein shall be developed and constructed to encourage the uniform development and use of roadside features wherever possible.

2.60.020 Design Standards.

The design and placement of roadside features included herein shall adhere to the specific requirements as listed for each feature, and, when applicable, to the appropriate standards as set forth in section 1.00.010.

2.60.030 Staking.

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

2.60.040 Testing.

Testing shall be required at the developer's or contractor's expense on all materials and construction as specified in the WSDOT/APWA Standard Specifications and with a frequency as specified in the WSDOT Construction Manual.

2.60.050 Survey Monuments.

- A. All existing survey control monuments which will be disturbed, covered or destroyed during construction shall be referenced prior to construction and replaced or raised after construction by a Professional Land Surveyor licensed by the State of Washington. All applicable RCWs and WACs will be complied with, including but not limited to, WAC 332-120, WAC 332-130, and RCW 58.09. The monuments shall be replaced with a cast in place monument (drawing number 2-16) at the expense of the responsible builder or developer.
- B. Major Arterial, Minor Arterial, Bus Routes, and Truck Routes require a pre-cast concrete monument (Standard Plan H-7a) with cast iron monument case and cover (Standard Plan H-7) installed per WSDOT standards is required.
- C. Commercial Collector, Neighborhood Collector, and Local streets require a poured-in-place concrete surface monument (see drawing number 2-16) per City standards is required.
- D. Monument Locations. Appropriate monuments as outlined in B or C above shall be:

1. At all street intersections;
 2. At the PC and PTs of all horizontal curves or at the PI if it lies in the traveled roadway;
- E. The monument case shall be installed after the final course of surfacing has been placed.

2.60.060 Guard Rails

For purposes of design and location, all guardrails along roadways shall conform to the criteria of the WSDOT Design Manual as may be amended or revised.

2.60.070 Retaining Walls

- A. Rock walls may be used for erosion protection of cut or fill embankments up to a maximum height of 8 feet in stable soil conditions which will result in no significant foundation settlement or outward thrust upon the walls. For heights over 6 feet or when soil is unstable, structural wall of acceptable design stamped by a licensed structural engineer shall be used. Rock walls over 6 feet high shall be subject to inspection by a geotechnical engineer as outlined in the following paragraph.

Any rock wall over 30 inches high in a fill section shall require an engineered design by a geotechnical engineer. The geotechnical engineer shall continuously inspect the installation of the wall as it progresses and shall submit inspection reports, including compaction test results and photographs taken during the construction, documenting the techniques used and the degree of conformance to the geotechnical engineer's design.

In the absence of such a rock wall design, walls having heights over 6 feet or walls to be constructed in conditions when soil is unstable require a structural wall having a design approved by the City if outside the Right-of-Way. The design of structural walls shall be by a professional engineer qualified in retaining wall design. Structural walls require issuance of a Building Permit prior to construction.

- B. The rock material shall be as nearly rectangular as possible. No stone shall be used which does not extend through the wall. The rock material shall be hard, sound, durable and free from weathered portions, seams, cracks and other defects. The rock density shall be a minimum of 160 pounds per cubic foot.
- C. The rock wall shall be started by excavating a trench having a depth below subgrade of one half the base course or one foot (whichever is greater).

- D. Rock selection and placement shall be such that there will be minimum voids and, in the exposed face, no open voids over 6 inches across in any direction. The final course shall have a continuous appearance and shall be placed to minimize erosion of the backfill material. The larger rocks shall be placed at the base of the rockery so that the wall will be stable and have a stable appearance. The rocks shall be placed in a manner such that the longitudinal axis of the rock shall be at right angles or perpendicular to the rockery face. The rocks shall have all inclining faces sloping to the back of the rockery. Each course of rocks shall be seated as tightly and evenly as possible on the course beneath. After setting each course of rock, all voids between the rocks shall be chinked on the back with quarry rock to eliminate any void sufficient to pass a 2-inch square probe.
- E. The wall backfill shall consist of quarry spalls with a maximum size of 6 inches and a minimum size of 4 inches or as specified by a licensed engineer. This material shall be placed to a 12 inch minimum thickness between the entire wall and the cut or fill material. The backfill material shall be placed in lifts to an elevation approximately 6 inches below the top of each course of rocks as they are placed, until the uppermost course is placed. Any backfill material on the bearing surface of one rock course shall be removed before setting the next course.
- F. Perforated drainage pipe and filter fabric shall be installed as per drawing number 2-18. This pipe requirement may be waived by the Engineer upon a showing by the developer that no subsurface water problem exists.

2.60.080 Parking Lots

Standards for parking lot construction.

- A. Materials and Workmanship. Materials and workmanship for all parking lot construction regardless if a parking lot construction permit is required, must comply with City adopted standards and specifications. Parking lot surfacing materials shall satisfy the requirement for a permanent all weather surface. Asphalt concrete pavement and cement concrete pavement satisfy this requirement and are approved materials. Gravel surfaces are not acceptable or approved surface material types. Combination grass/paving systems are approved materials types, however, their use requires submittal of an overall parking lot paving plan showing the limits of the grass/paving system sand a description of how the systems will be irrigated and maintained. If the Public Works Director determines the grass/paving system is not appropriate for the

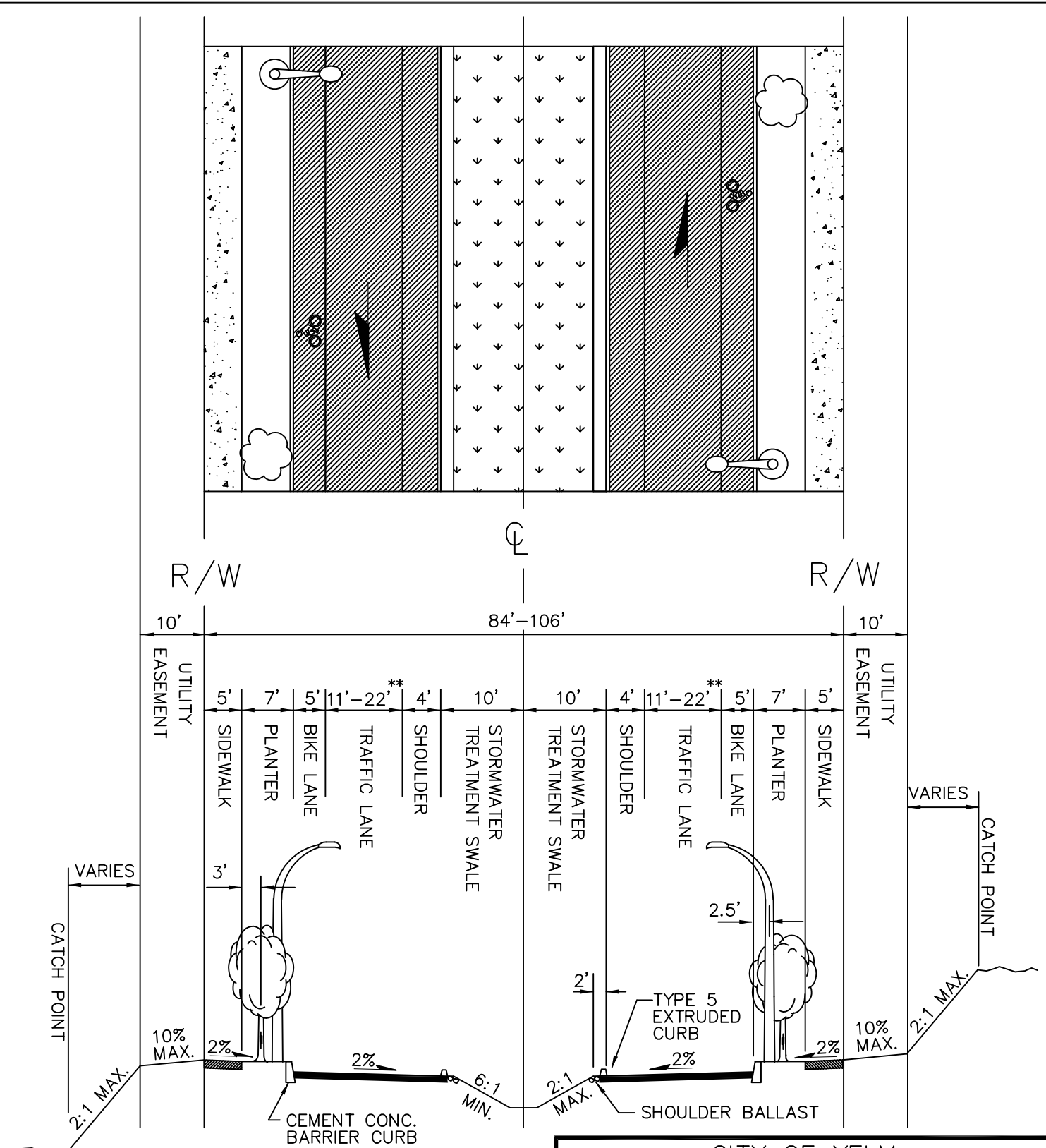
specific application, alternate approved surfacing materials shall be utilized.

- B. Other types of surfacing materials will be considered subject to the approval of the Public Works Director prior to construction.
- C. Non-Compliance--Removal--Lien. In the event that the construction covered under this section is not performed in accordance with the established specifications and the construction is not corrected as directed by the City Engineer, such construction may be removed and/or corrected by the City. Upon the failure of the owner to take such corrective steps as outlined within thirty days if notice in writing by the City Engineer, costs of such removal and/or correction or reconstruction as performed by the City shall be charged to the owner of the real property involved and shall become a lien against the premises until paid.
- D. Parking area construction shall include:
 - 1. Surfacing. All parking areas shall be surfaced with asphalt, concrete or similar pavement so as to provide a permanent all-weather surface that is durable and dust-free and shall be so graded and drained as to properly dispose of all surface water. Gravel surfaces are not acceptable or approved surface material.
 - 2. Subgrade Preparation. The subgrade shall be prepared for surfacing following the requirements outlined in Section 2-06 of the WSDOT Standard Specifications. Erosion/sedimentation control facilities shall be provided.
 - 3. Stormwater Runoff. All stormwater runoff shall be retained and disposed of on site or disposed of in a system designed for such runoff and which does not flood or damage adjacent properties. Stall Markings. Asphalt or concrete surfaced parking areas shall have parking stalls marked by surface paint lines or suitable substitute traffic marking material. Painted stall markings need not extend the full depth of the stall. If less than the full depth of the stall is painted, the combined stall depths and aisle width shall not be less than the appropriate unit parking depth. Wheel stops are required where a situation exists whereby a parked vehicle would encroach on an adjacent property or Right-of-Way or to protect landscaping. See drawing number 2-24 for approved stall markings and wheel stop locations.
- E. No certificate of occupancy shall be issued until all parking facilities are completed and approved unless otherwise allowed by the Director of Public Works.

TRANSPORTATION

LIST OF DRAWINGS

Title	Drawing
Roadway Section	
Boulevard with swale	2-1A
Boulevard, with central island.....	2-1B
Major Arterial.....	2-2
Urban Arterial.....	2-3
Commercial Collector.....	2-4
Neighborhood Collector.....	2-5
Local Access Commercial.....	2-6
Local Access Residential.....	2-7
Pedestrian Oriented Street Section.....	2-8A
On-Street Parking Detail.....	2-8B
Cement Concrete Approach.....	2-9
Trench-Pavement Restoration Detail	2-10
Cement Concrete Sidewalk	2-11
Typical Curb Ramps	2-12
Cement Concrete Curbs.....	2-13
Future Bikeways Map	2-14
Bikeway Classes	2-15
Cast in Place Monument	2-16
Bus Pullout	2-17
Rock Wall	2-18
Street Tree	2-19
Street Design - Central Business District	2-20
Nomenclature of Off-Street Parking Area	2-21
Most Common Minimum Parking Area Dimensions	2-22
Examples of Off-Street Parking	2-23
Stall Markings and Wheel Stop Locations	2-24
Driveway Dimensions Measurements	2-25
Mailbox Cluster Detail	2-26



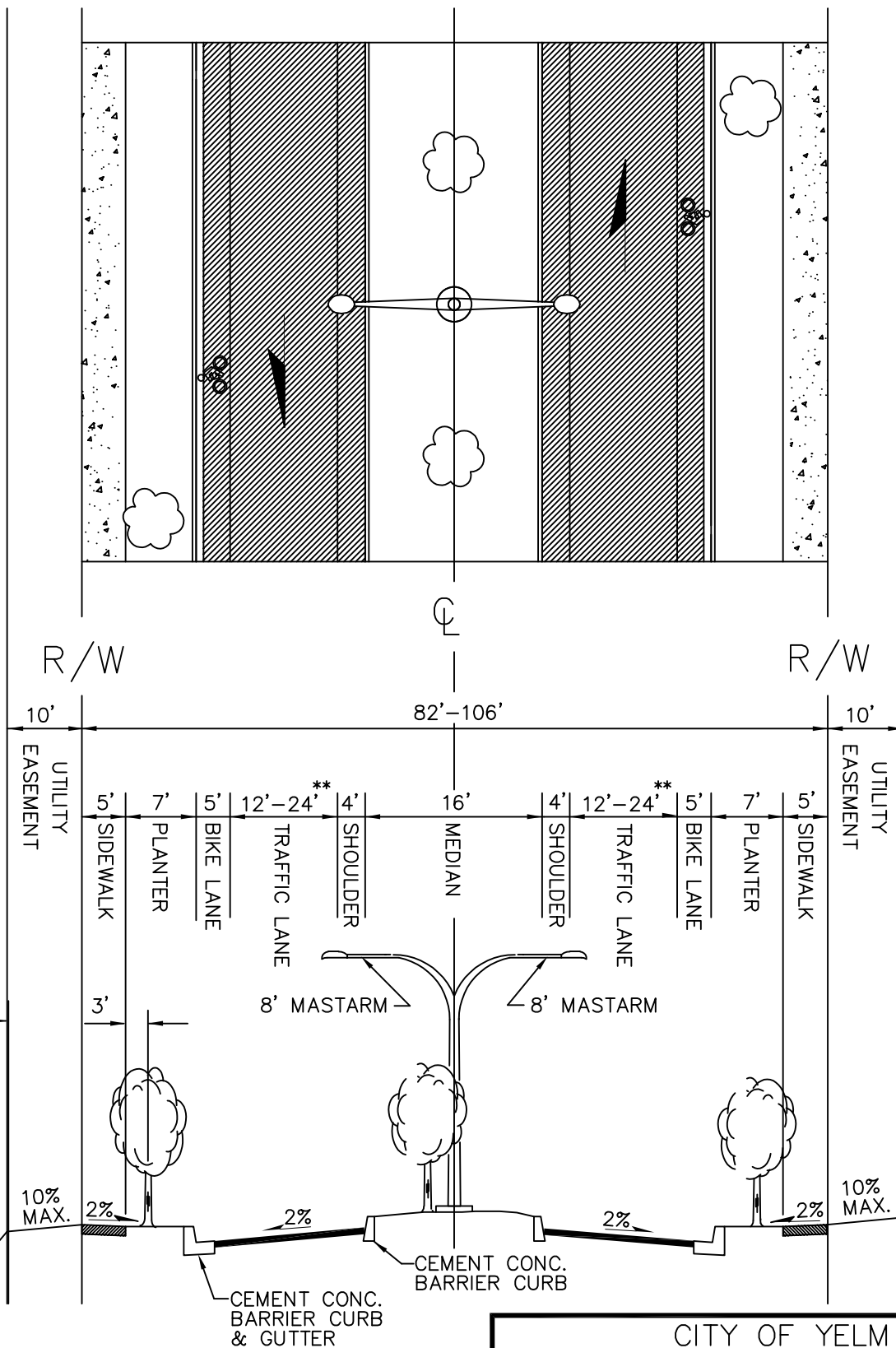
** 11' WITH 1 LANE
22' WITH 2 LANES

GENERAL NOTES:

1. NO "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ECT.

JEG

CITY OF YELM DEPT. OF PUBLIC WORKS			
BOULEVARD WITH SWALE			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			2-1A
DATE			
DES.	DWN.	CKD.	DATE
			9/21/2000



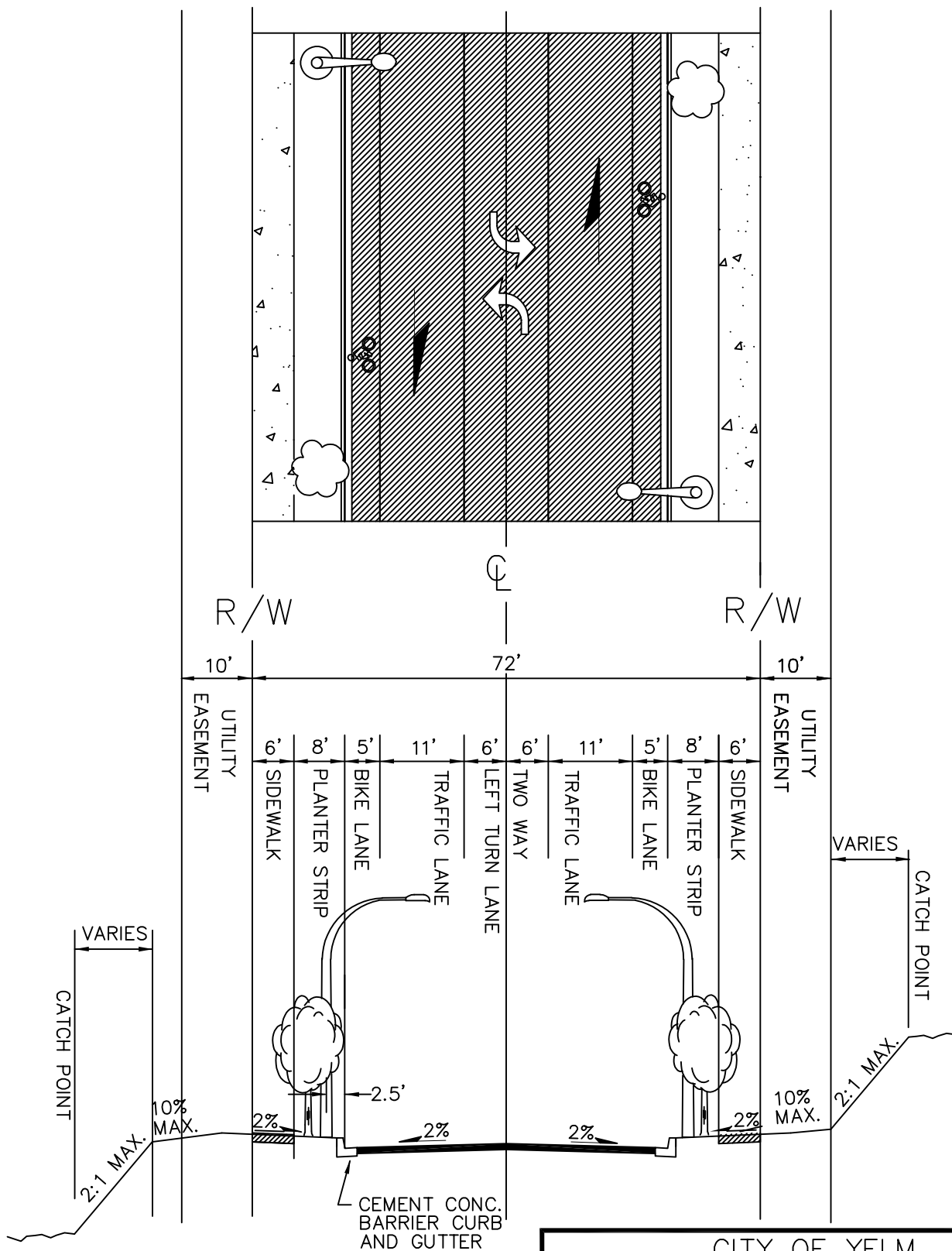
** 12' WITH 1 LANE
24' WITH 2 LANES

GENERAL NOTES:

1. NO "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ECT.

JEG

CITY OF YELM DEPT. OF PUBLIC WORKS			
BOULEVARD W/ CENTRAL ISLAND			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			2-1B
DES.	DWN.	CKD.	DATE
			9/21/2000

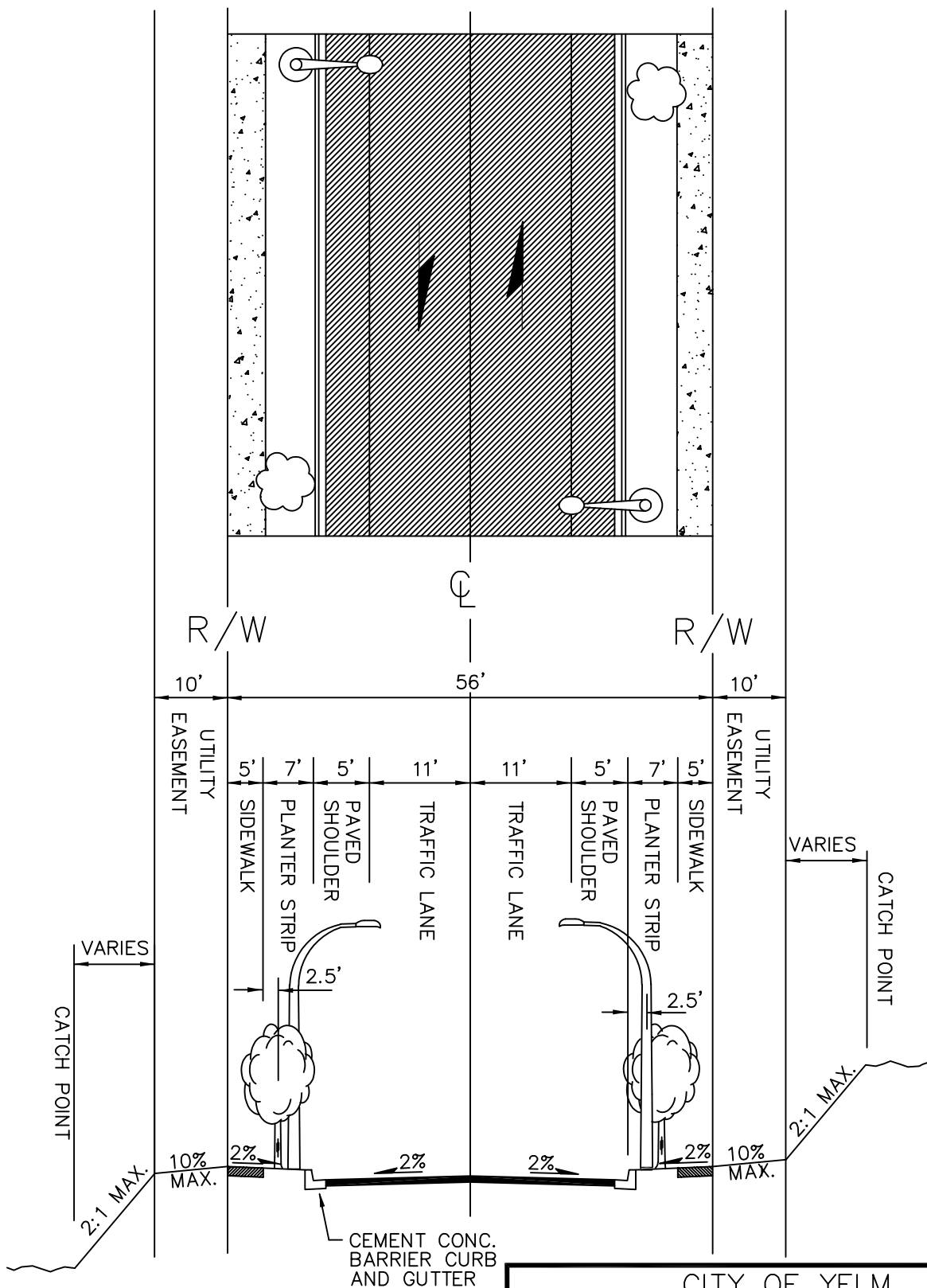


GENERAL NOTES:

1. NO "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ECT.

JEG

CITY OF YELM DEPT. OF PUBLIC WORKS			
URBAN ARTERIAL			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			2-3
DES.	DWN.	CKD.	DATE
			9/21/2000



GENERAL NOTES:

1. NO "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ECT.

CITY OF YELM
DEPT. OF PUBLIC WORKS

COMMERCIAL COLLECTOR

APPROVED

DWG. NO.

2-4

DES.

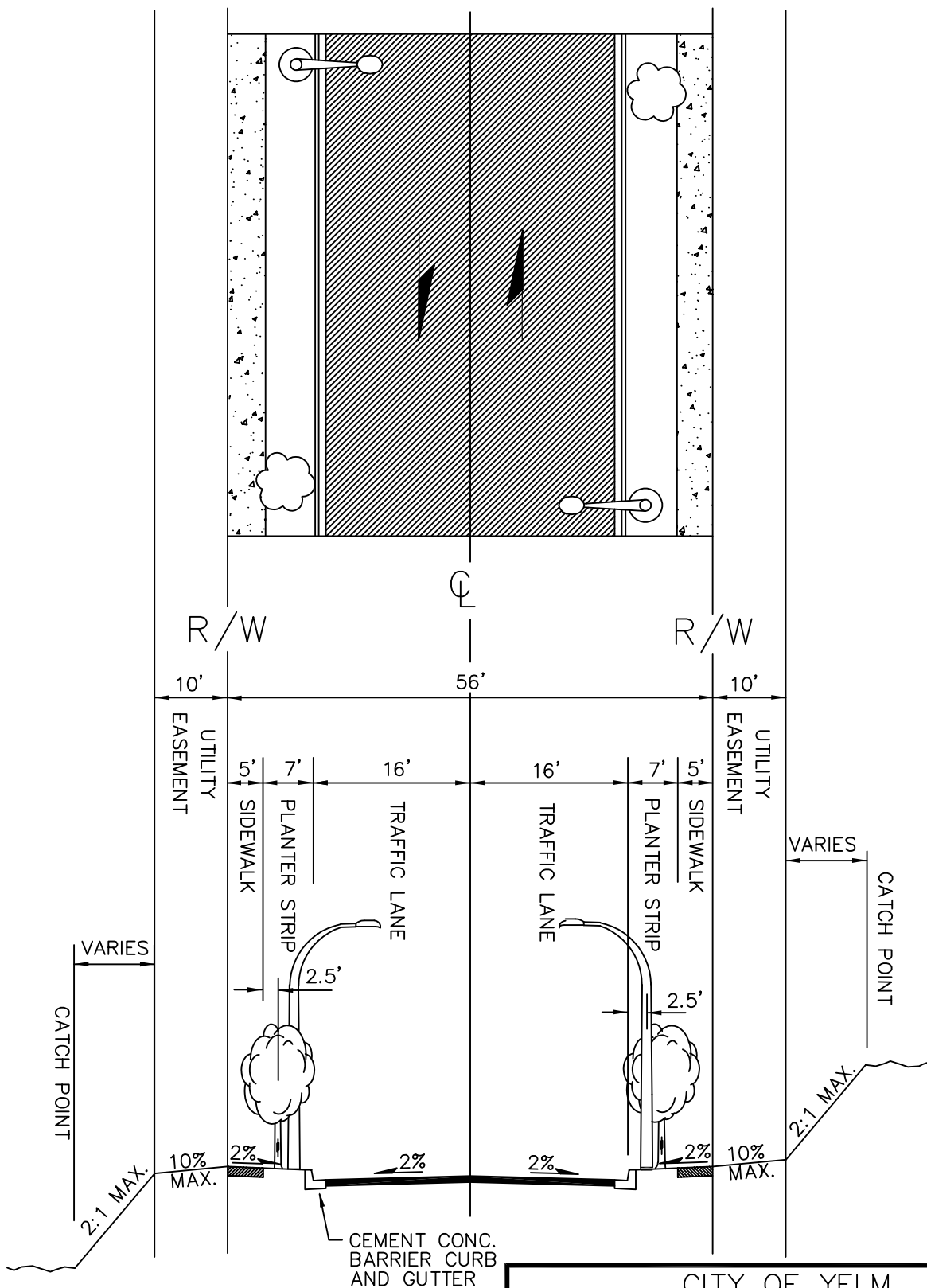
DWN.

CKD.

DATE

9/21/2000

JEG



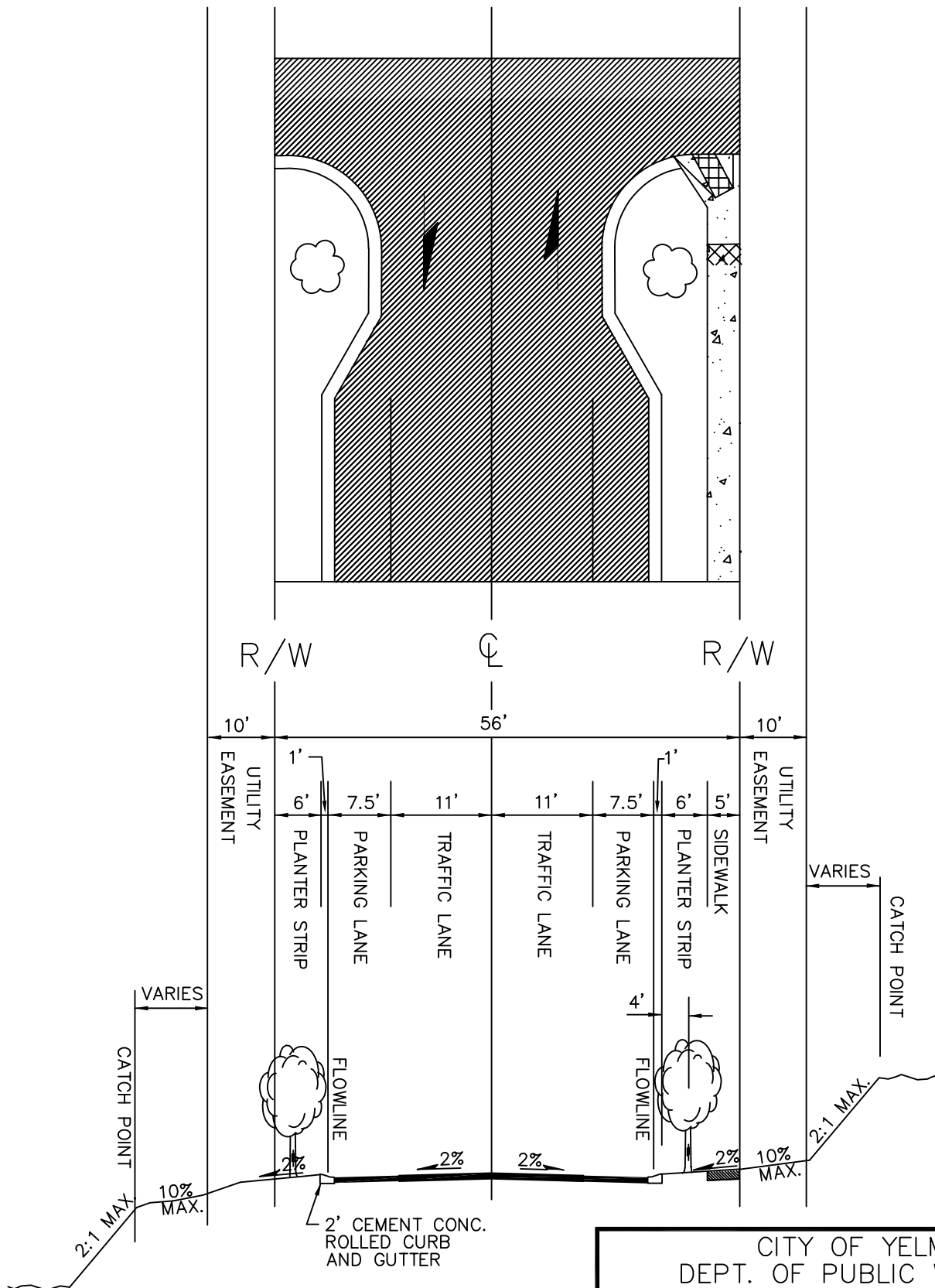
GENERAL NOTES:

1. NO "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ECT.

JEG

CITY OF YELM DEPT. OF PUBLIC WORKS			
NEIGHBORHOOD COLLECTOR			
APPROVED _____			DWG. NO. 2-5
DES. _____	DWN. _____	CKD. _____	DATE 9/21/2000

JEG



GENERAL NOTES:

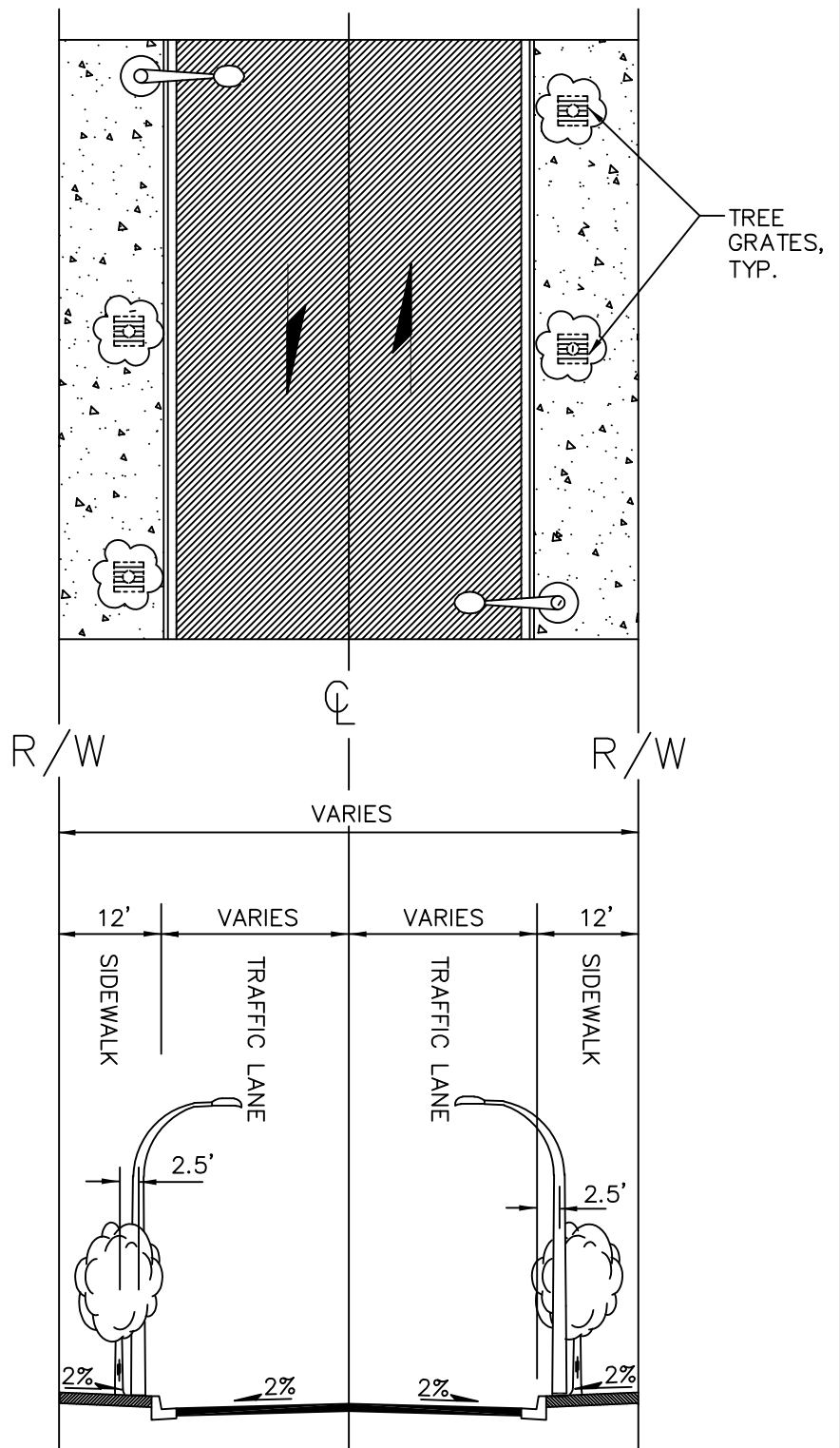
1. "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ETC.

CITY OF YELM DEPT. OF PUBLIC WORKS			
LOCAL ACCESS RESIDENTIAL			
APPROVED _____			DWG. NO. 2-7
DES.	DWN.	CKD.	DATE

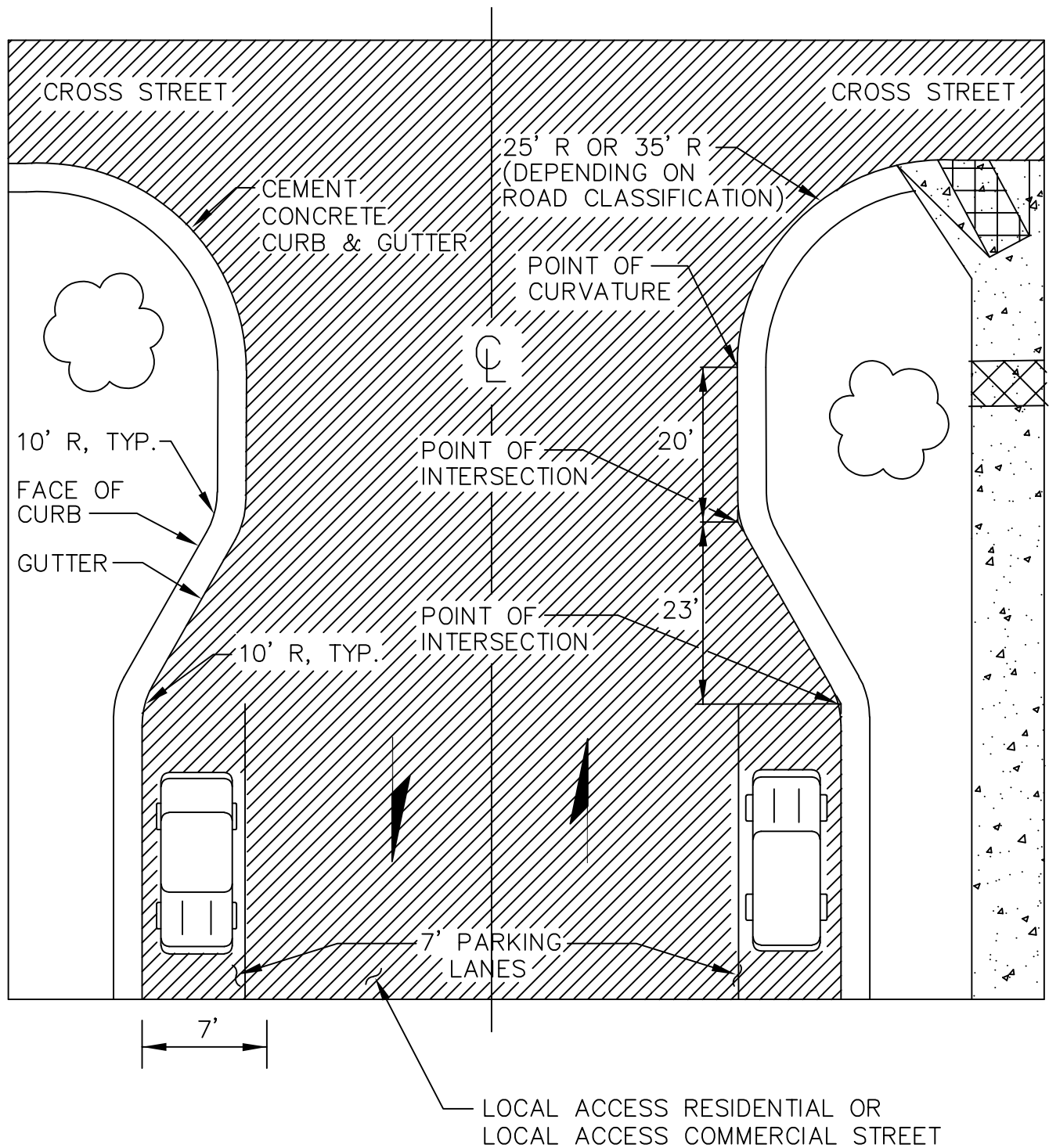
JEG

PEDESTRIAN- ORIENTED STREETS:

- **YELM AVENUE**
Between Solberg W. and 4th Street E.
- **FIRST STREET**
Between Mosman Avenue SE and Jefferson Avenue NE
- **SECOND STREET SE**
Between Washington Avenue SE and Yelm Avenue E
- **THIRD STREET SE**
Between Washington Avenue SE and Yelm Avenue E
- **ALL PUBLIC STREETS**
Within 1000 feet of the intersection of Yelm Avenue W. and Killion Road NW



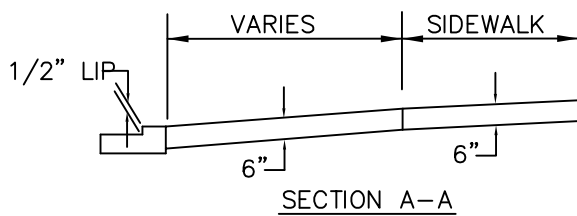
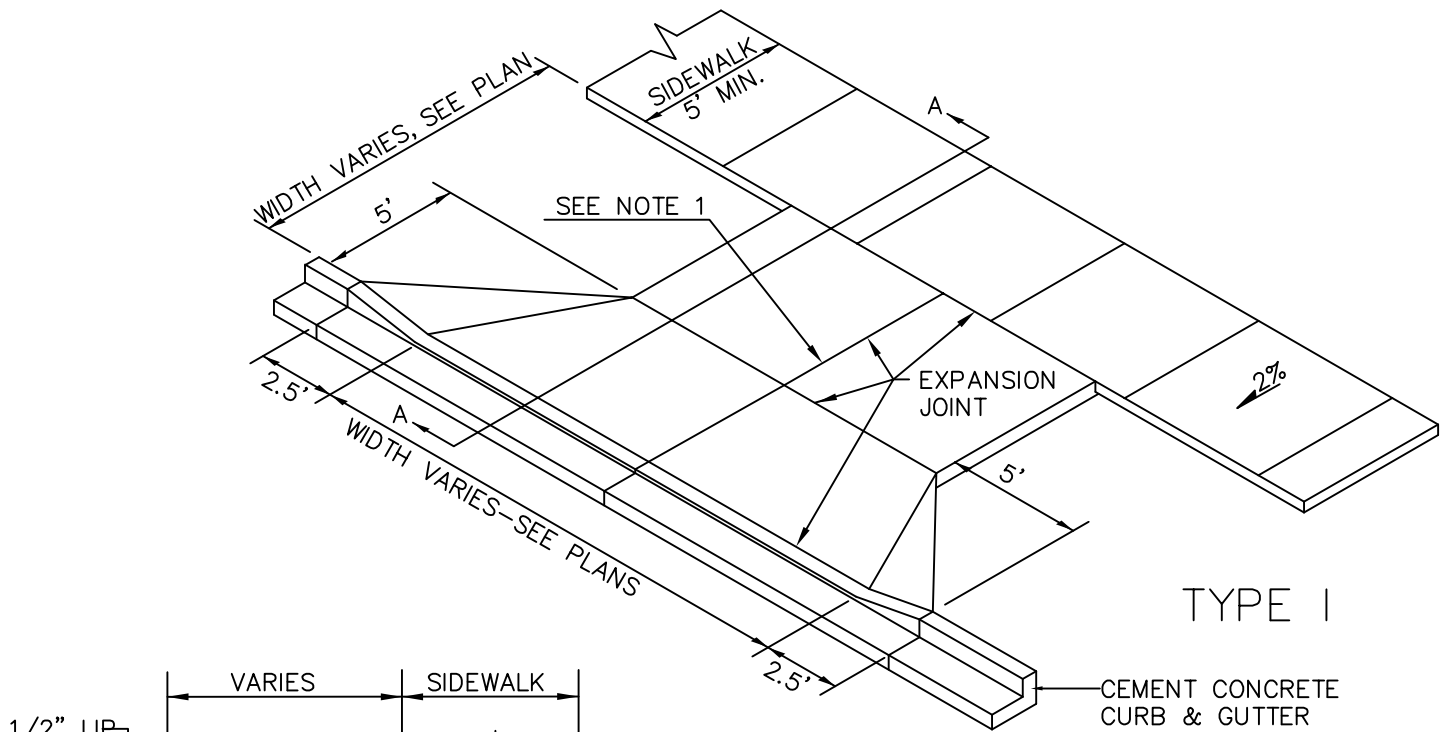
CITY OF YELM DEPT. OF PUBLIC WORKS			
TYPICAL PEDESTRIAN- ORIENTED STREET SECTION			
APPROVED			DWG. NO. 2-8A
DES.	DWN.	CKD.	DATE 9/21/2000



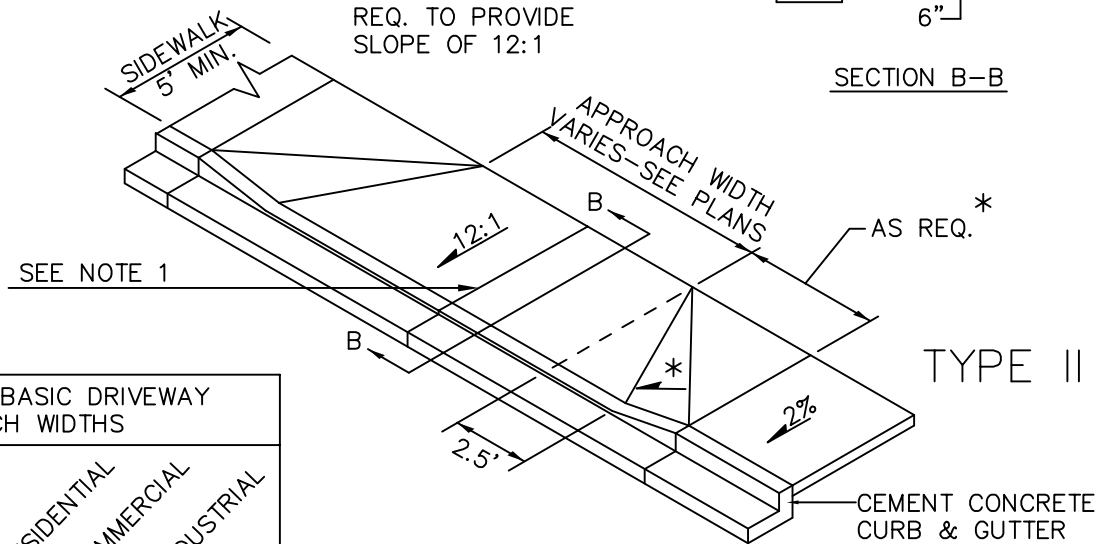
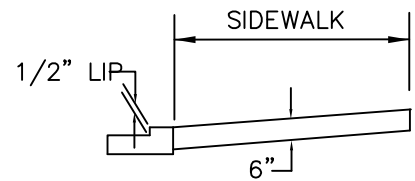
GENERAL NOTE:

1. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ETC.

CITY OF YELM DEPT. OF PUBLIC WORKS			
ON-STREET PARKING DETAIL			
APPROVED _____			DWG. NO. 2-8B
DES. _____	DWN. _____	CKD. _____	DATE 9/21/2000



* ADJUST WIDTH AS REQ. TO PROVIDE SLOPE OF 12:1

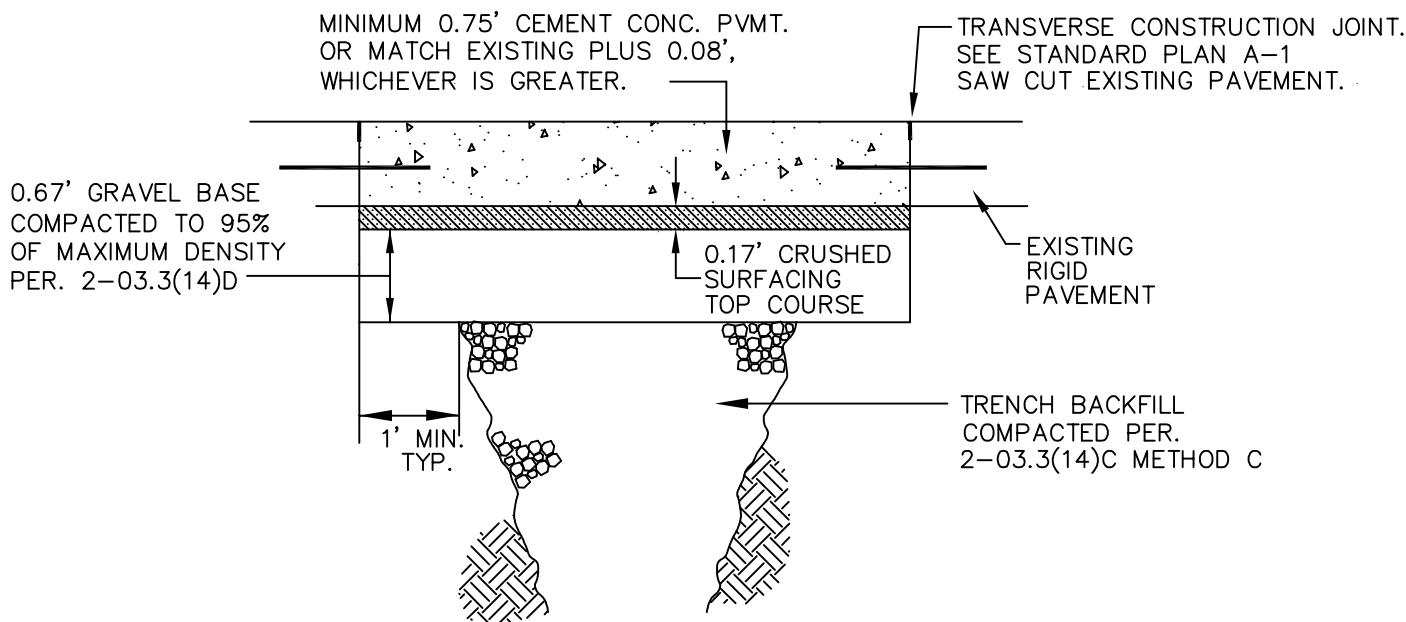
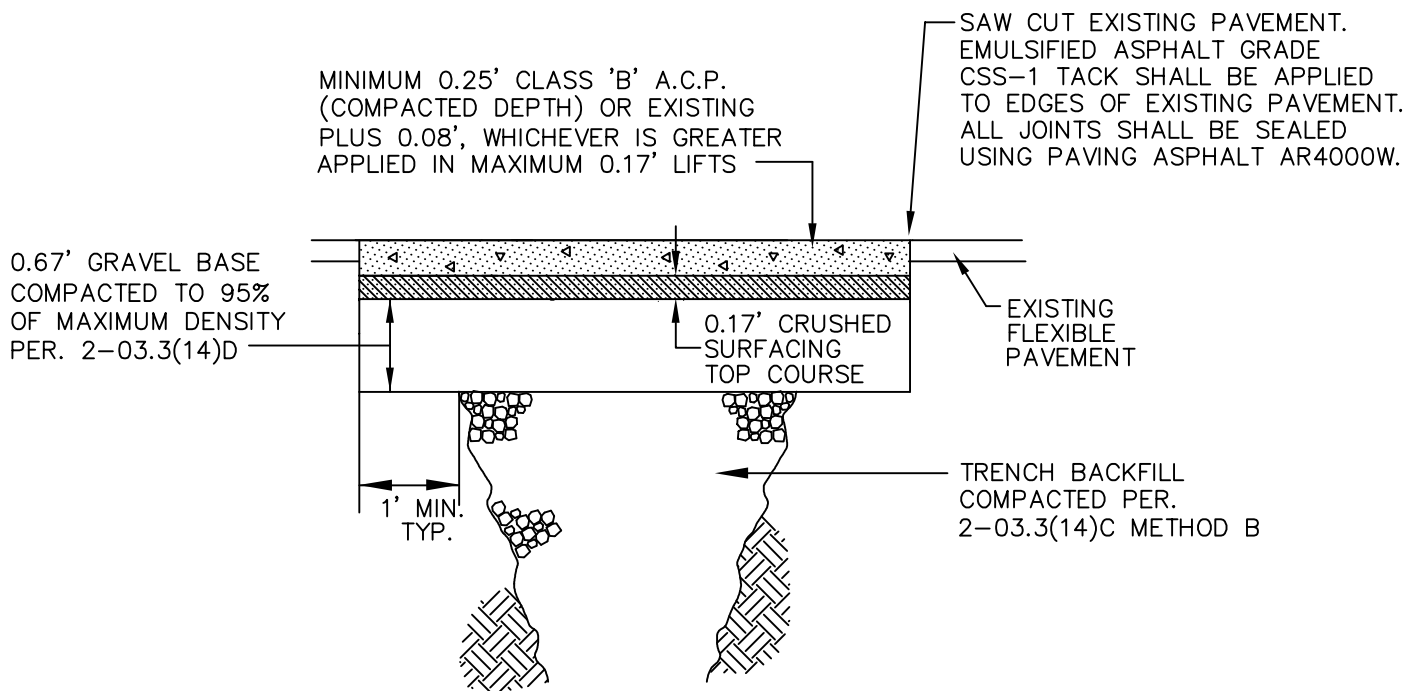


RECOMMENDED BASIC DRIVEWAY APPROACH WIDTHS			
NOMINAL WIDTH	RESIDENTIAL	COMMERCIAL	INDUSTRIAL
ONE-WAY	10'	15'	20'
TWO-WAY	10'	30'	40'

NOTES:

1. WHERE APPROACH EXCEEDS 16' WIDTH A FULL DEPTH EXPANSION JOINT SHALL BE PLACED LONGITUDINALLY, CENTERED IN THE APPROACH.
2. FORM AND SUBGRADE INSPECTION ARE REQUIRED BEFORE POURING CONCRETE.
3. REFER TO SECTION 4B.140, YELM DEVELOPMENT GUIDELINES.

CITY OF YELM DEPT. OF PUBLIC WORKS			
CEMENT CONCRETE APPROACH			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			DATE
DES.	DWN.	CKD.	DATE
S-C	S-C	S-C	2/2/95



NOTES:

1. ALL MATERIALS, WORKMANSHIP, AND INSTALLATION SHALL BE IN CONFORMANCE WITH THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AS AMENDED BY CITY OF YELM STANDARDS.

CITY OF YELM
DEPT. OF PUBLIC WORKS

TRENCH-PAVEMENT RESTORATION DETAIL

APPROVED

DWG. NO.

PUBLIC WORKS DIRECTOR

DATE

2-10

DES.

DWN.

CKD.

DATE

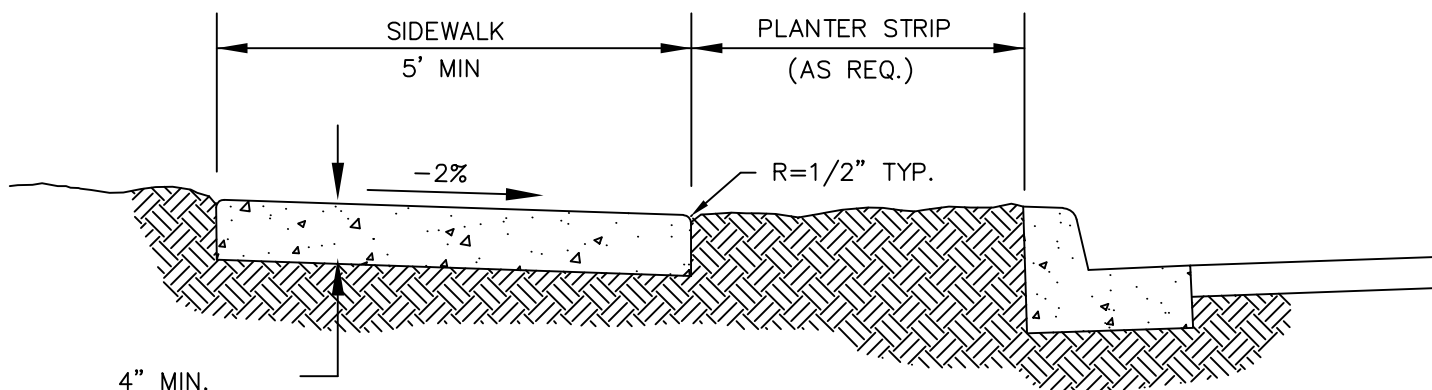
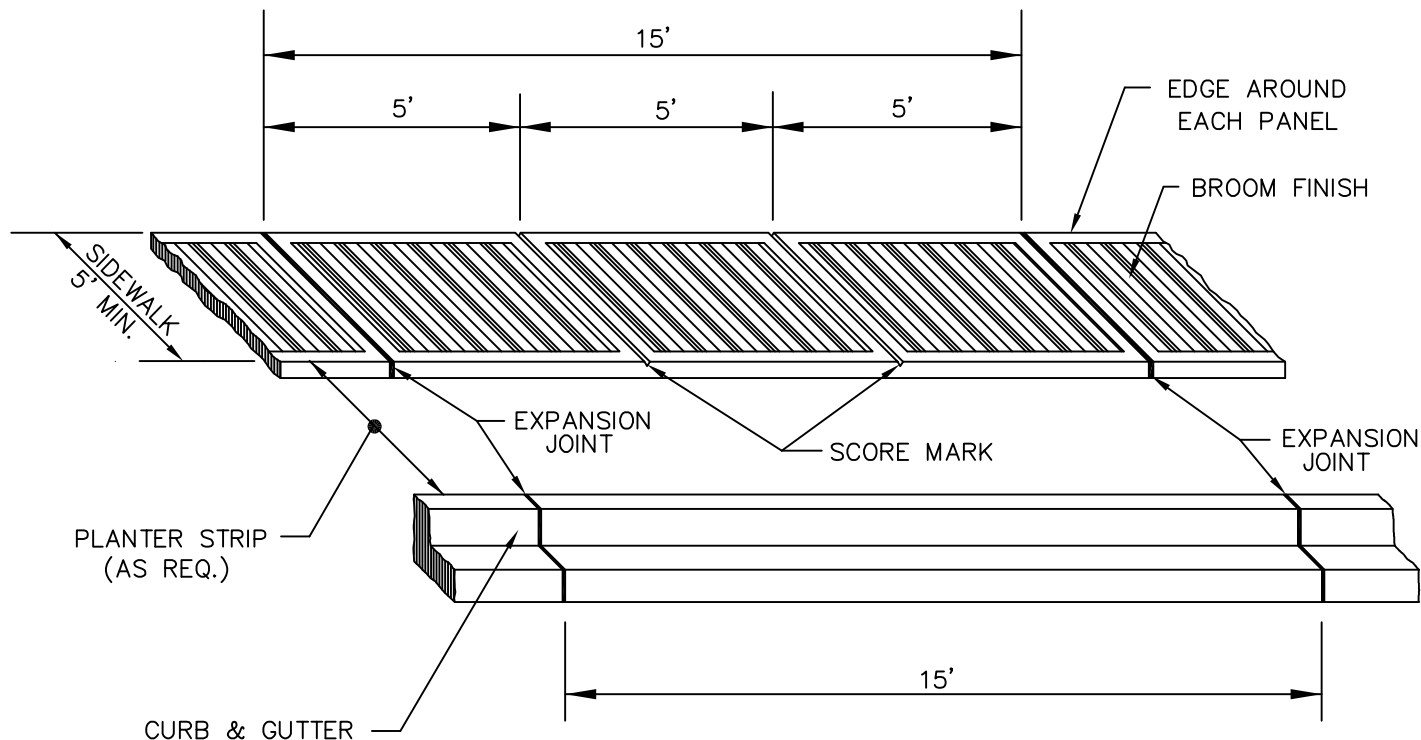
S-C

S-C

S-C

10/3/94

JEG



NOTES:

1. EXPANSION JOINT MATERIAL TO BE 3/8" THICK PREMOLDED JOINT FILLER FULL THICKNESS OF CONCRETE.
2. FORM AND SUBGRADE INSPECTION REQUIRED BEFORE POURING CONCRETE.
3. SCORE MARKS SHALL BE $\pm 1/8"$ WIDE BY $\pm 1/4"$ DEEP. FOR SIDEWALKS OVER 8' IN WIDTH, A LONGITUDINAL SCORE MARK SHALL BE MADE ALONG CENTER OF WALK.
4. EXPANSION JOINTS SHALL BE INSTALLED IN CURB AND GUTTER AND IN SIDEWALK AT PC AND PT AT ALL CURB RETURNS. EXPANSION JOINTS SHALL BE PLACED IN SIDEWALK AT SAME LOCATIONS AS THOSE IN CURB AND GUTTER WHEN SIDEWALK IS ADJACENT TO CURB AND GUTTER, UNLESS OTHERWISE DIRECTED BY ENGINEER.

CITY OF YELM
DEPT. OF PUBLIC WORKS

CEMENT CONCRETE SIDEWALK

APPROVED

DWG. NO.

PUBLIC WORKS DIRECTOR

DATE

2-11

DES.

DWN.

CKD.

DATE

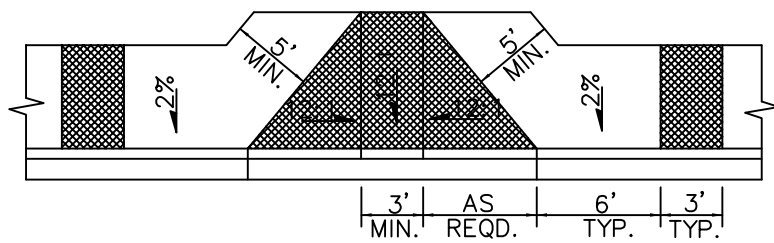
S-C

S-C

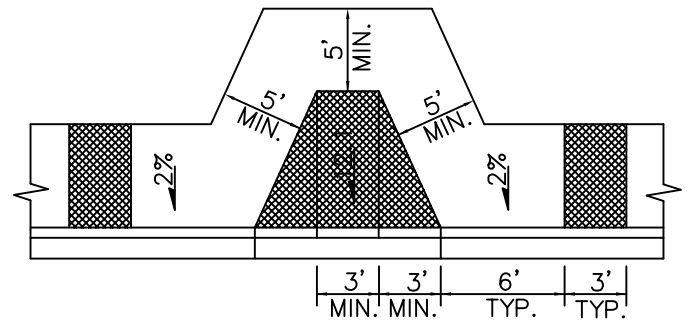
S-C

10/3/94

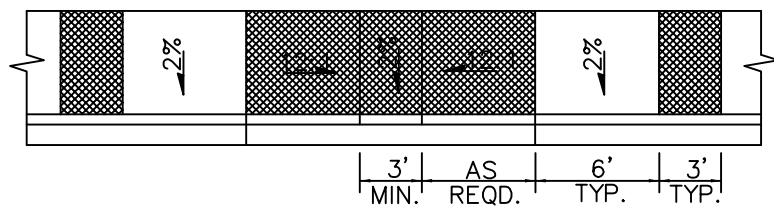
JEG



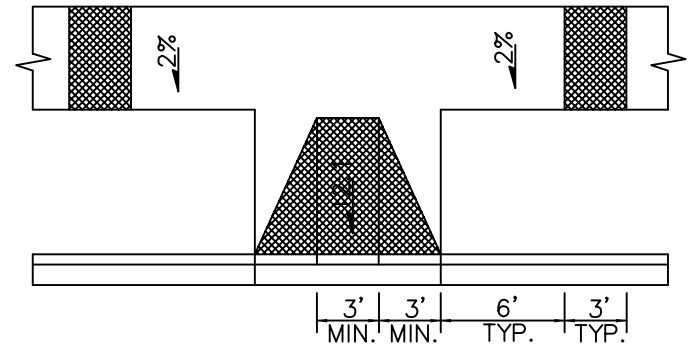
TYPE I



TYPE II



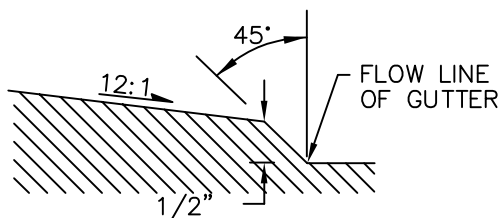
TYPE III



TYPE IV

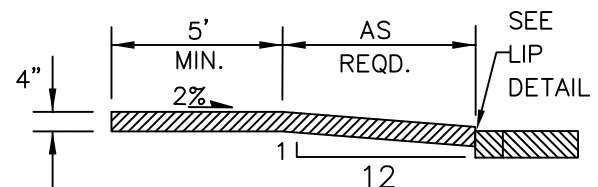
TYPICAL CURB RAMPS

BOTTOM OF RAMP MAY
HAVE MAX. 1/2" LIP
AT 45°.



LIP DETAIL

NOTE: SEE SIDEWALK SPACING,
EXPANSION JOINTS & SCORE
MARK DETAIL FOR ADDITIONAL
NOTES.



RAMP SECTION

NOTES:

1. RAMP TEXTURING IS TO BE DONE WITH AN EXPANDED METAL GRATE PLACED AND REMOVED FROM WET CON. TO LEAVE A DIAMOND PATTERN. THE LONG AXIS OF THE DIAMOND PATTERN SHALL BE PERPENDICULAR TO THE CURB. GROOVES SHALL BE 1/8" DEEP AND 1/4" WIDE.
2. CURB RAMPS SHALL BE POURED AS A SEPARATE UNIT FROM THE SIDEWALK AND FROM THE CURB AND GUTTER, ISOLATED BY EXPANSION JOINT MATERIAL ON ALL SIDES EXCEPT AT END OF RAMP NEXT TO ROADWAY.
3. INLETS SHALL BE LOCATED SO THAT RUNOFF DOES NOT FLOW PAST THE CURB RAMP. NO INLETS ARE TO BE SET SO THAT PEDESTRIANS WALK OVER OR AROUND THEM.

JEG

CITY OF YELM
DEPT. OF PUBLIC WORKS

TYPICAL CURB RAMPS

APPROVED

DWG. NO.

PUBLIC WORKS DIRECTOR

DATE

2-12

DES.

DWN.

CKD.

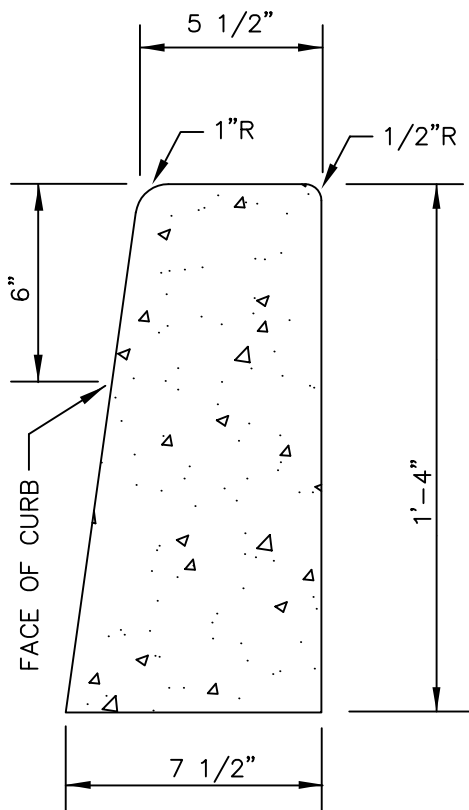
DATE

S-C

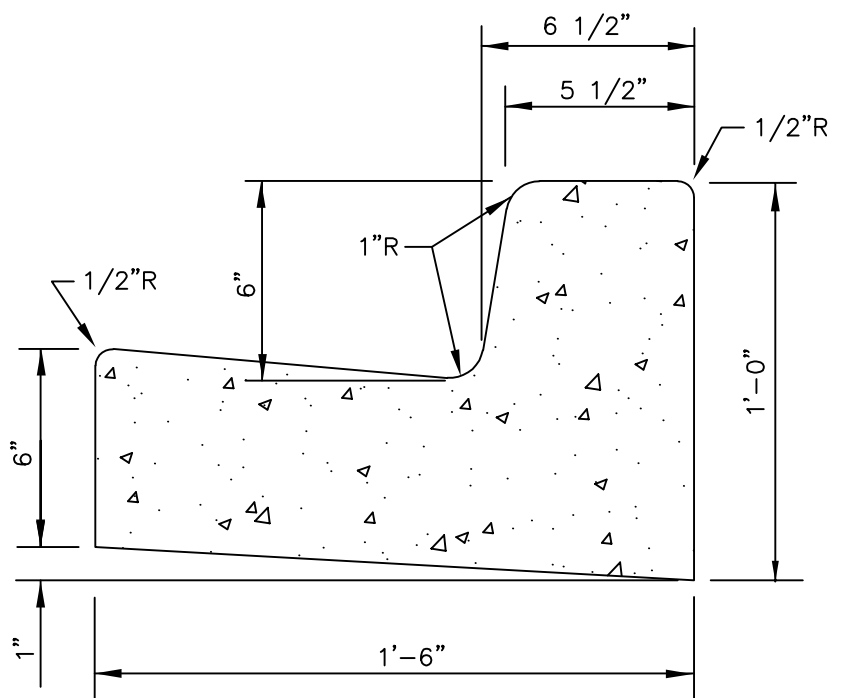
S-C

S-C

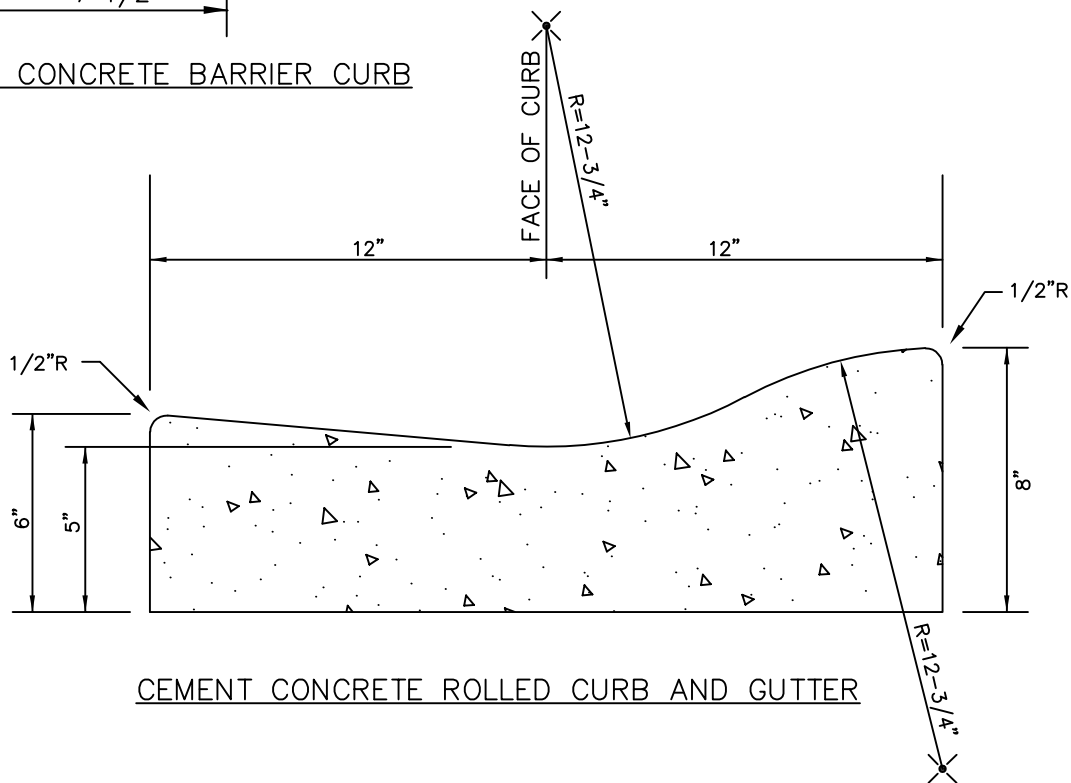
10/3/94



CEMENT CONCRETE BARRIER CURB



CEMENT CONCRETE BARRIER CURB AND GUTTER



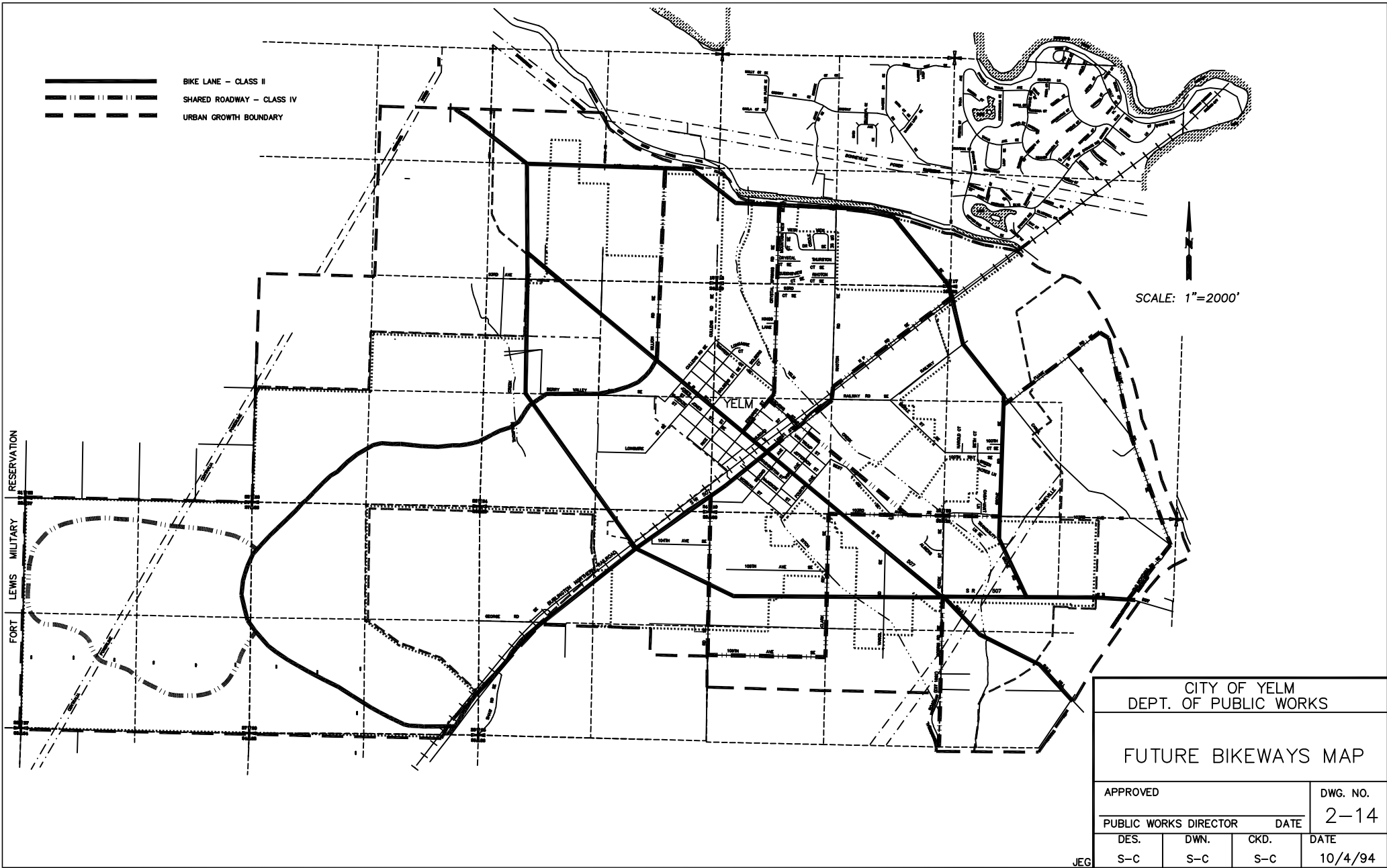
CEMENT CONCRETE ROLLED CURB AND GUTTER

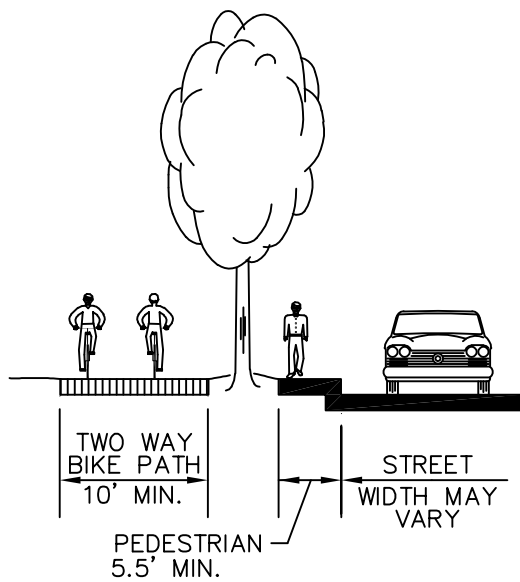
NOTES:

1. EXPANSION JOINT MATERIAL TO BE 3/8" THICK PREMOLDED JOINT FILLER FULL THICKNESS OF CONCRETE.
2. FORM AND SUBGRADE INSPECTION REQUIRED BEFORE POURING CONCRETE.
3. EXPANSION JOINTS TO BE PLACED ON 15' CENTERS.

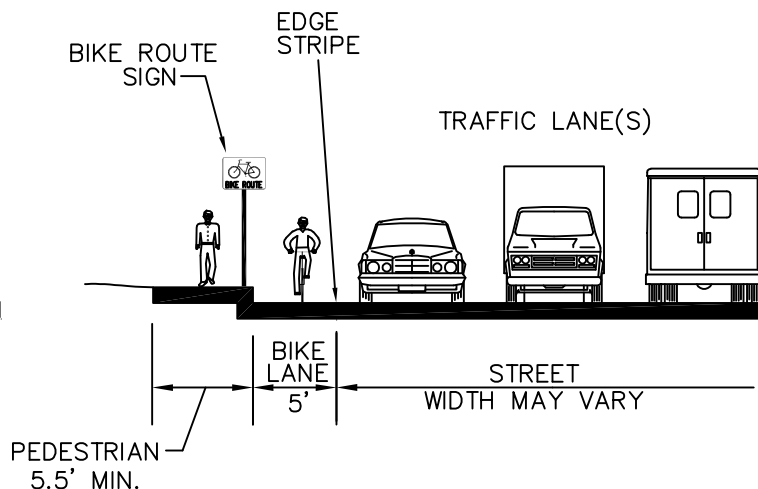
JEG

CITY OF YELM DEPT. OF PUBLIC WORKS			
CEMENT CONCRETE CURBS			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			2-13
DES.	DWN.	CKD.	DATE
S-C	S-C	S-C	3/15/94

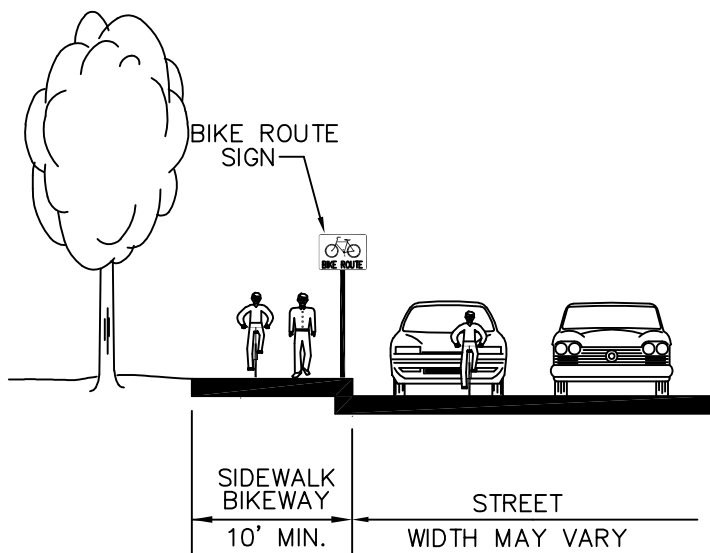




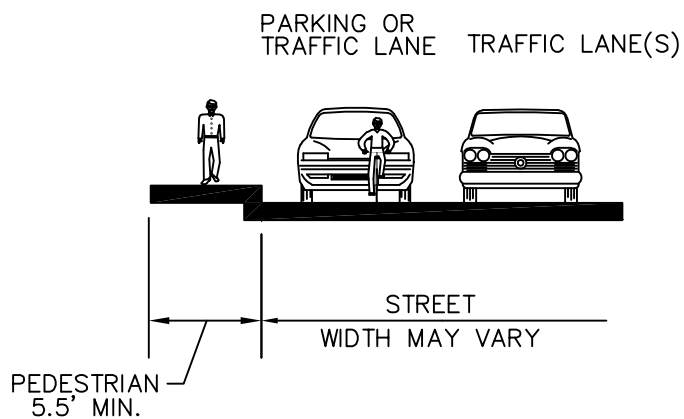
CLASS I BIKE PATH



CLASS II BIKE LANE



CLASS III BIKE ROUTE



CLASS IV SHARED ROADWAY

CITY OF YELM
DEPT. OF PUBLIC WORKS

BIKEWAY CLASSES

APPROVED

DWG. NO.

PUBLIC WORKS DIRECTOR

DATE

2-15

DES.

DWN.

CKD.

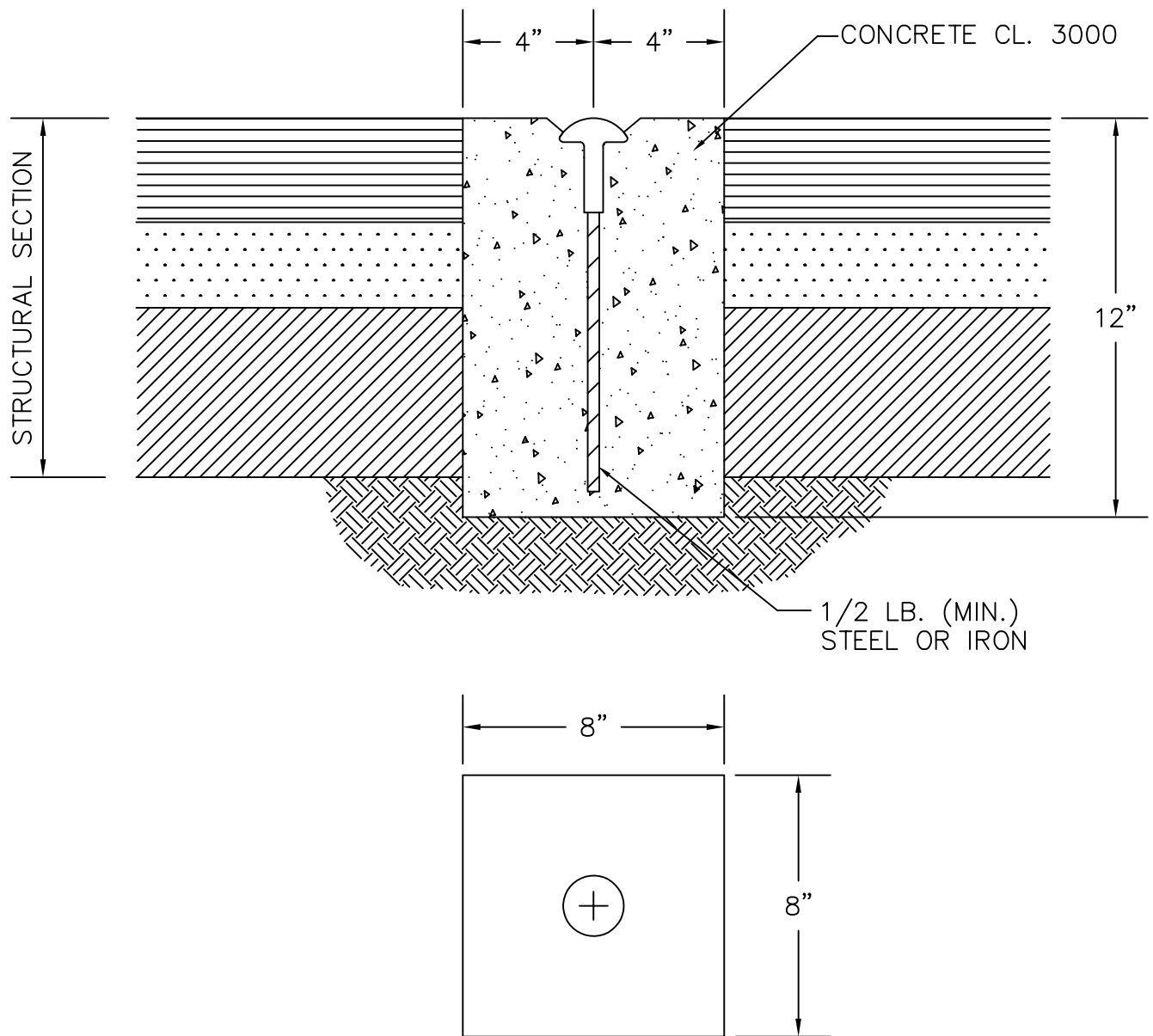
DATE

S-C

S-C

S-C

10/3/94

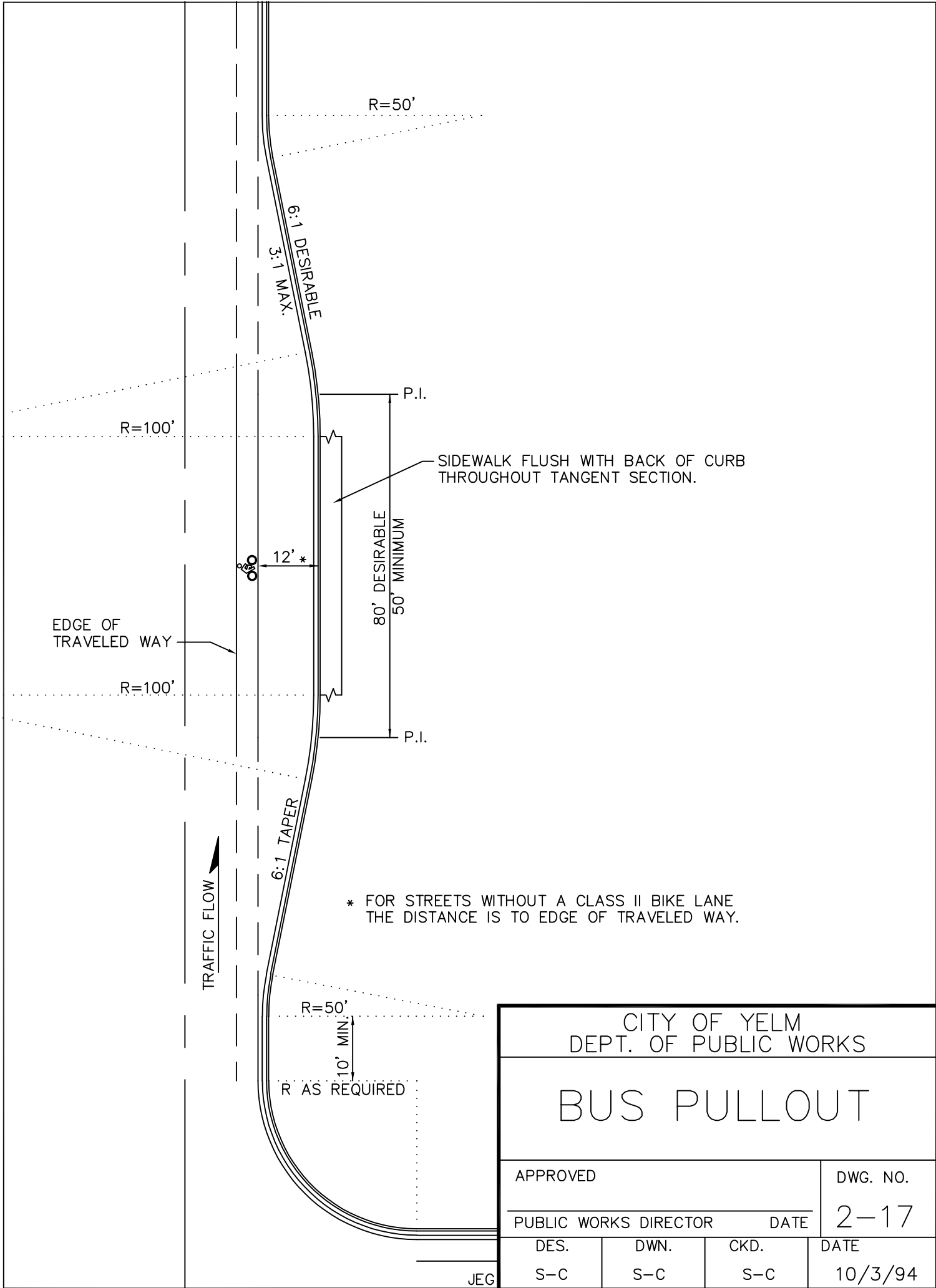


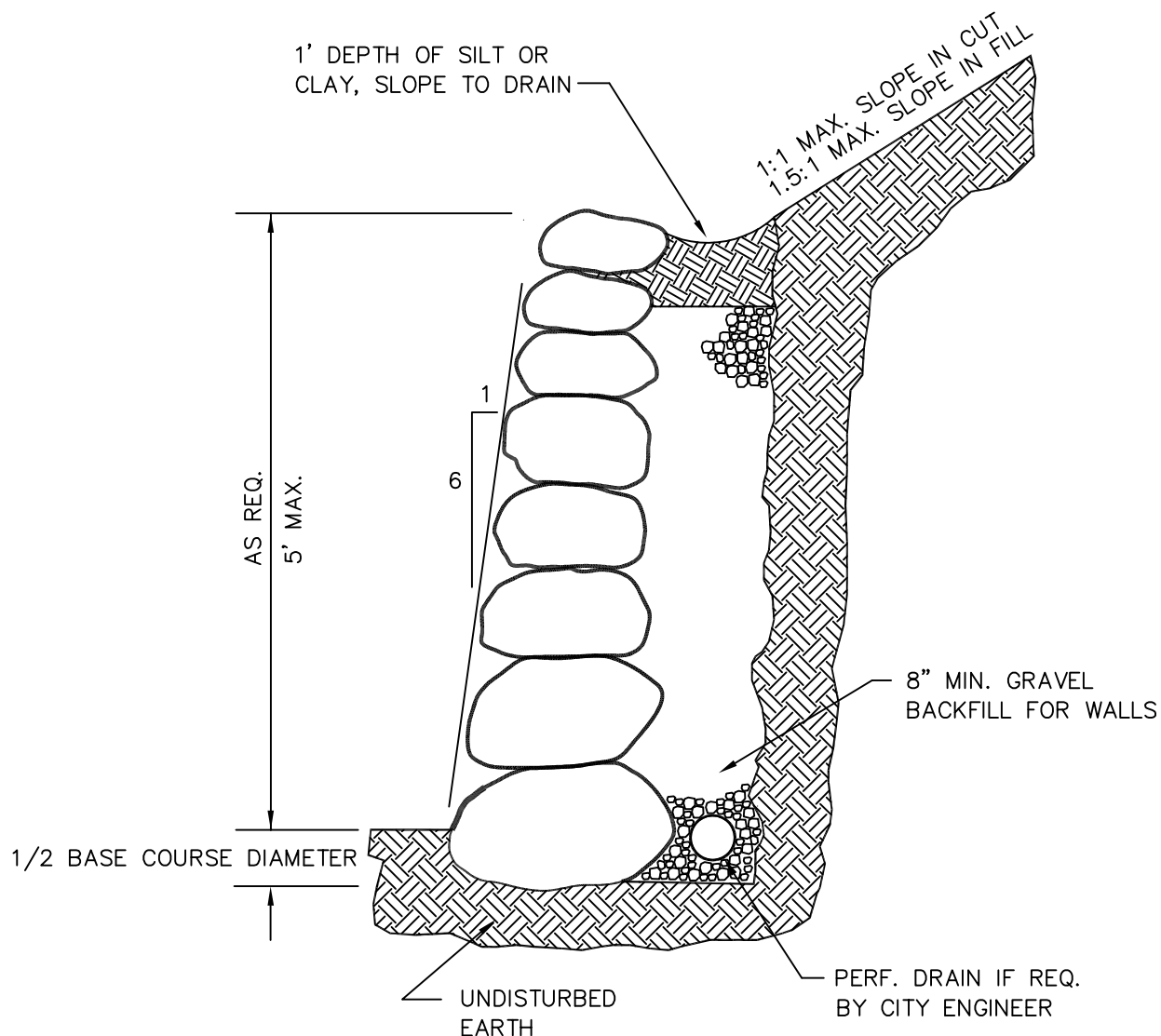
GENERAL NOTES:

1. THIS MONUMENT TO BE USED IN BITUMINOUS OR ASPHALT CONCRETE PAVEMENT WHERE CASED MONUMENT IS NOT REQUIRED
2. CONCRETE BASE DIMENSIONS SHOWN ARE MINIMUM. CONCRETE BASE NEED NOT BE FORMED.
3. CAP SHALL BE 2" MIN. DIAM. BRASS PLUG MARKER.
4. CONCRETE TO BE PLACED ON A FIRM AND UNYIELDING FOUNDATION.

CITY OF YELM DEPT. OF PUBLIC WORKS			
CAST IN PLACE MONUMENT			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			DATE
DES. S-C	DWN. S-C	CKD. S-C	DATE 10/3/94

JEG



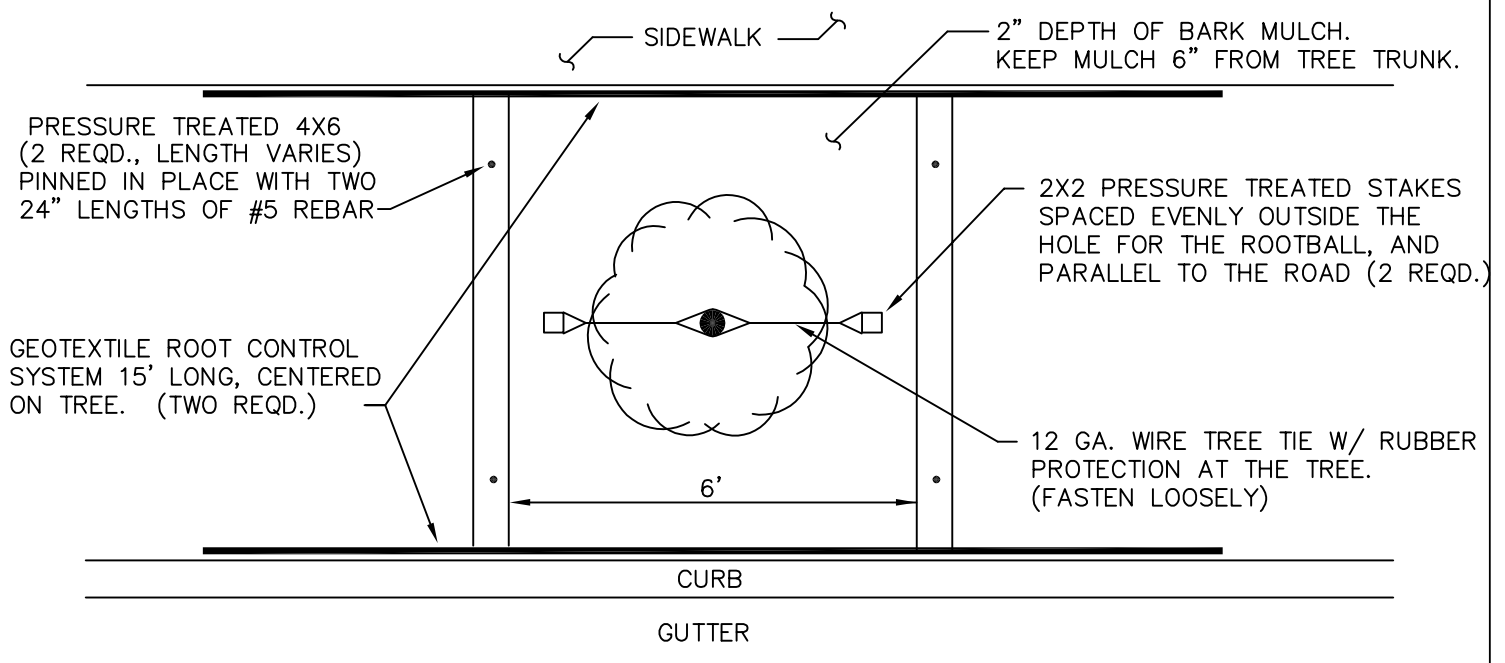


GENERAL NOTES:

1. ROCK WALLS SHALL BE CONSTRUCTED OF 3-MAN TO 2-MAN ROCKS FROM BOTTOM TO TOP. ROCK SIZES ARE AS FOLLOWS.
2-MAN ROCK (300 TO 600 LBS.) 13 INCHES IN LEAST DIMENSION.
3-MAN ROCK (600 TO 1200 LBS.) 16 INCHES IN LEAST DIMENSION.
2. THE ROCK WALL SHALL BE INSTALLED WITH A SMOOTH FACE.
3. THE LONG DIMENSION OF THE ROCKS SHALL BE PERPENDICULAR TO THE FACE OF THE WALL TO PROVIDE MAXIMUM STABILITY.
4. EACH ROCK SHALL BE PLACED SO AS TO LOCK INTO TWO ROCKS IN THE LOWER TIER.
5. CALL FOR INSPECTION PRIOR TO SETTING ANY ROCKS.
6. DESIGNS VARYING FROM THAT SHOWN SHALL CARRY THE SEAL OF A CIVIL ENGINEER.

JEG

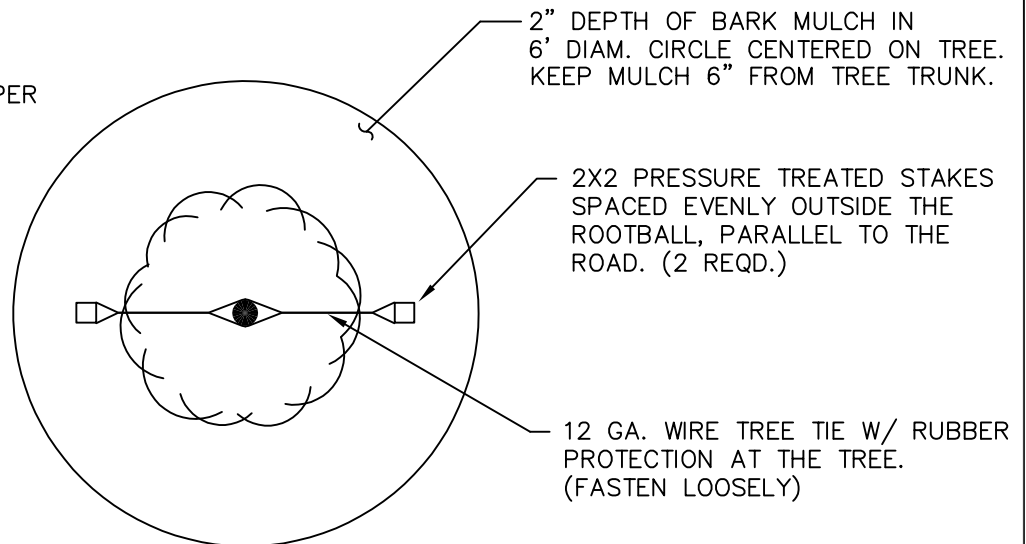
CITY OF YELM DEPT. OF PUBLIC WORKS			
ROCK WALL			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			2-18
DATE			
DES. S-C	DWN. S-C	CKD. S-C	DATE 10/3/94



FOR USE WHEN TREE IS WITHIN 6' OF CURB AND/OR SIDEWALK

STREET TREE SPECIFICATIONS:

1. TREES SHALL BE 2" TO 3" CALIPER MEASURED 6" ABOVE THE BASE.
2. TREES SHALL HAVE A MINIMUM 6 FOOT FREE-OF-BRANCH CLEARANCE, MEASURED FROM THE GROUND LINE TO THE FIRST BRANCH.
3. TREES SHALL BE SPACED 35 FEET ON CENTER STARTING 15 FEET FROM THE PROPERTY LINE.



FOR USE WHEN TREE IS NOT WITHIN 6' OF CURB AND/OR SIDEWALK

NOTES:

1. THE GEOTEXTILE ROOT CONTROL SYSTEM SHALL BE 12 INCH BIOBARRIER STRIPS, OR APPROVED EQUAL.
2. WIRE TREE TIE SHALL BE 42" ABOVE THE GROUND
3. FINISH GRADE FOR BARK MULCH SHALL BE 1 TO 2 INCHES BELOW SURROUNDING GRADE

CITY OF YELM
DEPT. OF PUBLIC WORKS

STREET TREE

APPROVED

DWG. NO.

PUBLIC WORKS DIRECTOR

DATE

2-19

DES.

DWN.

CKD.

DATE

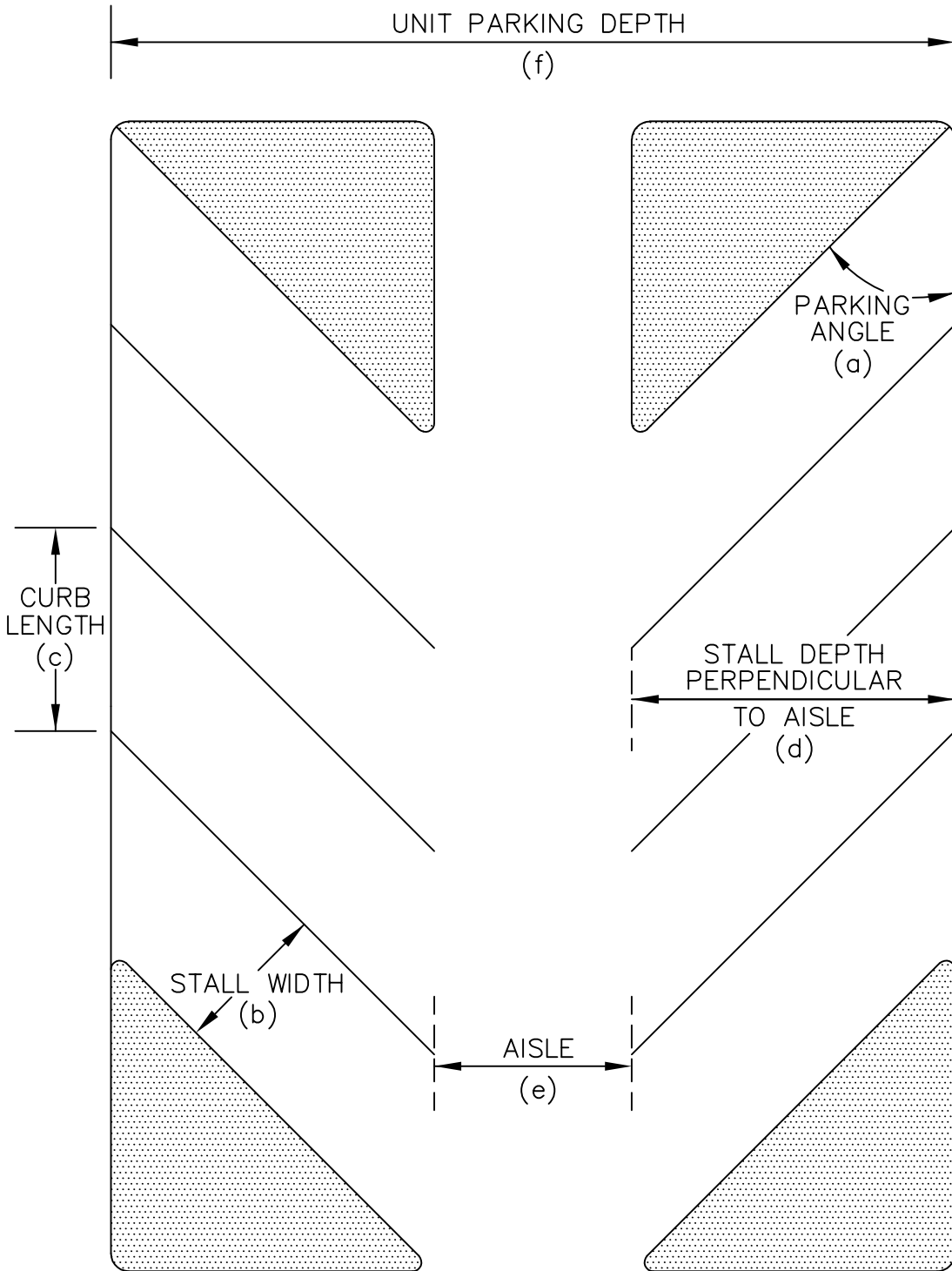
S-C

S-C

S-C

10/3/94.

JEG



CITY OF YELM
DEPT. OF PUBLIC WORKS

NOMENCLATURE OF
OFF-STREET
PARKING AREA

APPROVED

DWG. NO.

CITY ENGINEER

DATE

2-21

DES.

DWN.

CKD.

DATE

S-C

S-C

S-C

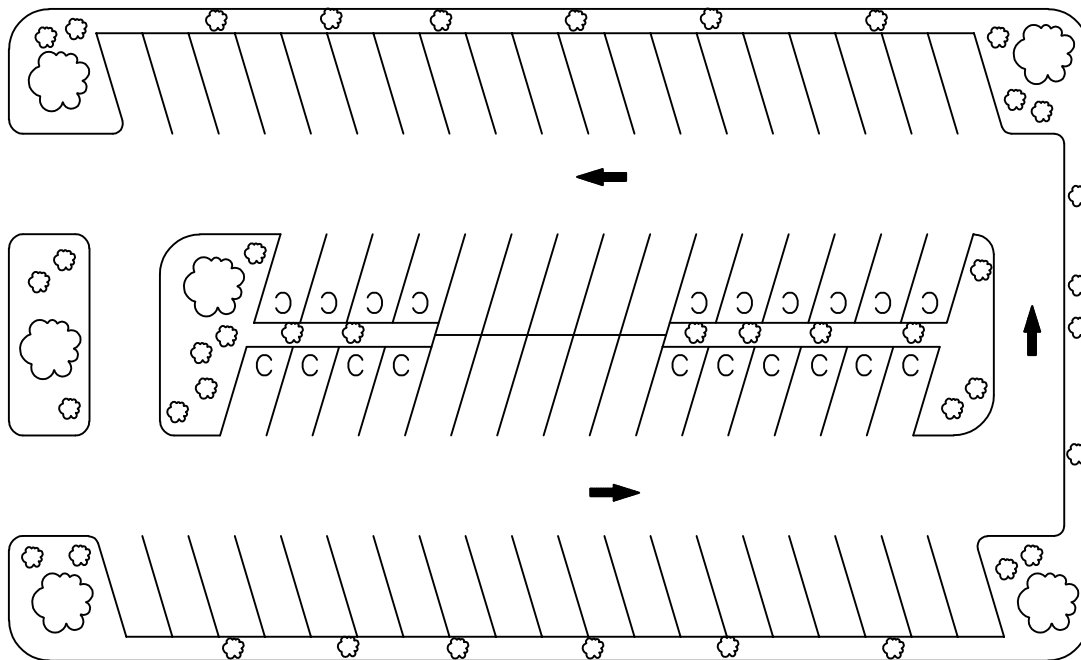
12/2/95

A	B	C	D	E		F	
PARKING ANGLE	STALL WIDTH	CURB LENGTH	STALL DEPTH	AISLE WIDTH 1-WAY	2-WAY	UNIT DEPTH 1-WAY	2-WAY
0	8.0*	20.0*	8.0*	12.0	20.0	**	**
	Min. 8.5	22.5	8.5	12.0	20.0	29.0	37.0
	Desired 9.0	22.5	9.0	12.0	20.0	30.0	38.0
30	8.0*	16.0*	15.0*	10.0	20.0	**	**
	Min. 8.5	17.0	16.5	10.0	20.0	43.0	53.0
	Desired 9.0	18.0	17.0	10.0	20.0	44.0	54.0
45	8.0*	11.5*	17.0*	12.0	20.0	**	**
	Min. 8.5	12.0	19.0	12.0	20.0	50.0	58.0
	Desired 9.0	12.5	19.5	12.0	20.0	51.0	59.0
60	8.0*	9.5*	18.0*	18.0	20.0	**	**
	Min. 8.5	10.0	20.0	18.0	20.0	58.0	60.0
	Desired 9.0	10.5	21.0	18.0	20.0	60.0	62.0
90	8.0*	8.0*	16.0*	23.0	23.0	**	**
	Min. 8.5	8.5	20.0	23.0	23.0	63.0	63.0
	Desired 9.0	9.0	20.0	23.0	23.0	63.0	63.0

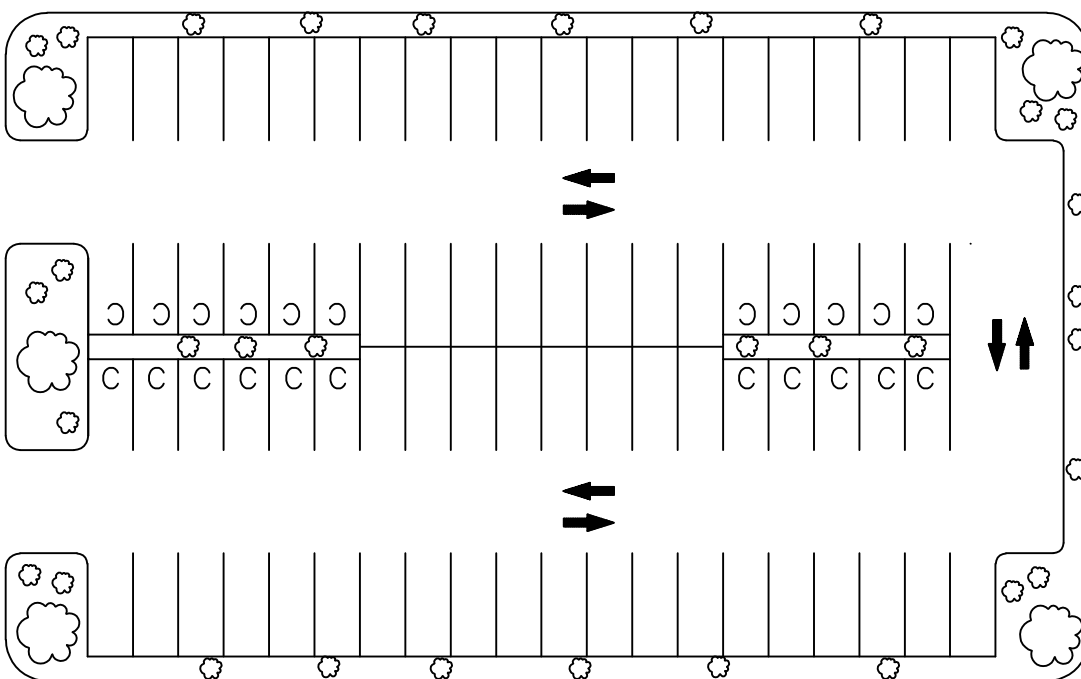
* FOR COMPACT STALL ONLY

** VARIABLE WITH COMPACT AND STANDARD COMBINATIONS

CITY OF YELM DEPT. OF PUBLIC WORKS			
MOST COMMON MINIMUM PARKING AREA DIMENSIONS			
APPROVED			DWG. NO.
CITY ENGINEER			DATE
DES. S-C	DWN. S-C	CKD. S-C	DATE 12/2/95

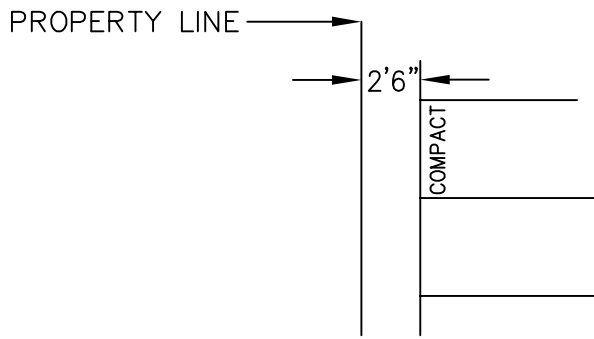


45°
ONE-WAY

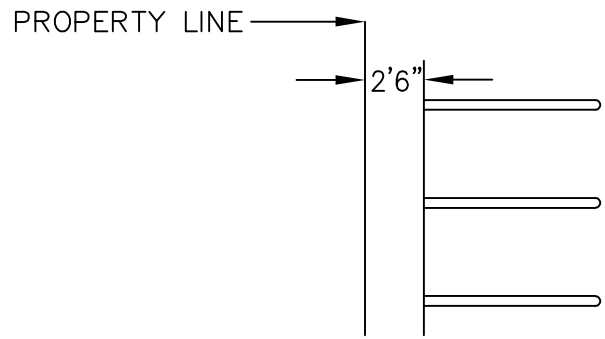


90°
TWO-WAY

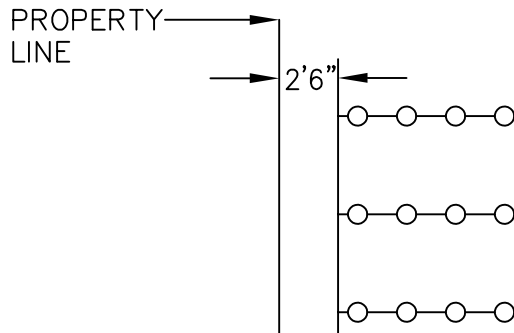
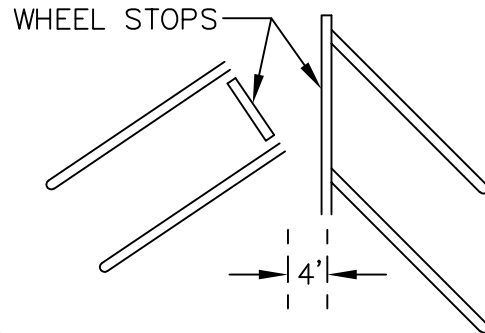
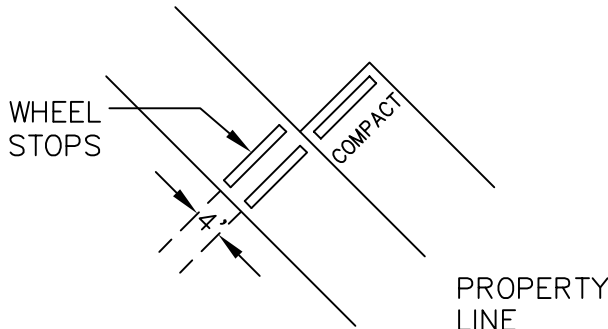
CITY OF YELM DEPT. OF PUBLIC WORKS			
EXAMPLES OF OFF-STREET PARKING			
APPROVED			DWG. NO.
CITY ENGINEER			DATE
DES.	DWN.	CKD.	DATE
S-C	S-C	S-C	12/2/95



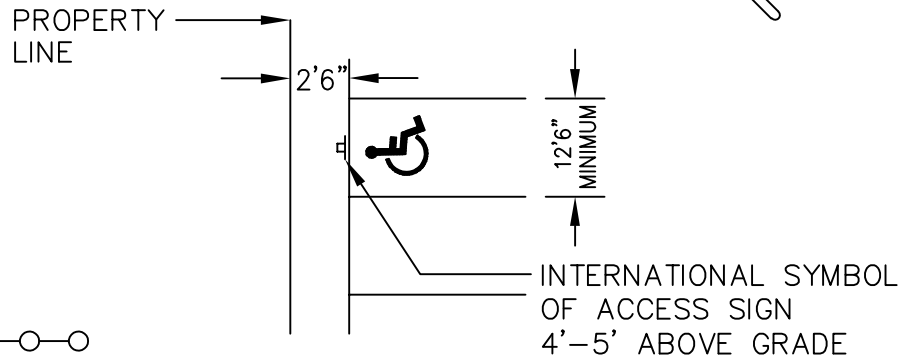
COMPACT MARKING



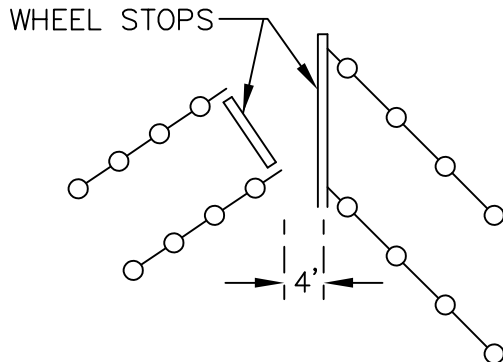
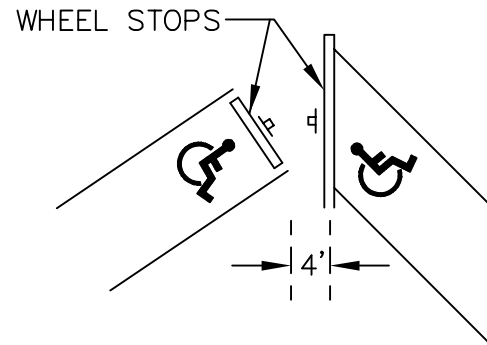
PAINTED HORSESHOE MARKING



METAL OR PLASTIC
TRAFFIC MARKING



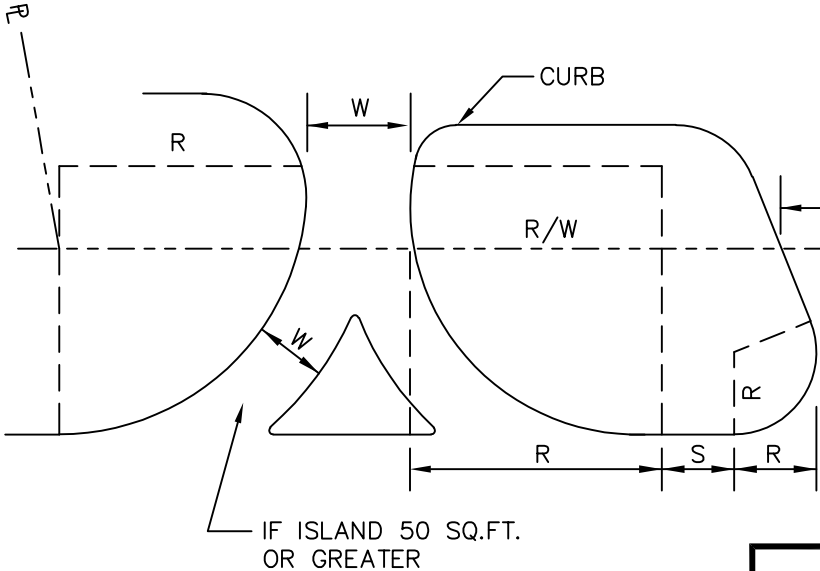
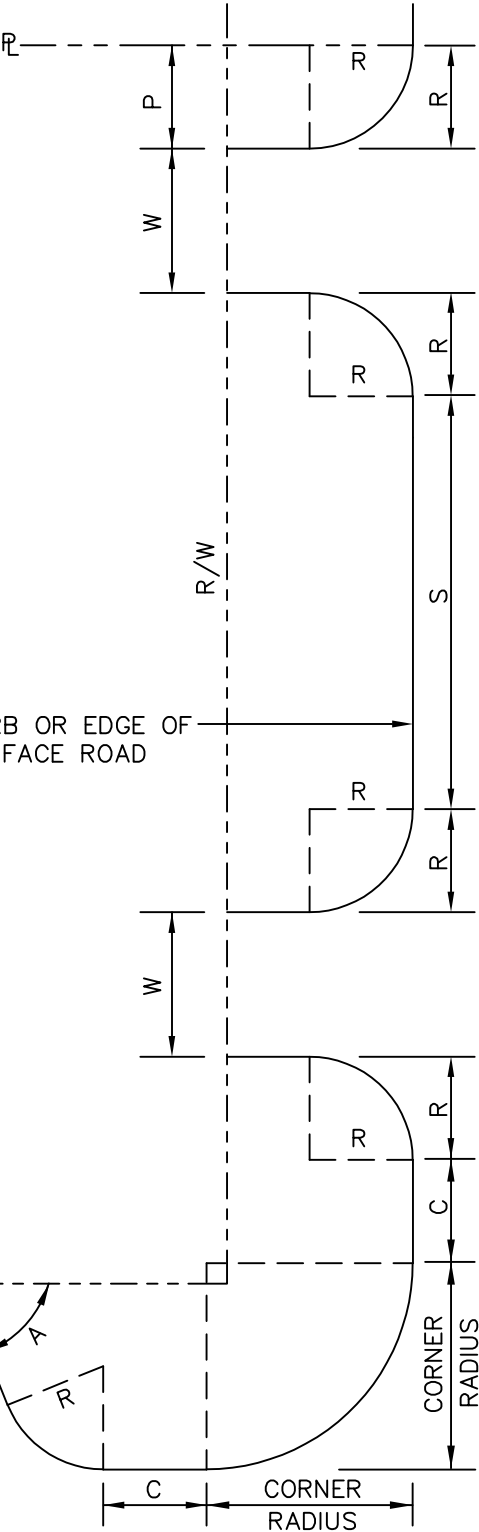
HANDICAP MARKING



CITY OF YELM DEPT. OF PUBLIC WORKS			
STALL MARKINGS AND WHEEL STOP LOCATIONS			
APPROVED			DWG. NO.
CITY ENGINEER		DATE	2-24
DES. S-C	DWN. S-C	CKD. S-C	DATE 12/2/95

RECOMMENDED BASIC DRIVEWAY DIMENSION GUIDELINES				
	DIMENSION REFERENCE	RESIDENTIAL	COMMERCIAL	INDUSTRIAL
MINIMUM LENGTH OF DRIVEWAY APPROACH 20' (RESIDENTIAL ONLY)				
NOMINAL WIDTH	W			
ONE-WAY		10	15	20
TWO-WAY		10	30	40
RIGHT TURN RADIUS	R			
MINIMUM		5	15	20
MINIMUM SPACING				
FROM PROPERTY LINE	P	0	0	-R
FROM STREET CORNER	C	5	10	10
BETWEEN DRIVEWAYS	S	3	3	10
MINIMUM ANGLE	A	40°	45°	30°

NOTE: MINIMUMS BASED ON LOCAL ACCESS AND LOW VOLUMES



CITY OF YELM DEPT. OF PUBLIC WORKS			
DRIVEWAY DIMENSIONS MEASUREMENTS			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			DATE
DES.	DWN.	CKD.	DATE
S-C	S-C	S-C	2-25 2/3/95

**YELM ENGINEERING SPECIFICATIONS AND STANDARD
DETAILS**

CHAPTER 3 STORM DRAINAGE

Table of Contents

CHAPTER 3.00 STORM DRAINAGE 2

3.00.010 GENERAL2

3.00.020 DESIGN STANDARDS2

3.00.030 CONVEYANCE2

3.00.040 STAKING.....3

3.00.040 TRENCH EXCAVATION.....3

3.00.050 BACKFILLING3

3.00.060 STREET PATCHING AND RESTORATION3

CHAPTER 3.00 STORM DRAINAGE

3.00.010 General

The standards established by this chapter are intended to represent the minimum standards for the design and construction of storm drainage facilities.

The design of storm drainage and or retention/detention systems shall be designed to meet or exceed the most current Stormwater Management Manual for Western Washington, as published by the Washington State Department of Ecology.

3.00.020 Design Standards

The following design considerations shall apply:

- A. The use of commercial parking lots for detention of storm water will be reviewed by the Director of Public Works and approved or denied based on the design. The detention area shall be situated away from areas of pedestrian movement unless means for rapid closing of the areas is incorporated in the design, the maximum depth of water in parking lot storage shall be limited to 12 inches.
- B. Maximum catch basin spacing shall be 300 feet on arterials and collectors and 500 feet on all other street classifications. No surface water shall cross any roadway.

3.00.030 Conveyance

- A. Pipe: Storm drain pipe within a public Right-of-Way or easement shall be sized to carry the maximum anticipated runoff from the possible contributing area.

The minimum main size shall be 8 inches diameter. Lateral lines may be 6 inches diameter. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to serve adjacent areas or for future service.

All pipe for storm mains shall comply with one of the following types:

- 1. Polyvinyl Chloride: PVC pipe per WSDOT/APWA Standard Specifications.
- 2. Plain Concrete: Plain concrete pipe per WSDOT/APWA Standard Specifications.
- 3. Reinforced Concrete: Reinforced concrete pipe per WSDOT/APWA Standard Specifications.

4. Ductile Iron: Ductile iron pipe per chapter 4.00.030.

5. Polyethylene: PE smooth wall pipe per Advanced Drainage Systems (ADS) N-12 constructed per WSDOT/APWA Standard Specifications.

B. Channels: The City encourages the use of open vegetated channels to convey stormwater runoff when possible. Any open channels proposed to be located within public Right-of-Way shall require special approval from the Director of Public Works.

3.00.040 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of storm sewer systems shall be as directed by the City Engineer or as follows:

- A. Stake centerline alignment every 50 feet with cut or fill to invert of pipe.
- B. Stake location of all catch basins, manholes and other fixtures for grade and alignment with cut or fill to rim and invert of all pipes.
- C. Grade stake or slope stake (as appropriate) at intervals, sufficient to control location, size and depth of retention/detention facilities.

3.00.040 Trench Excavation

See Chapter 4.00.170 for requirements regarding trench excavation.

3.00.050 Backfilling

See Chapter 4.00.190 for requirements regarding backfilling.

3.00.060 Street Patching and Restoration

See Sections 2.10.130 and 2.10.140 YDS for requirements regarding street patching and trench restoration.

YELM ENGINEERING SPECIFICATIONS AND STANDARD DETAILS

CHAPTER 4 WATER

Table of Contents

CHAPTER 4.00	WATER	2
4.00.010	GENERAL	2
4.00.020	DESIGN STANDARDS	2
GENERAL NOTES (WATER MAIN INSTALLATION)		2
PROCESS TO OBTAIN WATER SERVICE		5
4.00.030	MAIN LINE	6
4.00.040	CONNECTION TO EXISTING WATER MAIN	7
4.00.050	SERVICE INTERRUPTION	7
4.00.060	HYDRANTS	7
4.00.070	VALVES	9
4.00.080	CASING	10
4.00.090	AIR AND VACUUM RELEASE VALVE	10
4.00.100	BLOWOFF ASSEMBLY	10
4.00.110	BACKFLOW PREVENTION	10
4.00.120	SERVICE CONNECTION	11
4.00.130	MARKING SERVICE LINES ON CURBS	11
4.00.140	WATER MAIN/SANITARY SEWER CROSSINGS	12
4.00.150	IRRIGATION	13
4.00.160	STAKING	14
4.00.170	TRENCH EXCAVATION	14
4.00.180	THRUST BLOCKING	15
4.00.190	BACKFILLING	15
4.00.200	STREET PATCHING AND RESTORATION	15
4.00.210	HYDROSTATIC TESTS	16
4.00.220	STERILIZATION AND FLUSHING	16
4.00.230	FENCING AT WATER METERS	16
4.00.240	LANDSCAPING, WATER METERS AND FIRE HYDRANTS	16
LIST OF DRAWINGS - WATER		18

CHAPTER 4.00 WATER

4.00.010 General

Any extension of the Yelm Water System must be approved by the Director of Public Works and, all extensions must conform to DOH and the Coordinated Water System Plan, City of Yelm Water System Plan, and South East Thurston Fire Authority requirements.

In designing and planning for any development, it is the developer's responsibility to see that adequate water for both domestic use and fire protection is attainable. The developer must show, in the proposed plans, how water will be supplied and whether adequate water pressure will be attained in case of fire. An analysis of the system may be required if it appears that the system might be inadequate.

Prior to the release of any water meters, all Public Works improvements must be completed and approved including granting of Right-of-Way or easements, and all applicable fees must be paid.

Issuance of building permits for new construction of single family subdivisions shall not occur until final Public Works approval is given. For commercial projects, building permits may be issued upon completion and acceptance of the required fire protection facilities. A performance bond, in accordance with Section 1.00.050 YDS, will be required for the remaining Public Works improvements. Certificate of occupancy will not be issued until final Public Works approval is given for all improvements.

4.00.020 Design Standards

The design of any water extension/connection shall conform to City Standards and any applicable standards as set forth herein and in Section 1.00.010 YDS.

The layout of extensions shall provide for the future continuation and/or "looping" of the existing system as determined by the City. In addition, main extensions shall be extended as required in Section 1.00.095 YDS.

The General Notes on the following page shall be included on any plans dealing with water system design.

GENERAL NOTES (WATER MAIN INSTALLATION)

- A. All workmanship and material shall be in accordance with City of Yelm standards and the most current copy of the State of Washington Standard Specifications for Road, Bridge and Municipal Construction.
- B. All work in City right-of-way requires a permit from the City of Yelm. Prior to any work commencing, the general contractor shall arrange for a preconstruction meeting to be attended by all major contractors,

representatives of involved utilities, and the City of Yelm. The Contractor is responsible to have a set of approved plans at the meeting.

C. Water mains shall meet the following specifications:

1. Polyvinyl Chloride (PVC) Pipe (under 4 inches): Pipe material shall be PVC 1120, PVC 1220, or PVC 2120, and have minimum wall thickness equal to or less than the Standard Dimension Ratio (SDR) of 21, and meet the requirements of WSDOT Standard Specifications Section 9-30.1(5)B.
2. Polyvinyl Chloride (PVC) Pipe (4 through 12 inches): Shall meet the requirements of AWWA C900, Class 150 wall thickness equal to or greater than the SDR of 18, and meet the requirements of WSDOT Standard Specifications Section 9-30.1(5)A.
3. Polyvinyl Chloride (PVC) Pipe (14 through 20 inches): Shall meet the requirements of AWWA C905 wall thickness equal to or greater than the SDR of 18.
4. Ductile Iron Pipe (DIP): DIP shall conform to AWWA C151 Class 50 or greater, and shall be 1/16-inch cement lined and sealed in accordance with ANSI/AWWA C104/A21.4-90, and meet the requirements of WSDOT Standard Specifications Section 9-30.2.(1). Six-inch fire hydrant spools shall be Class 52.

D. Gate valves shall be resilient wedge, NRS (Non Rising Stem) with O-rings seals. Valve ends shall be mechanical joint or ANSI flanges. Valves shall conform to AWWA 509-80. Valves shall be Mueller, M & H, Kennedy, Clow R/W or Waterous Series 500. Existing valves to be operated by City employees only.

E. Hydrants shall be M & H Reliant Style 929, Mueller Centurion, or Clow Medallion or AVK. Hydrants shall be bagged until system is approved.

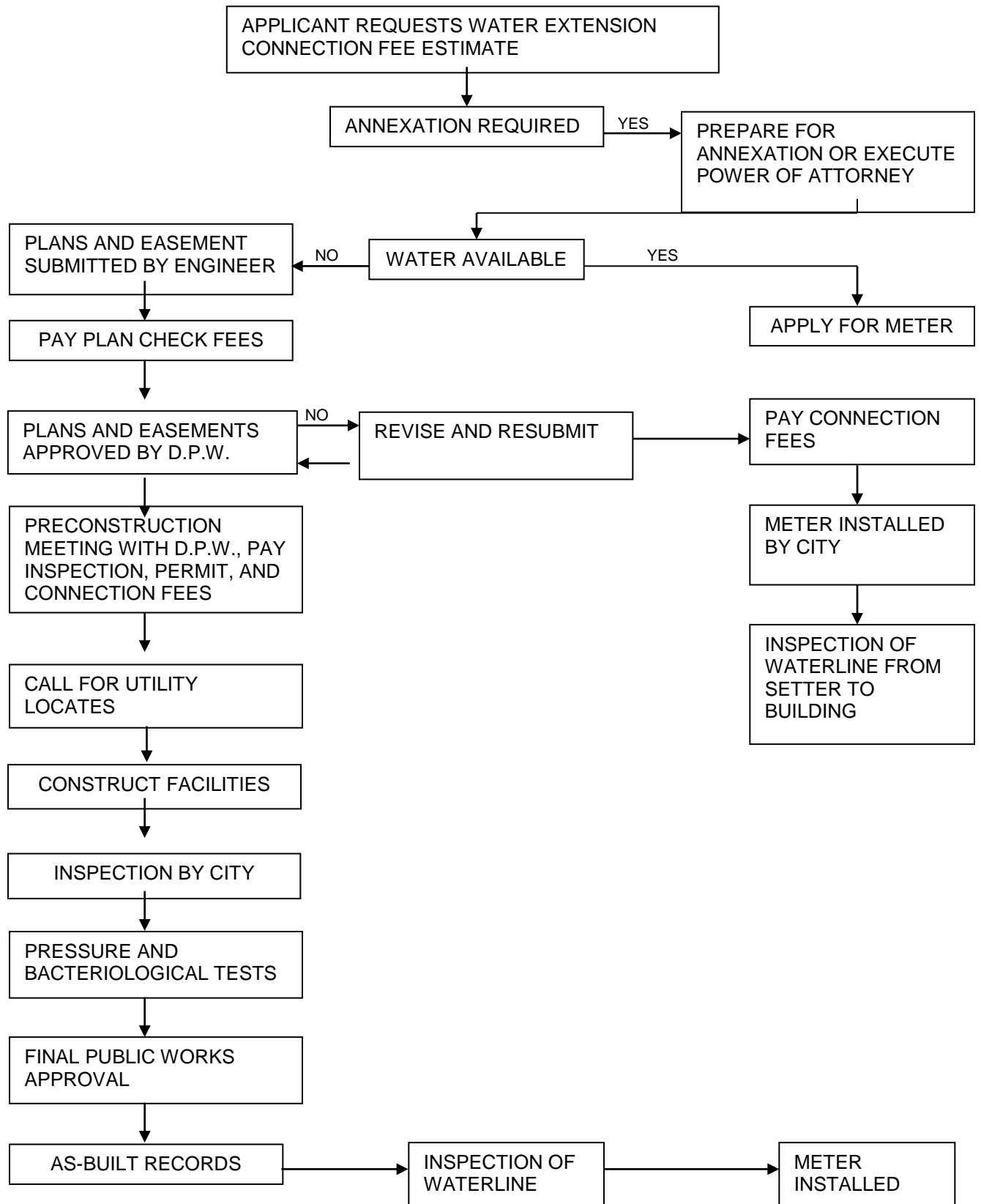
F. All lines shall be chlorinated and tested in conformance with the above referenced specification (Note 1).

G. All pipe and services shall be installed with continuous tracer tape installed 12" to 18" under the final ground surface. The marker shall be plastic non-biodegradable, metal core or backing marked water 2-inch-wide minimum, which can be detected by a standard metal detector. Tape shall be Terra Tape "D" or approved equal. In addition to tracer tape, install 14 gauge heavy duty direct bury coated copper wire (PAIGE "UF" single conductor or equal), wrapped around the pipe, brought up and tied off at valve body. All wire connections shall use wire nuts and a DBR Splice Kit, manufactured by 3-M or approved

equal. All locator wire for service pipe shall be connected to the locator wire on the water main.

- H. Provide traffic control plan(s) as required in accordance with MUTCD.
- I. All water mains shall be staked for grades and alignment by an engineering or surveying firm capable of performing such work.
- J. All service line locations shall be marked on the face of the curb with an embossed "W" 1/4 inch into concrete.
- K. Call Underground Locate at 1-800-424-5555 a minimum of 48 hours prior to any excavations.
- L. The City will be given 72 hours' notice prior to scheduling a shutdown. Where connections require "field verification", connection points will be exposed by contractor and fittings verified 48 hours prior to distributing shut-down notices.
- M. At any connection to an existing line where a new valve is not installed, the existing valve must be pressure tested to City standards prior to connection. If an existing valve fails to pass the test, the contractor shall make the necessary provisions to test the new line prior to connection to the existing system or install a new valve.
- N. After completion of all items shown on these plans and before acceptance of the project, the contractor shall obtain a "punch list" prepared by the City's Inspector detailing remaining items of work to be completed. All items of work shown on these plans shall be completed to the satisfaction of the City prior to acceptance of the water system and provision of water service.
- O. A copy of these approved plans and applicable city developer specifications and details shall be onsite during construction.
- P. Any revisions made to these plans must be reviewed by the developer's engineer and the City of Yelm prior to any implementation in the field. The City shall not be responsible for any errors and/or omissions on these plans.

PROCESS TO OBTAIN WATER SERVICE



4.00.030 Main Line

- A. Water mains shall be sized to provide adequate domestic plus fire flow at the required residual pressure. Fire flow requirements will be determined by South East Thurston Fire Authority, however, the quantity of water required will in no case be less than 750 GPM at 20 psi residual pressure.

The minimum water main size shall be 6 inches diameter as long as fire flow requirements can be met. Larger size mains are required in specific areas outlined in the Coordinated Water System Plan. Nothing shall preclude the City from requiring the installation of a larger sized main in areas not addressed in the Coordinated Water System Plan if the City determines a larger size is needed to meet fire protection requirements or for future service.

- B. All pipe for water mains shall have flexible gasketed joints and shall comply with one of the following types:

Water mains shall meet the following specifications:

1. Polyvinyl Chloride (PVC) Pipe (under 4 inches): Pipe material shall be PVC 1120, PVC 1220, or PVC 2120, and have minimum wall thickness equal to or less than the Standard Dimension Ratio (SDR) of 21, and meet the requirements of WSDOT Standard Specifications Section 9-30.1(5)B.
 2. Polyvinyl Chloride (PVC) Pipe (4 through 12 inches): Shall meet the requirements of AWWA C900, Class 150 wall thickness equal to or less than the SDR of 18, and meet the requirements of WSDOT Standard Specifications Section 9-30.1(5)A.
 3. Polyvinyl Chloride (PVC) Pipe (14 through 20 inches): Shall meet the requirements of AWWA C905 wall thickness equal to or greater than the SDR of 18.
 4. Ductile Iron Pipe (DIP): DIP shall conform to AWWA C151 Class 50 or greater, and shall be 1/6-inch cement lined and sealed in accordance with ANSI/AWWA C104/A21.4-90, and meet the requirements of WSDOT Standard Specifications Section 9-30.2.(1). Six-inch fire hydrant spools shall be Class 52.
- C. All fittings for ductile iron pipe or PVC pipe shall be ductile iron compact fittings conforming to AWWA C 153 or Class 250 gray iron conforming to AWWA C 110 and C 111. All shall be cement mortar lined conforming to AWWA C 104. Plain end fittings shall be ductile iron if mechanical joint retainer glands are installed on the plain

ends. All fittings shall be connected by flanges or mechanical joints.

- D. All pipe and services shall be installed with continuous tracer tape installed 12" to 18" under the final ground surface. The marker shall be plastic non-biodegradable, metal core or backing marked water 2-inch-wide minimum, which can be detected by a standard metal detector. Tape shall be Terra Tape "D" or approved equal. In addition to tracer tape, install 14 gauge heavy duty direct bury coated copper wire (PAIGE "UF" single conductor or equal), wrapped around the pipe, brought up and tied off at valve body. All wire connections shall use wire nuts and epoxy DBY water connection kit.
- E. The minimum cover for all water mains from top of pipe to finish grade shall be 42 inches unless otherwise approved.
- F. No trees shall be planted closer than 5 feet to the water main.

4.00.040 Connection To Existing Water Main

The developer's engineer shall be responsible for determining the scope of work for connection to existing water mains. See drawing number 4-10.

It shall be the Contractor's responsibility to field verify the location and depth of the existing main and the fittings required to make the connections to the existing mains. All fittings shall be approved by the Water Department prior to installation.

4.00.050 Service Interruption

The contractor shall give the City a minimum of 72 hours notice of any planned connection to an existing pipeline. This includes all cut-ins and live taps. Notice is required so any disruptions to existing services can be scheduled. The City will notify customers involved or affected of the water service interruption. The contractor shall make every effort to schedule water main construction with a minimum interruption of water service. In certain situations, the City may dictate scheduling of water main shutdowns so as not to impose unnecessary shutdowns during specific periods to existing customers.

4.00.060 Hydrants

- A. The lead from the service main to the fire hydrant shall be ductile iron cement mortar lined Class 52 no less than 6 inches in diameter. MJ joint shall be restrained with wedge action retainer glands, MegaLug 1006 or approved equal.

- B. Fire Hydrants, shall have two, 2-1/2 inch outlets and one 4-1/2 inch pumper port outlet. All outlet ports shall be National Standard thread. The valve opening shall be no less than 5-1/4 inch diameter with a 5-inch "Storz" coupling and blind flange cap installed on the steamer port. The hydrant shall have a positive and automatic barrel drain and shall be of the "traffic safety" or break-away style; i.e., when accidentally broken off, water will not flow.

All hydrants shall be center-stem compression design, valve shall open against pressure.

Hydrants shall be M & H Reliant Style 929 or Mueller Centurion, or Clow Medallion or American AVK Series 2780. All hydrants shall be bagged until system is approved.

- C. The Department of Public Works and South East Thurston Fire Authority work together to insure that adequate hydrant spacing and installation are achieved.

Unless otherwise required by the governing authority, the following guidelines shall apply for hydrant number and location:

1. At least one hydrant shall be installed at all intersections.
 2. Hydrant spacing of 330 feet shall be required in all areas except single family and duplex residential areas.
 3. Hydrant spacing of 660 feet shall be required for single family and duplex residential areas.
 4. Hydrants located in cul-de-sac or dead end areas either by design, topographic or manmade feature which prohibit straight line distance measurement, shall be located to serve no more than 120,000 square feet, and be served by an 8-inch-minimum main.
 5. When any portion of a proposed building is in excess of 150 feet from a water supply on a public street, there shall be provided, when required by the fire chief, on-site hydrants and mains capable of supplying the required fire flow. Such hydrants shall be located as may be required by the South East Thurston Fire Authority and easements for such hydrants shall be granted to the City.
- D. Fire hydrants shall be set as shown in drawing number 4-7.
- E. For requirement regarding use, size and location of a fire department connection (FDC) and/or post indicator valve contact

South East Thurston Fire Authority. Location of FDC shall be shown on water plans.

- F. Where needed, the Department of Public Works or South East Thurston Fire Authority will require hydrants to be protected by two or more posts, each eight inches in diameter by five feet in height made of either reinforced concrete or steel. Post shall be painted to match hydrant color.
- G. Fire hydrants must be installed, tested, and accepted prior to the
- H. Fire Hydrants must have 3 foot of clearance around them.
- I. Hydrant locks are required to be installed as part of the City's water conservation and accountability program. Hydrant locks and adapters are purchased from the City.

4.00.070 Valves

Where possible, valves shall be located at tee's or crosses, and be flanged by mechanical joints.

All valves and fittings shall be ductile iron with ANSI flanges or mechanical joint ends. All existing valves shall be operated by City employees only.

Valves shall be installed in the distribution system at sufficient intervals to facilitate system repair and maintenance, but in no case shall there be less than one valve every 1000 feet. Generally, there shall be two valves on each tee and three valves on each cross. Specific requirements for valve spacing will be made at the plan review stage.

- A. Gate Valves, 6 inch to 12 inch. The design, materials and workmanship of all gate valves shall conform to AWWA C509-80 latest revision. Gates valves shall be resilient wedge non-rising stem (NRS) with two internal O-ring stem seals. Gate valves shall be Mueller, M & H, Kennedy, Clow R/W or Waterous Series 500.

Gate valves shall be used on all 2 to 12-inch lines.

- B. Butterfly Valves. Butterfly valves shall conform to AWWA C504, Class 150B, with cast iron short body and O-ring stem seals. Butterfly valves shall be Mueller, Linseal III, M & H, Pratt Ground hog, or Allis Chalmers.

Butterfly valves shall be used on all lines 14 inches and larger.

- C. Valve Box. All valves shall have a standard Inland Foundry, 910 or equal water valve box set to grade with a 6 inch ASTM SDR 21 PVC riser from valve to within 4 to 6 inches of valve box top. If valves are not set in paved area, a 3 foot by 3 foot by 4 inch concrete pad

shall be set around each valve box at finished grade. In areas where valve box falls in road shoulder, the ditch and shoulder shall be graded before placing asphalt or concrete pad. See drawing number 4-11.

- D. Valve marker Post. Valve marker posts shall be 4 inch x 4 inch reinforced concrete or schedule 40 steel posts 5 feet long stamped with "W" and distance to valve. Post shall be painted with 1 base coat and 2 coats white oil base enamel. See drawing number 4-12.

4.00.080 Casing

Steel casing shall be designed to a minimum of H2O loading. Pipe spacers shall be Cascade style CC5 with 8 inch runners as available from Cascade Waterworks. Casing pipe and spacers shall be sized for pipe being installed. Install minimum of three spacers per section of pipe.

4.00.090 Air and Vacuum Release Valve

Combination air and vacuum release valves (ARV) shall be 2" combination air release valve, or approved equal. Installation shall be as shown on drawing number 4-8.

The installation shall be set at the high point of the line when required. Where possible, pipes are to be graded to prevent the need for an air release valve. Air release valves may not be required when services are in the vicinity.

4.00.100 Blowoff Assembly

If a fire hydrant is not located at the end of a dead end main, a blowoff assembly shall be required. On water mains which will be extended in the future, the valve which operates the blowoff assembly shall be the same size as the main and provided with a concrete thrust block. The pressure rating for blowoff assemblies shall be 200 psi. Installation shall be as shown on drawing number 4-9.

4.00.110 Backflow Prevention

All water system connections to serve buildings or properties with domestic potable water, fire sprinkler systems, or irrigation systems shall comply with the minimum backflow requirements as established by the Department of Health (DOH) and the City of Yelm.

The installation of all backflow devices is required to protect the existing water system and users from possible contamination.

Public Works shall get the certificate for testing of any backflow prevention device before releasing the certificate of occupancy on any building. Test may be performed by any person certified by the

Washington State Board of Health. A list of approved testers may be obtained from Washington Environmental Training Resource Center (WETRC) located in Auburn, Washington.

South East Thurston Fire Authority will test the fire line and obtain the certificate for underground piping. In any situation, South East Thurston Fire Authority No. 2 will not test their portion of underground until Public Works has tested and approved their main up to the fire line.

4.00.120 Service Connection

- A. All service connections relating to new development shall be installed by the developer at the time of mainline construction. After the lines have been constructed, tested and approved the owner may apply for a water meter. The City will install a water meter after the application has been made and all applicable fees have been paid. Water meters will be set only after system is inspected and final approval is given.
- B. When water is desired to a parcel fronting an existing main but not served by an existing setter, an application must be made to the City. Upon approval of the application and payment of all applicable fees, the City will tap the main, and install the meter, box, and setter.
- C. Service lines shall be one inch high density polyethylene pipe, minimum pressure class 200 psi DR7, Phillips Drisco 5100 Ultra-Line, or Westflex. No glued joints will be accepted. Service lines shall be installed 90 degrees off the main. Tracer tape and wire wrapped around the pipe shall be installed on all service lines.
- D. Service saddle shall be all ductile iron body with stainless steel straps and shall be Romac style 202S, Rockwell 313 or approved equal. All clamps shall have rubber gasket and iron pipe threaded outlets.
- E. Corporation stop shall be all bronze, lead free, and shall be Ford type FB1101 or approved equal with iron pipe threads conforming to AWWA C 800. Stainless steel inserts shall be used with pack joints and polyethylene pipe.
- F. Master meters will not be allowed for service to more than one per building. An approved backflow prevention system must be installed in conjunction with any master meter. Deviations to this may be granted by the Director of Public Works.

4.00.130 Marking Service Lines on Curbs

The location of all service lines shall be marked on the face or top of the cement concrete curb with a "W" 1/4 inch into concrete.

4.00.140 Water Main/Sanitary Sewer Crossings

The Contractor shall maintain a minimum of 18 inches of vertical separation between sanitary sewers and water mains. The minimum cover for water main of 42 inches may be reduced to 24 inches upon approval by the City to provide for as much vertical separation as possible.

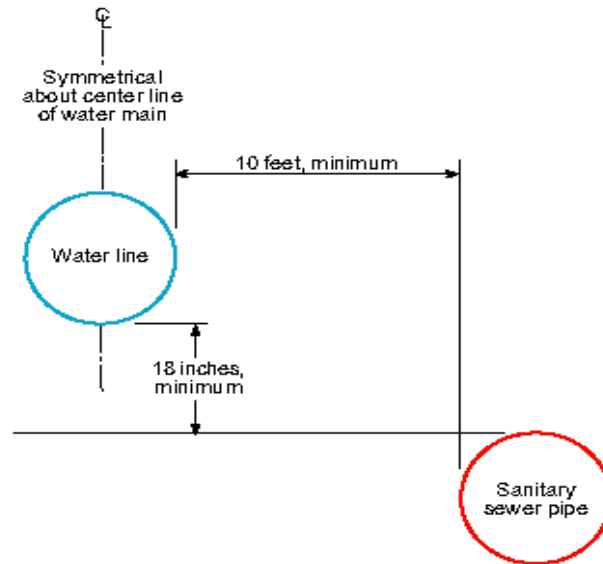
The longest standard length of water pipe shall be installed so that the joints will fall equidistant from any sewer crossing. In some cases where minimum separation cannot be maintained, it may be necessary to encase the water pipe and/or sewer service in pipe or concrete. No concrete shall be installed unless specifically directed by the City.

Taken from: "Criteria for Sewage Works Design"

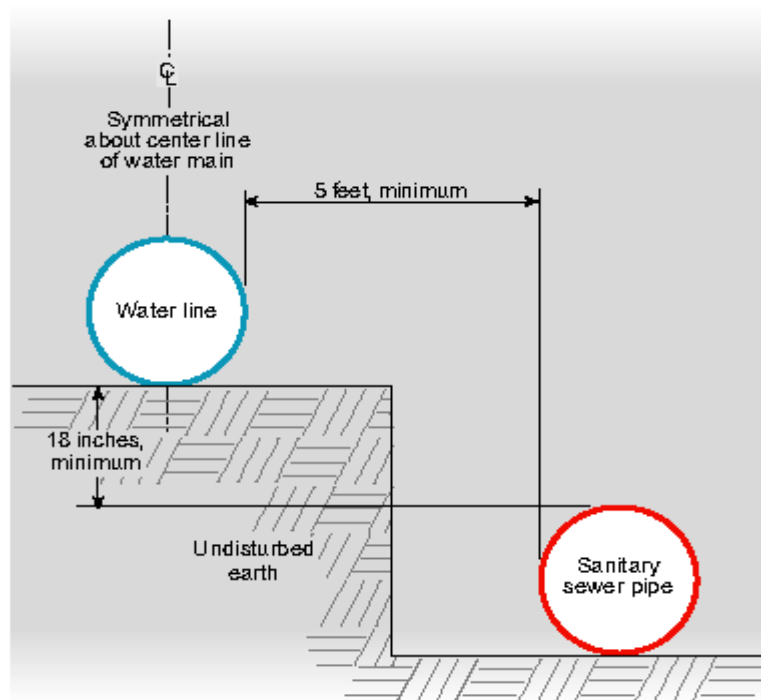
By: "State of Washington Department of Ecology,
December 1998.

Situations not addressed below shall follow the criteria as outlined in the most current edition of the above mentioned document.

WATER MAIN STANDARD PIPE MATERIAL			
	AWWA (ASTM) Standard		
Type of Pipe	PIPE	JOINT	FITTINGS
Ductile Iron – Class 50	C151 & C104	C111	C110 & C153
Polyvinyl-Chloride – Class 150	C900	D3139 & 477	C110 & FC153
Concrete Cylinder	C303		



Required Separation Between Water Lines and Sanitary Sewers, Parallel Construction



Required Separation Between Water Lines and Sanitary Sewers, Unusual Conditions Parallel Construction

4.00.150 Irrigation

All irrigation systems shall be installed with an approved backflow prevention assembly approved by the Department of Health.

Irrigation sprinklers shall be situated so as to not wet any public street or sidewalk.

4.00.160 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of waterlines shall be as directed by the City Engineer or as follows:

- A. Stake centerline alignment every 50 feet with cut or fill to invert of pipe maintaining 42 inches of cover over pipe. Cuts are normally not required when road grade has been built to subgrade elevation.
- B. Stake alignment of all fire hydrants, tees, water meters, setters and other fixtures and mark cut or fill to hydrant flange finished grade.

4.00.170 Trench Excavation

- A. Clearing and grubbing where required shall be performed within the easement or public Right-of-Way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the owner or contractor in accordance with the terms of all applicable permits. Temporary erosion control measures shall be installed and approved by the City Inspector prior to any excavations.
- B. Trenches shall be excavated to the line and depth designated by the Engineer to provide a minimum of 42 inches of cover over the pipe. Except for unusual circumstances where approved by the City, the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench. The owner shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.

- C. The contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below water main grade. Where materials are removed from below water main grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted Section 4.00.190 YDS.
- D. Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without approval of the City, and shall be in conformance with Washington Industrial Safety and Health Administration (WISHA) and Office of Safety and Health Administration (OSHA) Safety Standard.
- E. The bottom of the trench shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to make up the joint.

4.00.180 Thrust Blocking

Location of thrust blocking shall be shown on plans. Thrust block concrete shall be commercial Class 3000 psi poured against undisturbed earth. A plastic barrier shall be placed between all thrust blocks and fittings.

See drawing number 4-13 and 4-14 for thrust block locations and calculations.

4.00.190 Backfilling

Backfilling and surface restoration shall closely follow installation of pipe so that not more than 100 feet is left exposed during construction hours without approval of the City. All trenches shall be backfilled during non-working hours unless otherwise approved by the City. Selected backfill material shall be sorted or screened so that the maximum aggregate is 4 inches and placed and compacted around and under the water mains by hand tools to a height of 6 inches above the top of the water main. The remaining backfill shall be compacted to 95 percent of the maximum density in traveled areas, 90 percent outside traveled area. Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction. See Standard Drawing No. 4-15 for backfill and bedding materials.

4.00.200 Street Patching and Restoration

See Chapter 2 for requirements regarding street patching and trench restoration.

4.00.210 Hydrostatic Tests

Prior to the acceptance of the work, the installation shall be subjected to a hydrostatic pressure test of 200 psi for 15 minutes, and any leaks or imperfections developing under said pressure shall be remedied by the contractor. No main shall be hydrostatically tested until the lines are flushed of chlorine. The main shall be tested between valves. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. Test pressure shall be maintained while the entire installation is inspected.

The contractor shall provide all necessary equipment and shall perform all work connected with the tests. Tests shall be made after all connections have been made and the roadway section is constructed to subgrade. This is to include any and all connections as shown on the plan. The contractor shall perform the test to assure that the equipment to be used for the test is adequate and in good operating condition and the air in the line has been released before requesting the City to witness the test.

See Section 4.00.110 for testing responsibilities for backflow prevention devices.

4.00.220 Sterilization and Flushing

Sterilization of water mains shall be accomplished by the contractor in accordance with the requirements of the Washington State Department of Health and in a manner satisfactory to the City. At no time shall chlorinated water from a new main be flushed into a body of fresh water. This is to include lakes, rivers, streams, drainage ways, and any and all other waters where fish or other natural water life can be expected.

When a chlorine concentration has been established throughout the line, the valves shall be closed and the line left undisturbed for 24 hours. The line shall then be thoroughly flushed and water samples taken by the contractor at least 24 hours after flushing and disinfecting for approval by the local health agency. Should the initial treatment result in an unsatisfactory bacteriological test, the original chlorination procedure shall be repeated by the contractor until satisfactory results are obtained. The sample can only be taken on Mondays, Tuesdays, and Wednesdays until noon. Testing and sampling shall take place after all underground utilities are installed and compaction of the roadway section is complete.

4.00.230 Fencing at Water Meters

Water meters shall not be fenced in yard. Fencing shall be placed around meters to allow access from the City right-of-way or easements.

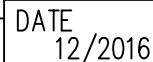
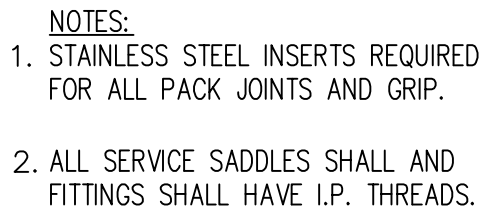
4.00.240 Landscaping, Water Meters and Fire Hydrants

No trees or shrubs shall be planted within 5 feet of any water meter or fire hydrant. Improvement or landscaping of any sort shall not be constructed which will impede easy access or maintenance to water meters and fire hydrants.

LIST OF DRAWINGS - WATER

<u>Title</u>	<u>Drawing</u>
5/8" Single Meter Service	4 - 1
5/8" Dual Meter Service	4 - 2
1 ½" to 2" Meter Service	4 - 3
Double Detector Check Valve	4 - 4
2" Blowoff Assembly	4 - 4.1
Water Vault Details	4 - 4.2
Double Detector Check Valve Notes.	4 - 4.3
Fire Department Connection.	4 - 4.4
3" – 4" – 6" Water Meter.	4 - 5
Typical Meter Placement.	4 - 6
Fire Hydrant.....	4 - 7
2" Air and Vacuum Release Valve.	4 - 8
2" Blowoff Assembly.	4 - 9
Connection to Existing Main	4 - 10
Standard Valve Box	4 - 11
Valve Marker Post & Hydrant Bollard Detail	4 - 12
Standard Blocking Detail	4 - 13
Thrust Loads.....	4 - 14
Typical Water Main Trench & Bedding.....	4 - 15
Double Check Valve Assembly 2" and Smaller	4 - 16
Reduced Pressure Backflow Assembly for 2" or Smaller	4 - 17
Reduced Pressure Backflow Assembly for 3" and Greater.....	4 - 18

LID - *FLUSH COVER WITH PLASTIC OR CAST IRON READ DOOR
BOX- *OLD CASTLE BOX 1118BCF
*OR PRE APPROVED EQUAL

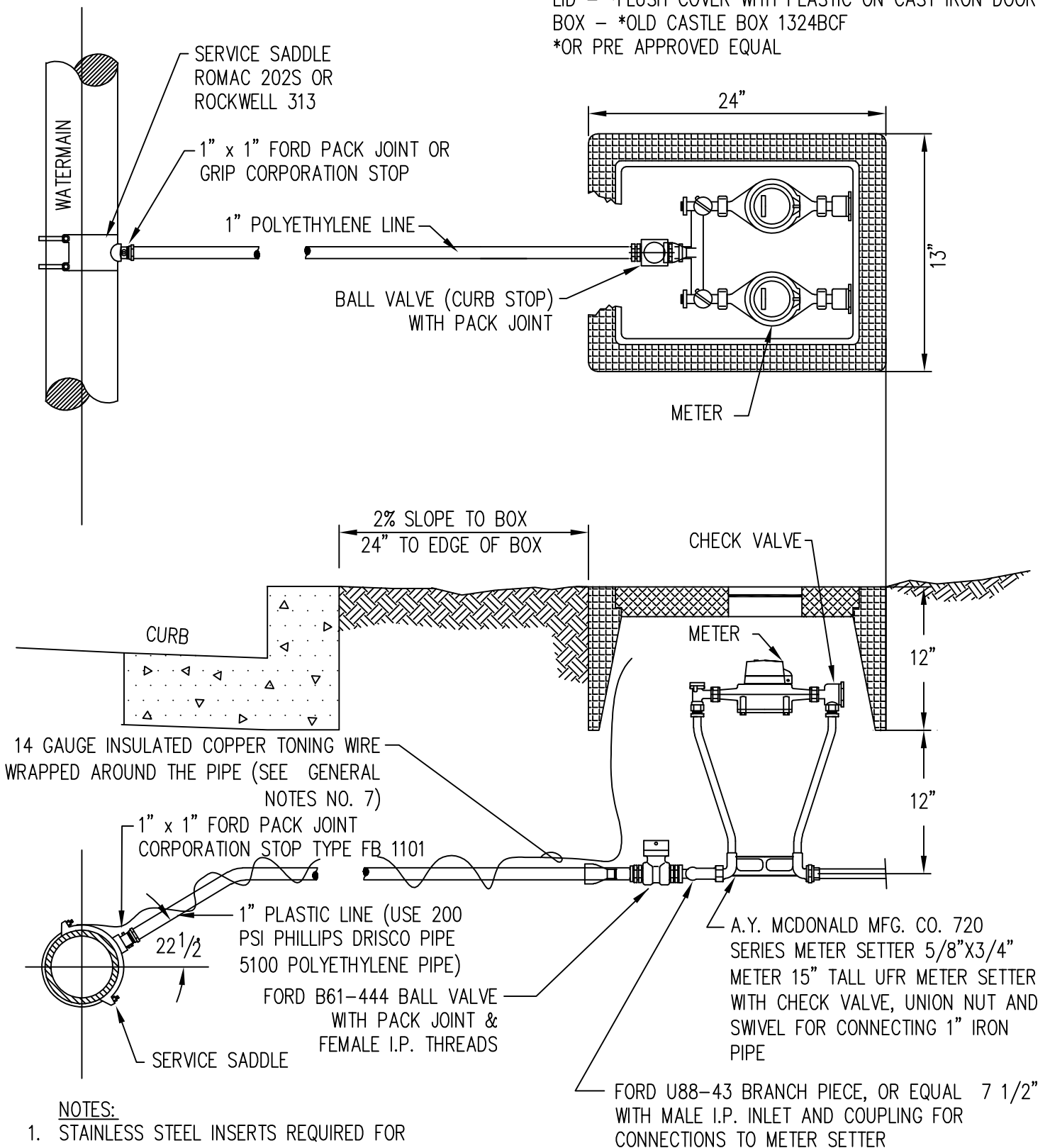


APPROVED METER BOX

LID - *FLUSH COVER WITH PLASTIC ON CAST IRON DOOR

BOX - *OLD CASTLE BOX 1324BCF

*OR PRE APPROVED EQUAL



NOTES:

1. STAINLESS STEEL INSERTS REQUIRED FOR ALL PACK JOINTS AND GRIP.
2. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.



CITY OF YELM

5/8" DUAL METER SERVICE

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

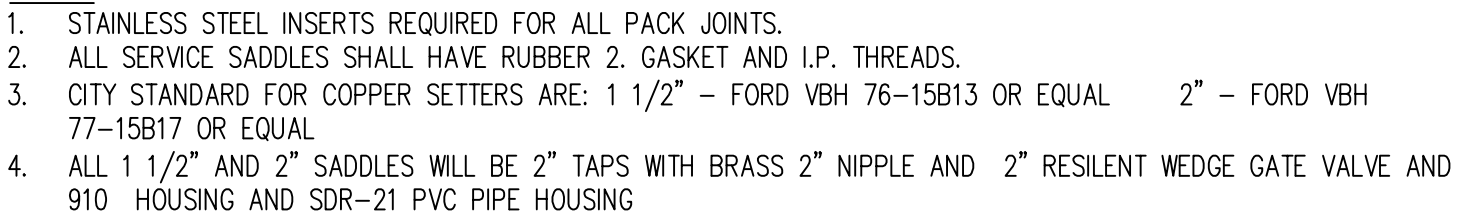
CKD. JEG

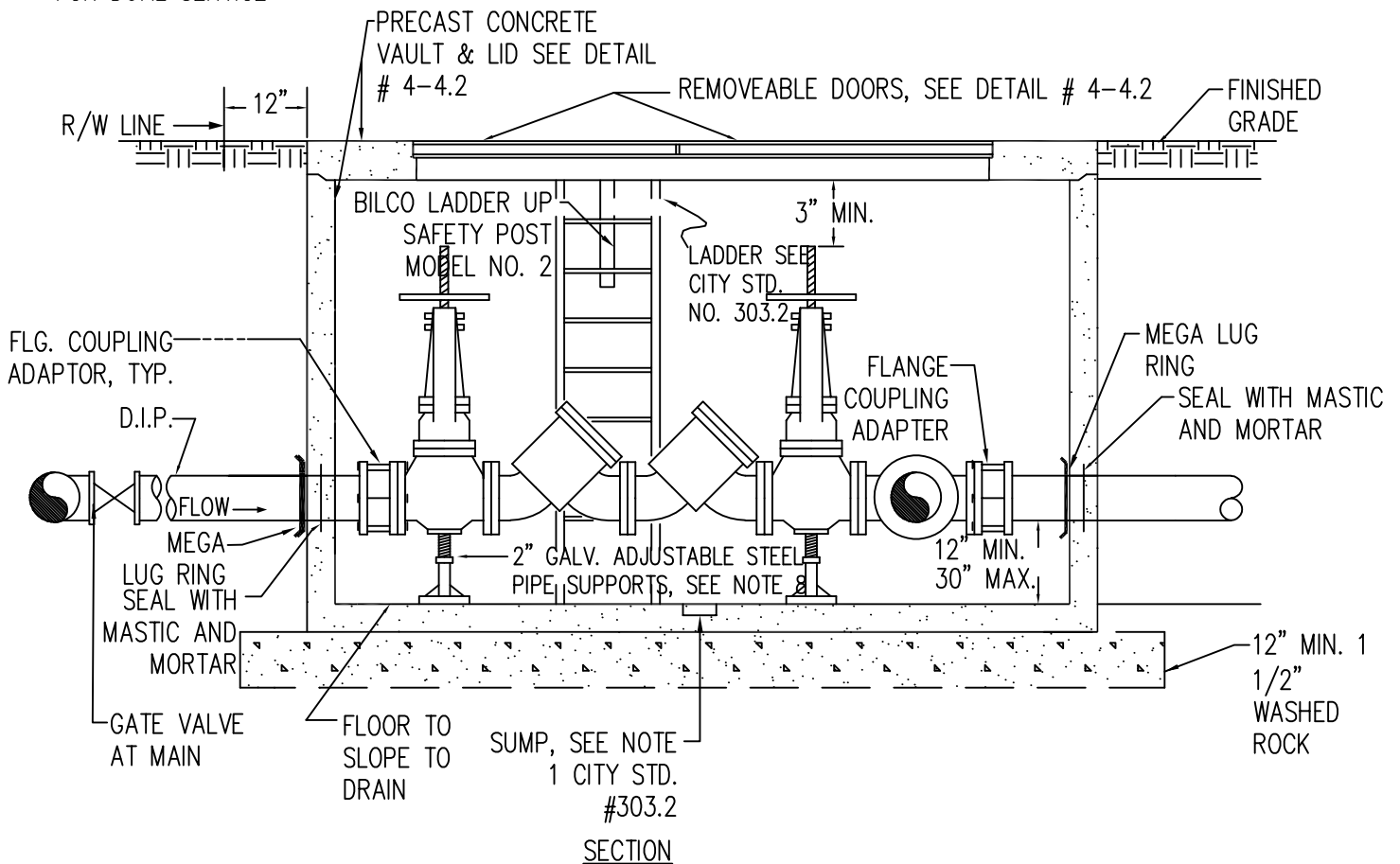
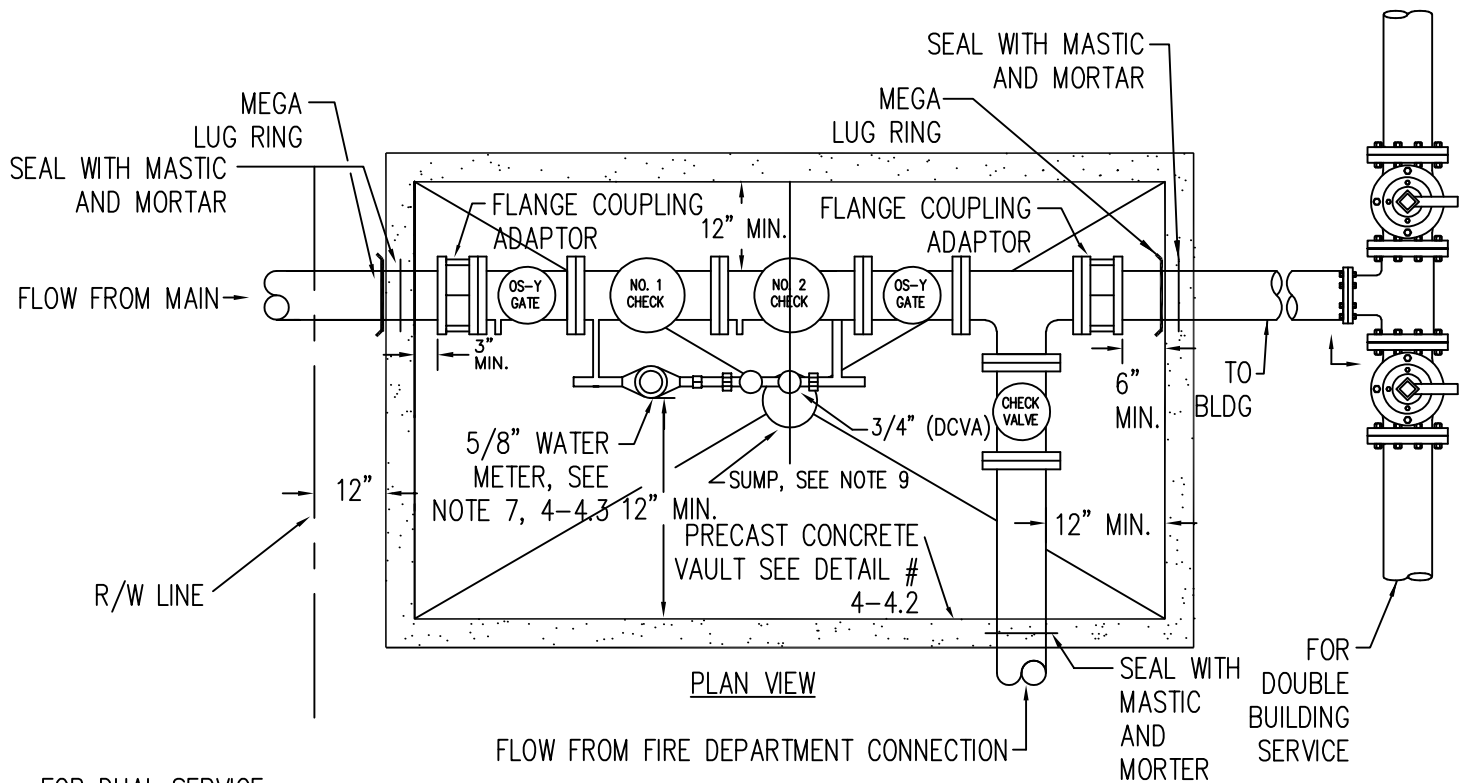
DWG. NO.

4-2

DATE
12/2016

APPROVED METER BOX
LID - *1730 DI READER LID
BOX - *BCF 1730 X 12 BASE
*OR APPROVED EQUAL





CITY OF YELM
DOUBLE DETECTOR CHECK VALVE

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

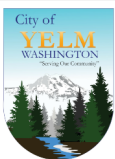
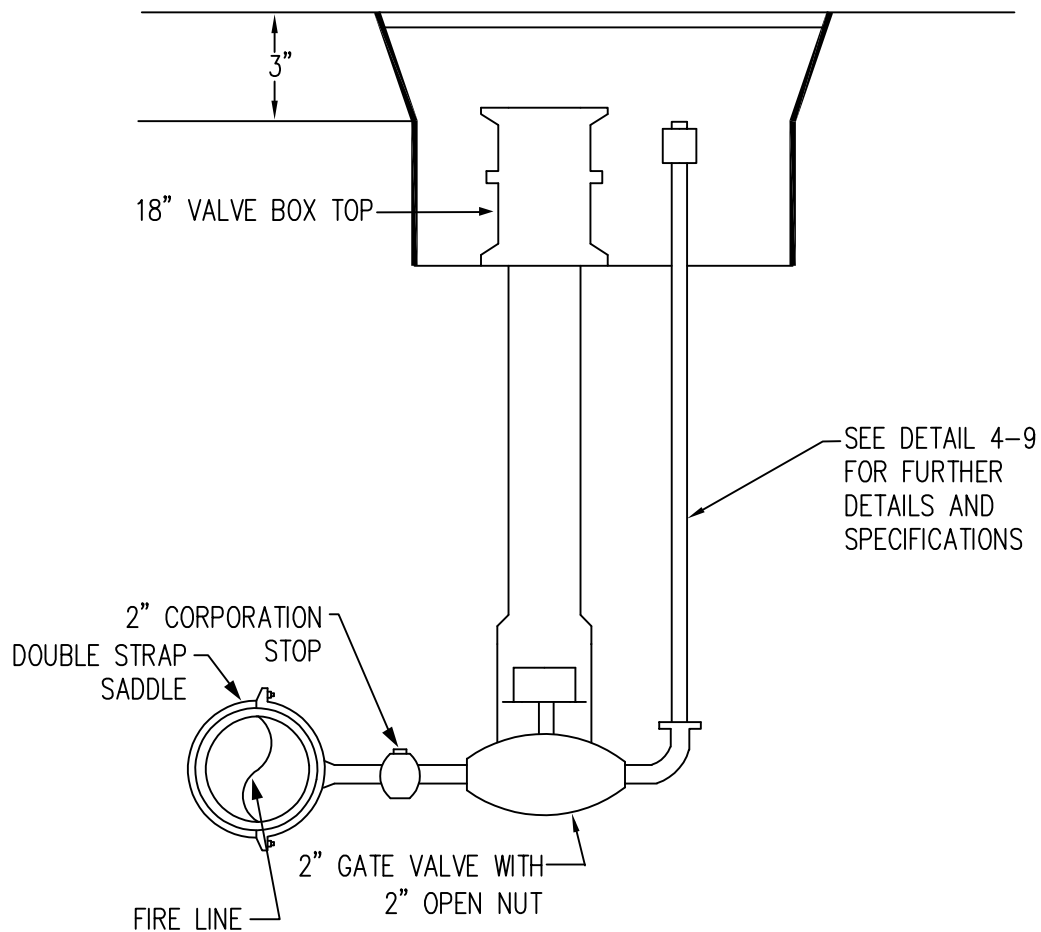
DWN. MKD

CKD. JEG

DWG. NO.

4-4

DATE
12/2016



CITY OF YELM

2 INCH BLOW-OFF ASSEMBLY

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

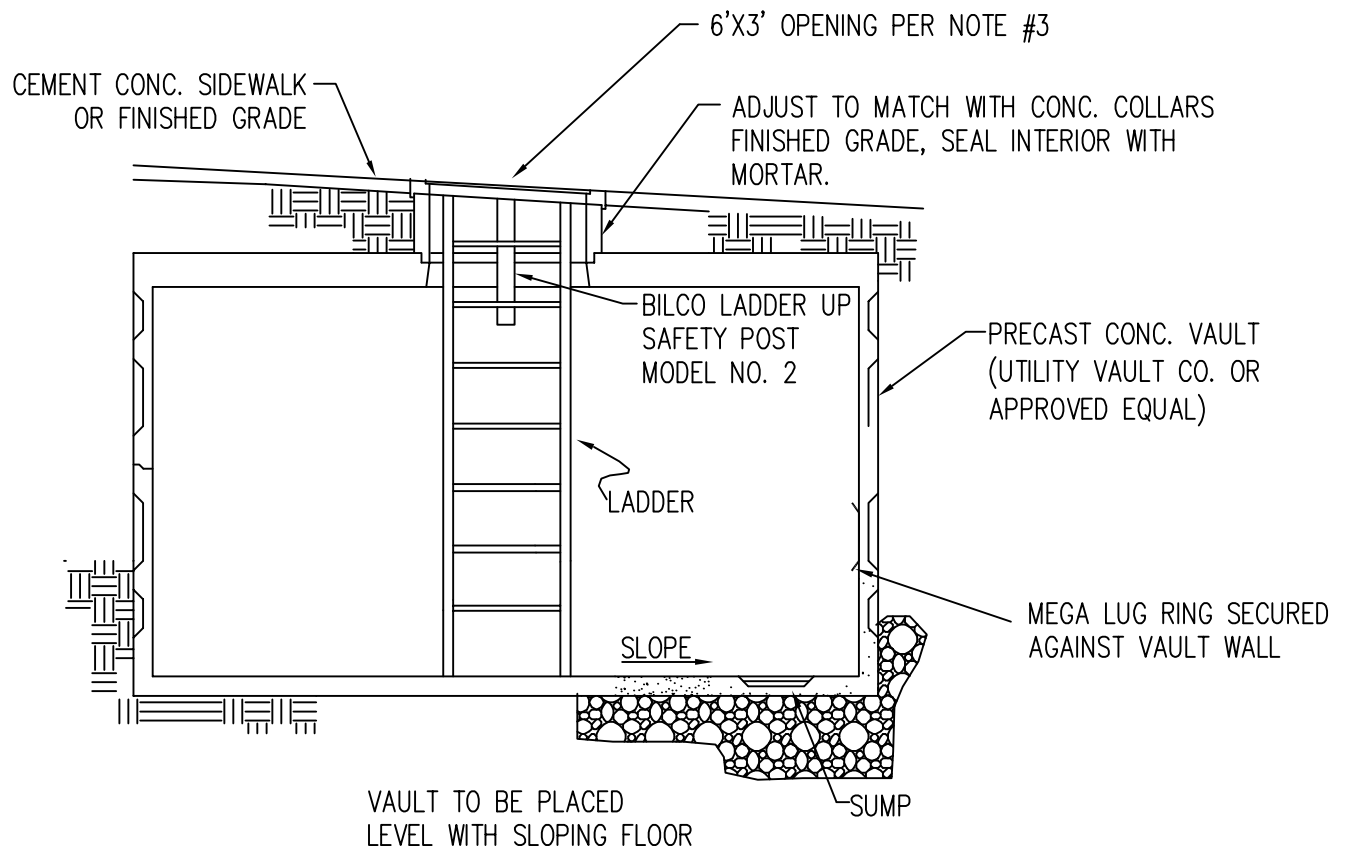
DWN. MKD

CKD. JEG

DWG. NO.

4-4.1

DATE
12/2016



1. IN AREAS OF HIGH GROUNDWATER A 1/4 HP SUMP PUMP SHALL BE INSTALLED IN THE SUMP PIT OF THE VAULT. IT SHALL BE WIRED PER WASHINGTON STATE ELECTRICAL CODE AND INSPECTED BY AT STATE ELECTRICAL INSPECTOR. THE DISCHARGE PIPE SHALL BE CONNECTED TO THE NEAREST APPROVED ON-SITE STORM DRAINAGE STRUCTURE OR DRAIN TO DAYLIGHT. WHERE NO GROUNDWATER IS PRESENT USE A 2"Ø DRAIN HOLE WITH 1/4 CUBIC YARD OF WASHED DRAIN ROCK.
2. THE VAULT SHALL BE A PRECAST CONCRETE VAULT SIZED TO MEET THE CLEARANCE REQUIREMENTS SHOWN ON DETAIL #4-5.
3. REMOVABLE DOORS SHALL BE A MINIMUM OF 6'-0" X 3'-0" DIAMOND PLATE HINGED LOCKING DOORS, WITH HINGES LOCATED AT EACH END OF OPENING. DOORS SHALL HAVE AN H-20 LOAD RATING IN AREAS THAT ARE SUBJECT TO VEHICLE TRAFFIC. DOORS SHALL BE SPRING LOADED WITH OPEN POSITION LOCK.
4. A GALVANIZED LADDER SHALL BE SET INSIDE THE VAULT FOR ACCESS INTO THE VAULT. IT SHALL BE SECURED TO THE VAULT WITH 1/2" DIA. BOLTS EPOXIED TO THE VAULT LID AND FLOOR.
5. A BILCO LADDER UP SAFETY POST MODEL NO. 2 SHALL BE ATTACHED TO THE LADDER STEPS.



CITY OF YELM

WATER VAULT DETAILS

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. JEG

DWG. NO.

4-4.2

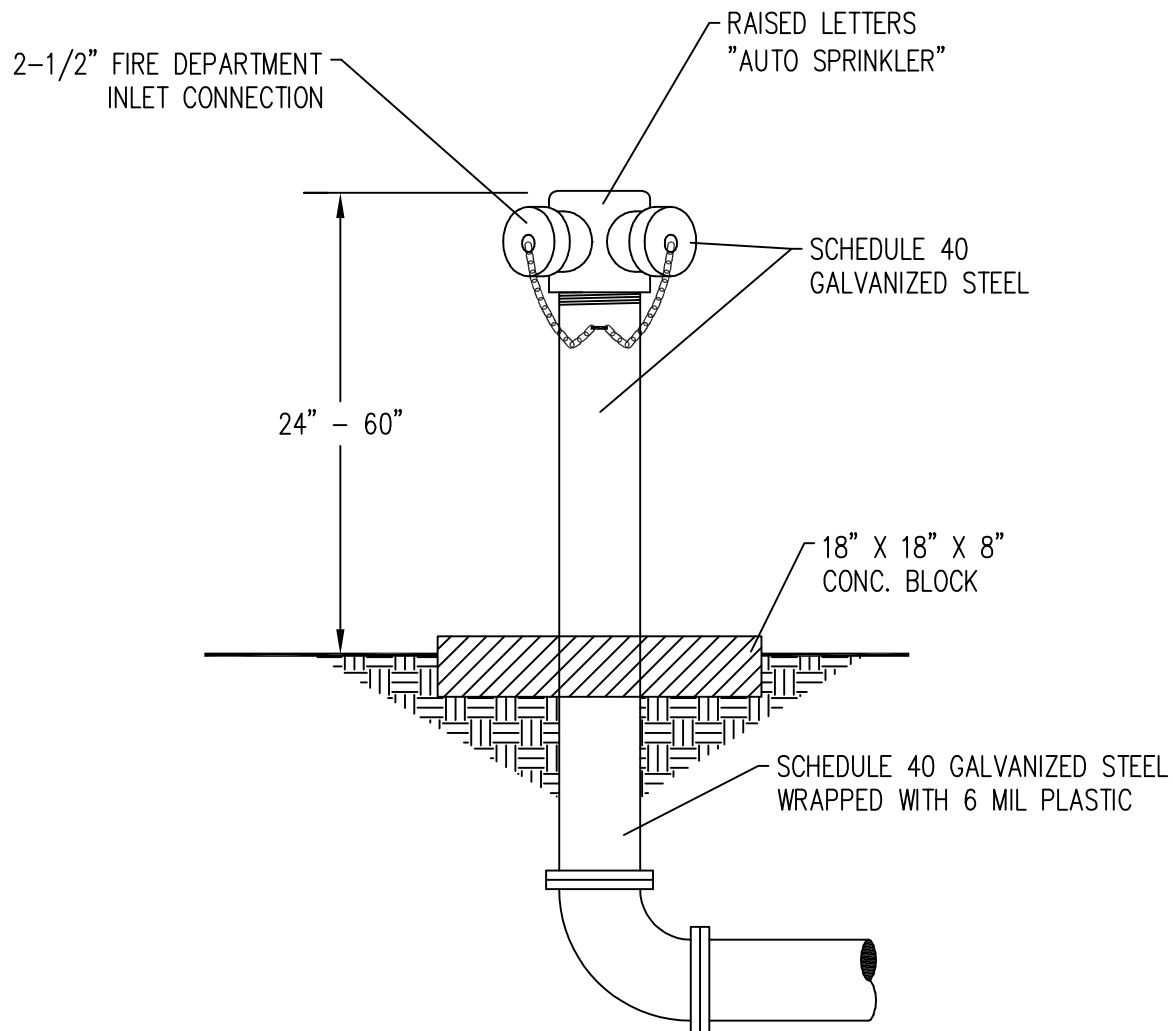
DATE
12/2016

NOTES FOR: DOUBLE DETECTOR CHECK VALVE ASSEMBLY (DDCVA) INSTALLATION

1. INSTALLATION OF THE APPROVED BACKFLOW ASSEMBLY SHALL BE IN ACCORDANCE WITH THE "BACKFLOW PREVENTION AND CROSS-CONNECTION CONTROL: RECOMMENDED PRACTICES" MANUAL, OF THE CROSS-CONNECTION CONTROL COMMITTEE, PACIFIC N.W. SECTION OF THE A.W.W.A., FEBRUARY 2015 OR CURRENT ADDITION.
2. BACKFLOW ASSEMBLY MUST BE SELECTED FROM WASHINGTON STATE DEPARTMENT OF HEALTH LIST OF BACKFLOW PREVENTION ASSEMBLIES APPROVED FOR INSTALLATION IN WASHINGTON STATE, LATEST EDITION.
3. UPON INSTALLATION OF THE APPROVED BACKFLOW ASSEMBLY, (AND YEARLY THEREAFTER), THE ASSEMBLY SHALL BE TESTED BY A WASHINGTON STATE CERTIFIED BACKFLOW ASSEMBLY TESTER, WHO SHALL PROMPTLY FORWARD THE TEST RESULTS TO: THE CITY OF YELM, WATER DEPARTMENT, PRIOR TO OCCUPANCY.
4. DOUBLE DETECTOR CHECK VALVE ASSEMBLY OS & Y GATE VALVES SHALL HAVE SUPERVISED TAMPER SWITCHES.
5. ALL ELECTRICAL SHALL BE INSPECTED BY BY A WASHINGTON STATE ELECTRICAL INSPECTOR.
6. DDCVA MUST BE PURCHASED AS A UNIT. NO MODIFICATIONS TO ASSEMBLY ARE ALLOWED.
7. WATER METER SHALL BE CITY OF YELM APPROVED, READING IN CUBIC FEET.
8. PIPE SUPPORTS SHALL BE RUST-PROTECTED WITH ALUMINUM PAINT.
9. THE FIRE DEPARTMENT CONNECTION SHALL BE LOCATED WITHIN 15 FEET OF A FIRE HYDRANT BUT NOT LESS THAN 10 FEET.
10. WHEN DDCVA IS LOCATED WITHIN A BUILDING, THE BALL DRIP SHALL DRAIN TO THE NEAREST APPROVED CATCH BASIN.



CITY OF YELM		APPROVED BY		DWG. NO.
DOUBLE DETECTOR CHECK VALVE NOTES		PUBLIC WORKS DIRECTOR DATE		4-4.3
		DES. MKD	DWN. MKD	DATE 12/2016
			CKD. JEG	



CITY OF YELM

FIRE DEPARTMENT CONNECTION

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. JEG

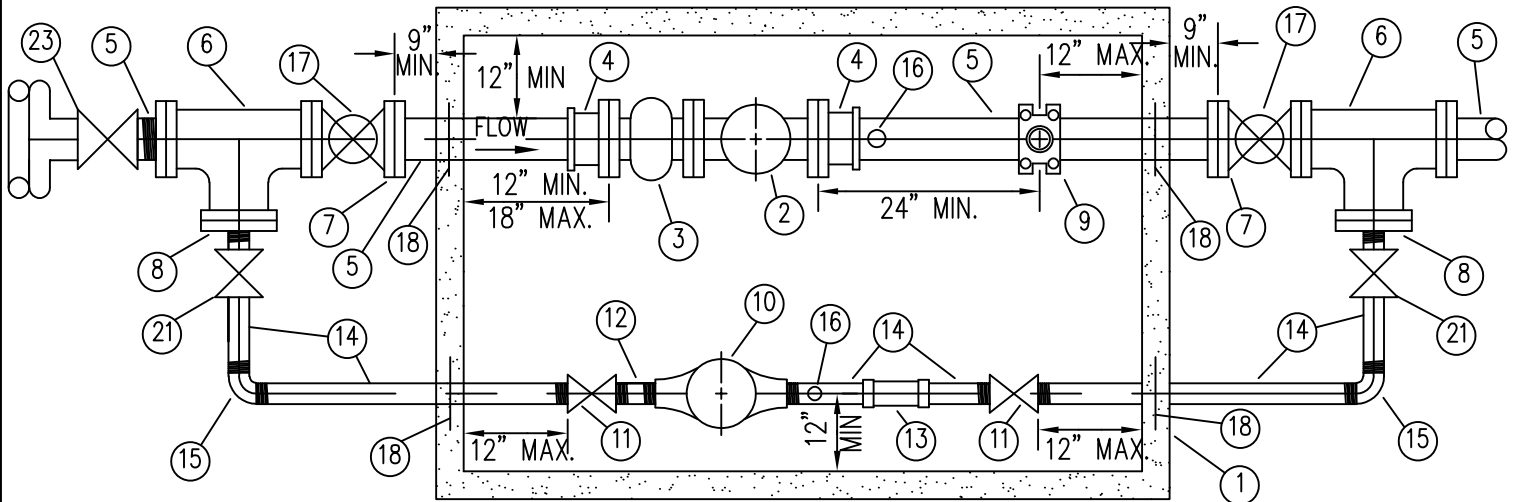
DWG. NO.

4-4.4

DATE
12/2016

-GENERAL NOTES-

1. ALL PIPE, VALVES, FITTINGS AND OTHER MATERIAL USED SHALL CONFORM TO AWWA STANDARDS (LATEST EDITION).
2. ALL CONSTRUCTION SHALL CONFORM TO WSDOT/APWA STANDARDS SPECIFICATIONS, 2000 EDITION, AND CITY OF YELM STANDARDS.



- ① VAULT, UTILITY VAULT OR APPROVED EQUAL, SIZED TO MAINTAIN CLEARANCES AS SHOWN.
- ② **COMPOUND PRO READ METER – READS IN CUBIC FEET.
- ③ *FLANGED STRAINER.
- ④ *FLANGED COUPLING ADAPTOR.
- ⑤ *DUCTILE IRON PIPE—CLASS 50 INSTALL VALVE AT MAIN LINE TEE.
- ⑥ *X*X* TEE (MJxFLGxFLG).
- ⑦ *GATE VALVE (FLGxMJ) W/2\" THR. PLUG – SAME SIZE PIPE
- ⑧ *BLIND FLANGED W/2\" THREADED OUTLET.
- ⑨ *x2\" DOUBLE STRAP D.I. SADDLE W/2\" THR. PLUG.
- ⑩ **2\" PRO READ – READS IN CUBIC FEET.
- ⑪ 2\" GATE VALVE, KENNEDY FIG. 982 W/HANDWHEEL.
- ⑫ 2\"x6\" THR. GALV. NIPPLE.
- ⑬ 2\" COMPRESSION COUPLING, ROCKWELL #522.
- ⑭ 2\" THR. GALV. PIPE—CUT TO LENGTH REQUIRED.
- ⑮ 2\" THR. GALV. ELL.
- ⑯ 2\" ADJUSTABLE PIPE SUPPORT—GALVANIZED.
- ⑰ VALVE BOX W/WATER MARKED ON LID.
- ⑱ MASTIC AND MORTAR SEAL.
- ⑲ REMOVABLE DOORS SHALL BE A MINIMUM OF 6'-0\" X 3'-0\" DIAMOND PLATE HINGED LOCKING DOORS, WITH HINGES LOCATED AT EACH END OF OPENING. DOORS SHALL HAVE AN H-20 LOAD RATING IN AREAS THAT ARE SUBJECT TO VEHICLE TRAFFIC. DOORS SHALL BE SPRING LOADED WITH OPEN POSITION LOCK.
- ⑳ VAULT SHALL DRAIN TO DAYLIGHT OR STORM DRAIN. * = 3\",4\",OR 6\" DEPENDING ON SERVICE LINE SIZE NOTE: APPROVED EQUAL SUBSTITUTIONS MAY BE MADE FOR MOST MATERIALS, EXCEPT THE METER AND THE PIPE.
- ㉑ 2\" SQUARE NUT RISILIENT WEDGE GATE VALVE AND HOUSING PER STANDARD DETAIL.
- ㉒ BY-PASS FOR MEDICAL ONLY
- ㉓ *X\" GATE VALVE

** CITY TO SUPPLY METER AT THE OWNER'S EXPENSE. METER TO BE READ ONLY BY YELM METER READING EQUIPMENT.



CITY OF YELM

3\"-4\"-6\" WATER METER

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

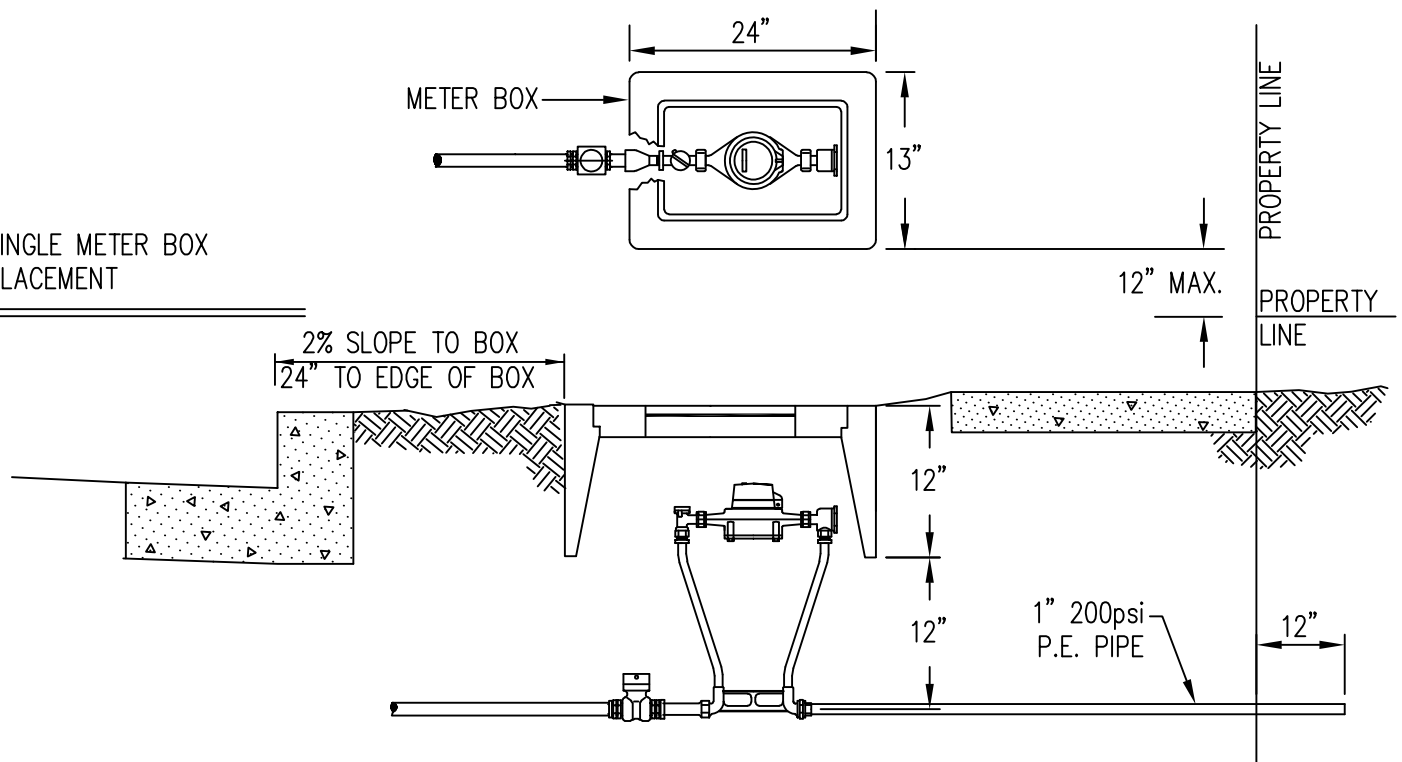
CKD. JEG

DWG. NO.

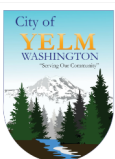
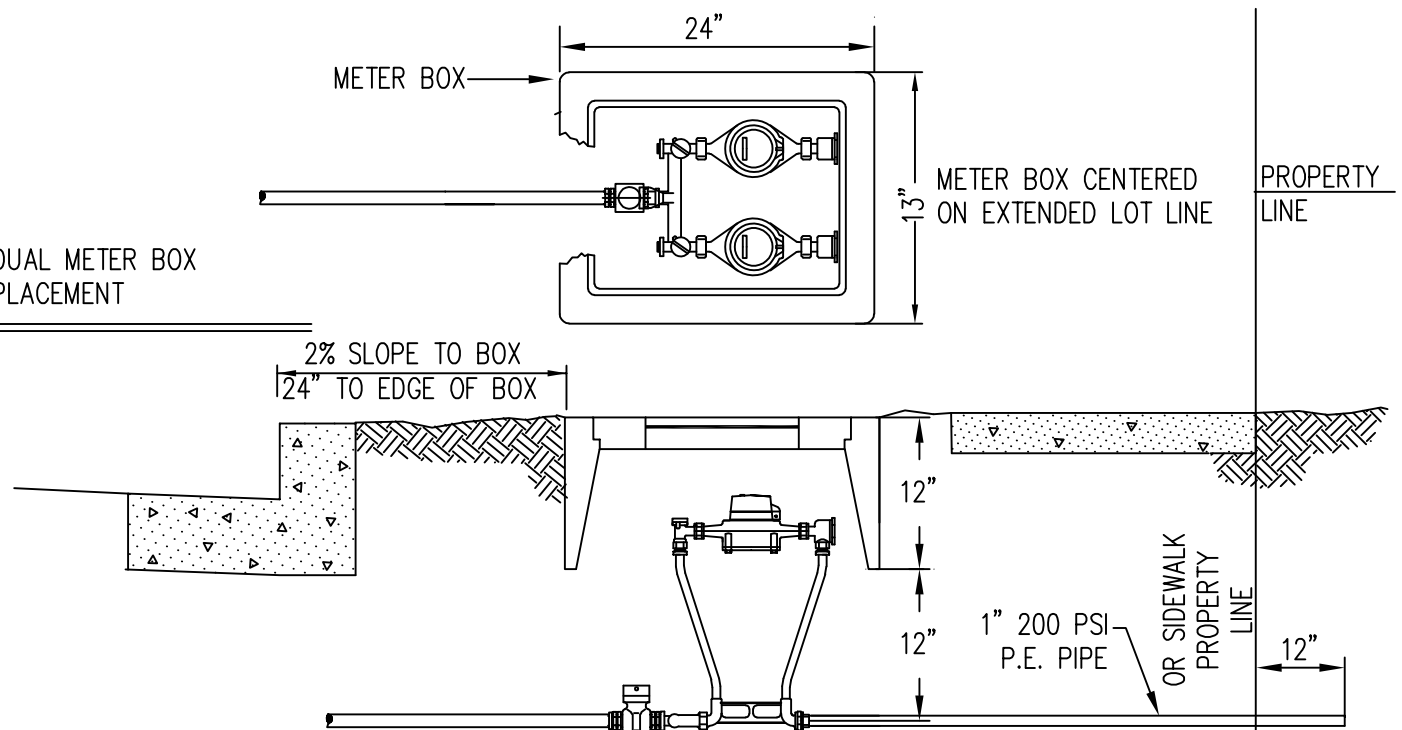
4-5

DATE
12/2016

SINGLE METER BOX PLACEMENT



DUAL METER BOX PLACEMENT



CITY OF YELM TYPICAL METER PLACEMENT W/ SIDEWALK

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

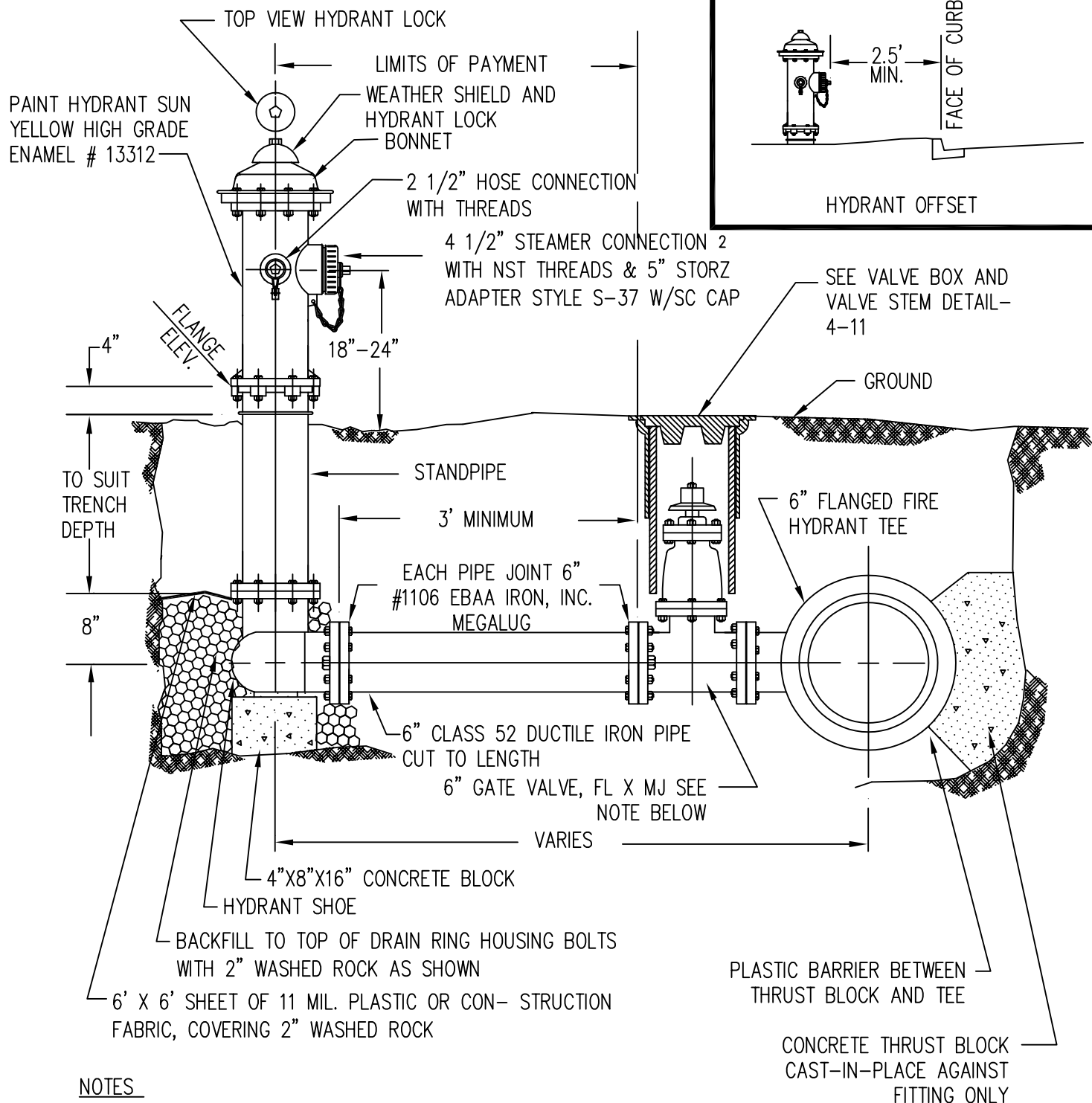
DWN. MKD

CKD. JEG

DWG. NO.

4-6

DATE
12/2016



NOTES

1. HYDRANTS SHALL BE LOCATED IN ACCORDANCE WITH SECTION 6.060. IN ADDITION, A MINIMUM THREE FOOT RADIUS UNOBSTRUCTED WORKING AREA SHALL BE PROVIDED AROUND ALL HYDRANTS.
2. HYDRANTS SHALL BE DRESSER M & H RELIANT STYLE 129, CLOW MEDALLION OR AMERICAN AVK SERIES 2780 OR MUELLER CENTURION
3. GATE VALVES SHALL BE RESILIENT WEDGE NRS WITH O-RING SEALS. VALVE ENDS SHALL BE MECHANICAL JOINT BY ANSI FLANGES. VALVES SHALL CONFORM TO AWWA 509-80. VALVES SHALL BE MUELLER M&H, KENNEDY, CLOW R/W OR WATEROUS SERIES 500.
4. FIRE HYDRANT LOCK PAYMENT IS REQUIRED CITY WILL ORDER AND INSTALL.



CITY OF YELM

FIRE HYDRANT

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. JEG

DWG. NO.

4-7

DATE
12/2016

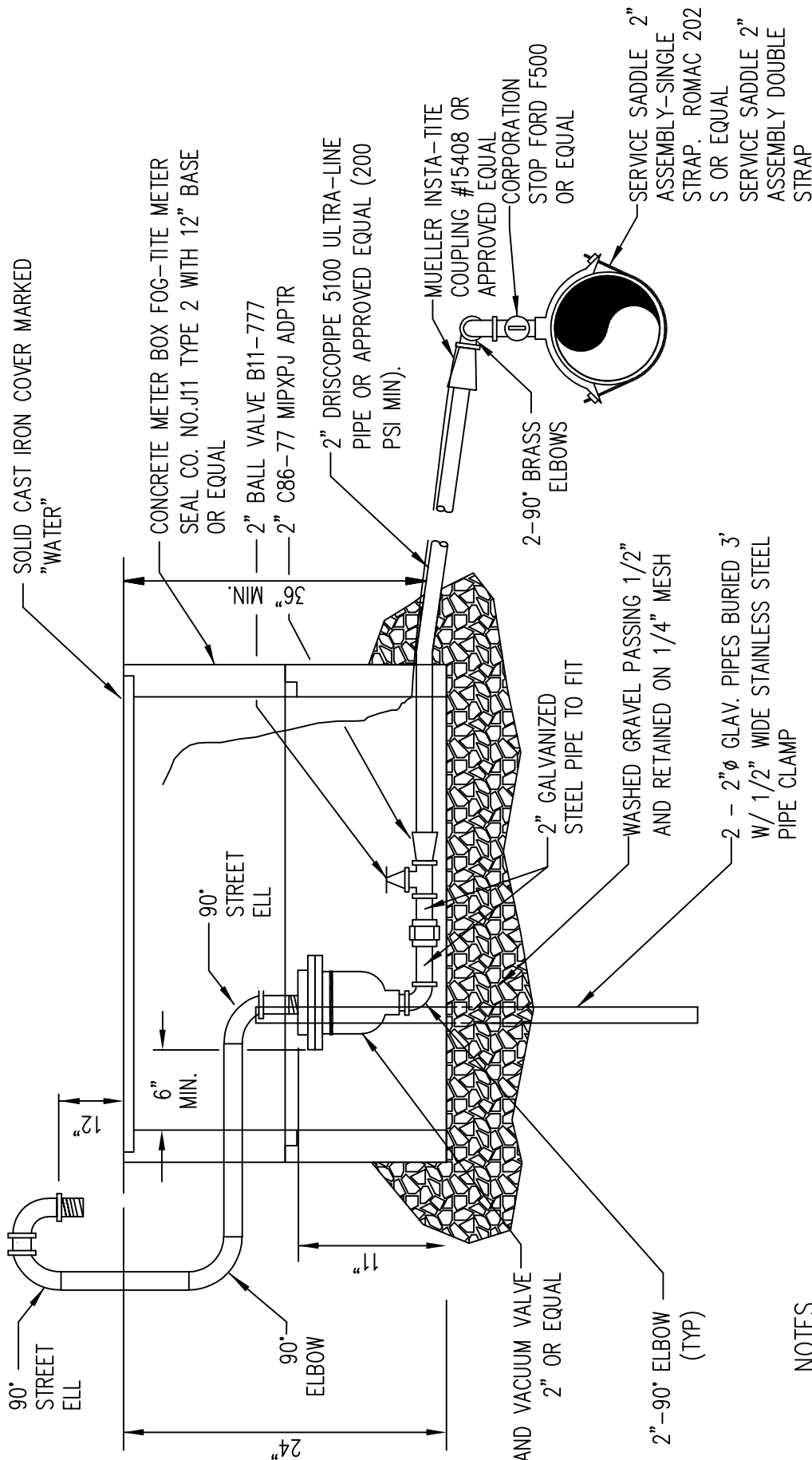


CITY OF YELM

2" AIR AND VACUUM RELEASE VALVE

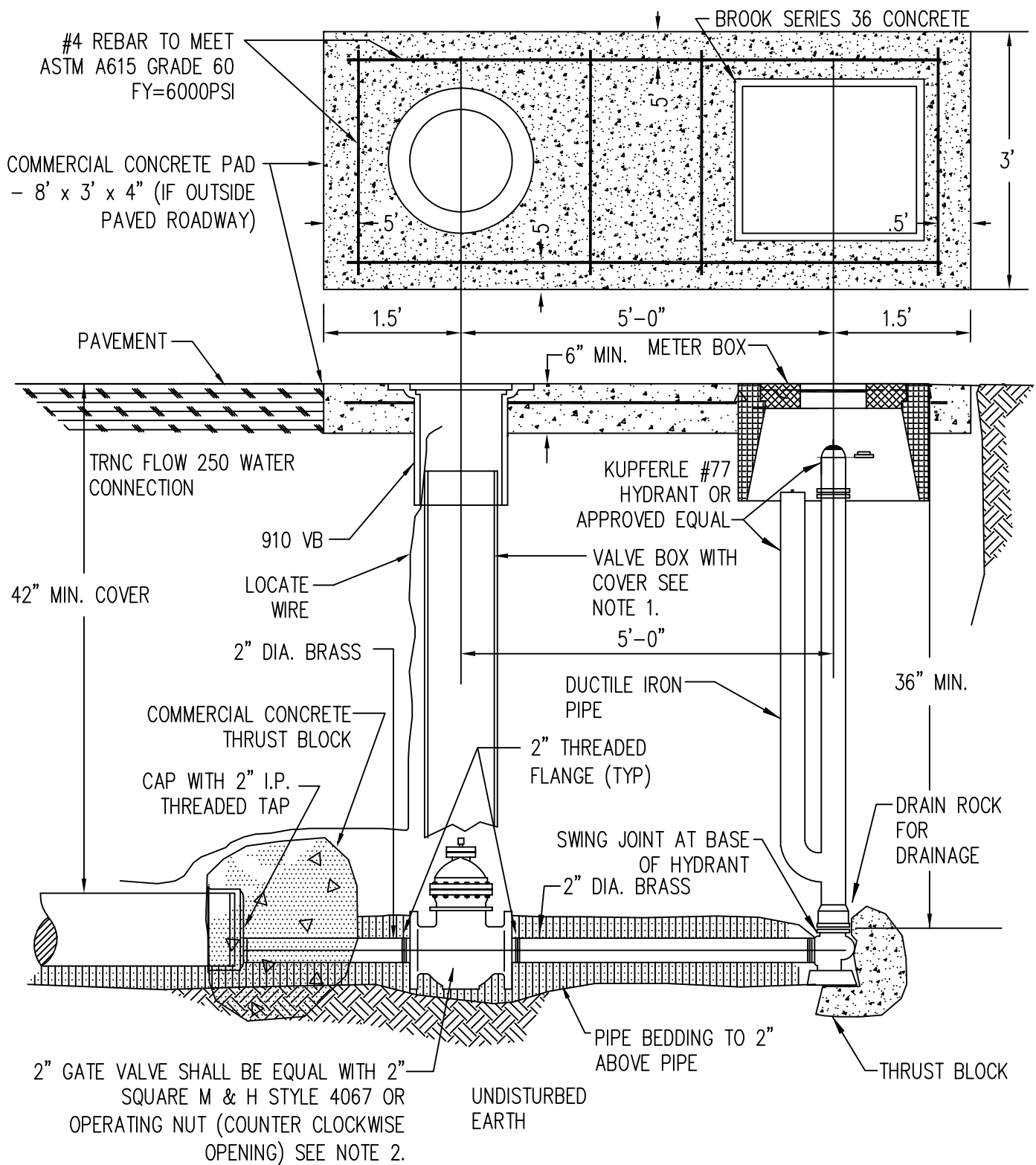
APPROVED BY		
PUBLIC WORKS DIRECTOR		
DES. MKD	DWN. MKD	CKD. JEG

DWG. NO.
4-8
DATE
12/2016



NOTES

1. AIR & VACUUM VALVE ASSEMBLY MUST BE INSTALLED AT HIGHEST POINT OF LINE.
2. REMOVE ALL FOR KNOCKOUTS TO ALLOW FOR DRAINAGE.
3. FACE OF METER BOX TO BE LOCATED 1' IN BACK OF CURB.
4. WHERE AIR RELEASE VALVE FALLS OUTSIDE OF PLANNED IMPROVEMENTS. REPAIR SIDEWALK TO MATCH EXISTING.
5. THE WATER SERVICE LINE SHALL HAVE 36" OF COVER BELOW FINISH GRADE.
6. METALLIC (DETECTABLE MARKING) TAPE SHALL BE COLOR CODE BLUE AND SHALL BE IMPRINTED CONTINUOUSLY OVER ITS ENTIRE LENGTH IN PERMANENT BLACK INK, WITH THE MESSAGE "WATER LINE BURIED BELOW" AND THE WORD "CAUTION" PROMINENTLY SHOWN. TAPE SHALL BE A 2" MIN WIDTH AND WILL HAVE LOCATE WIRE.



NOTES:

1. VALVE BOX AND COVER SHALL BE PER YELM VALVE BOX
DETAIL 6-11.
2. WATERMAINS WHICH WILL BE EXTENDED IN THE FUTURE, THE
VALVE WHICH OPERATES THE BLOWOFF ASSEMBLY SHALL BE
THE SAME SIZE AND INSTALLED ON THE MAINLINE AND
PROVIDED WITH A CONCRETE THRUST BLOCK.



CITY OF YELM

2" BLOW-OFF ASSEMBLY

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

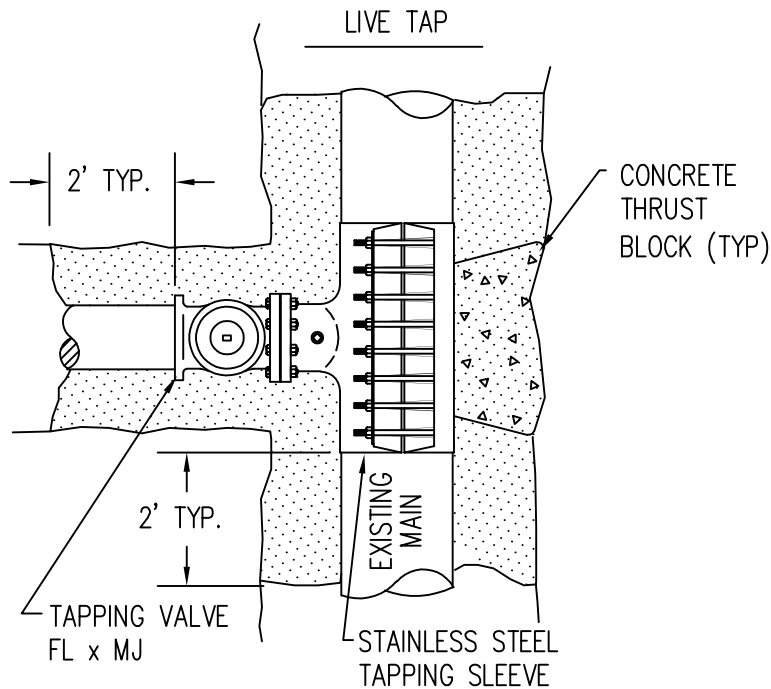
DWN. MKD

CKD. JEG

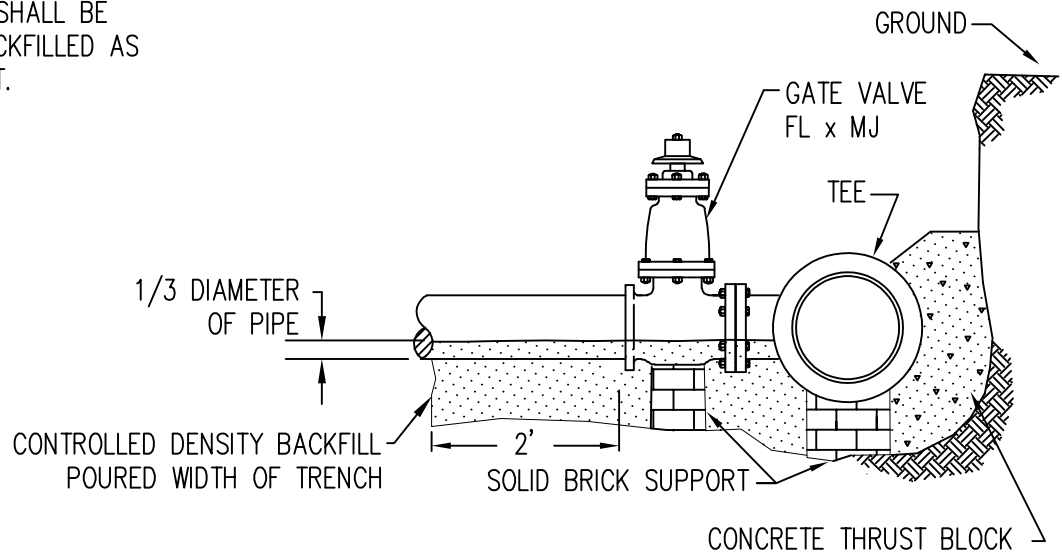
DWG. NO.

4-9

DATE
12/2016



VALVE AND SLEEVE SHALL BE SUPPORTED AND BACKFILLED AS SHOWN BELOW-RIGHT.



NOTES:

1. 11 MIL PLASTIC OR CONSTRUCTION FABRIC SHALL BE WRAPPED AROUND PIPE AND FITTINGS BEFORE THRUST BLOCK AND BACKFILL ARE POURED.
2. MJ CUT IN TEES SHALL NOT BE PERMITTED.
3. SUPPORT VALVE AND SLEEVE CONTINUOUSLY THROUGH INSTALLATION.



CITY OF YELM

CONNECTION TO EXISTING MAIN

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

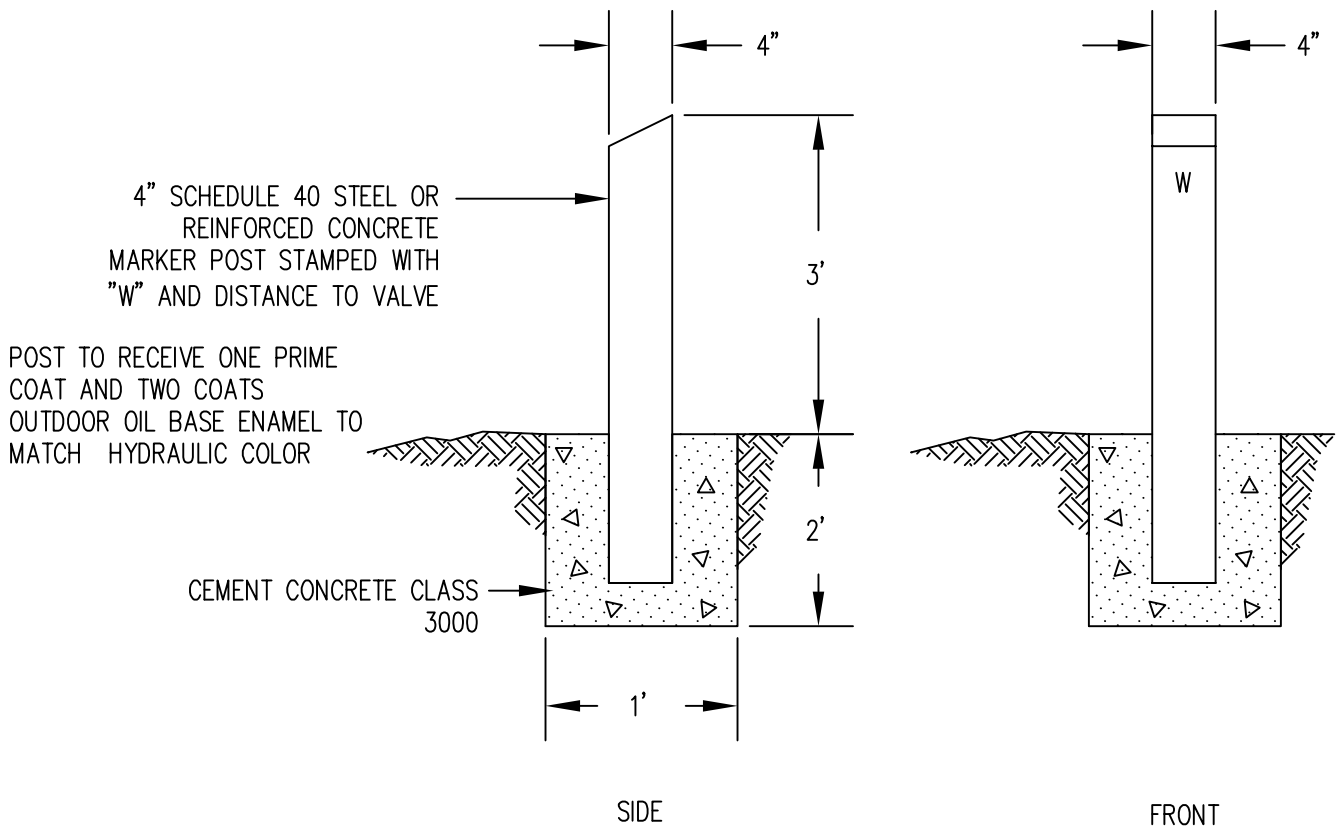
DWN. MKD

CKD. JEG

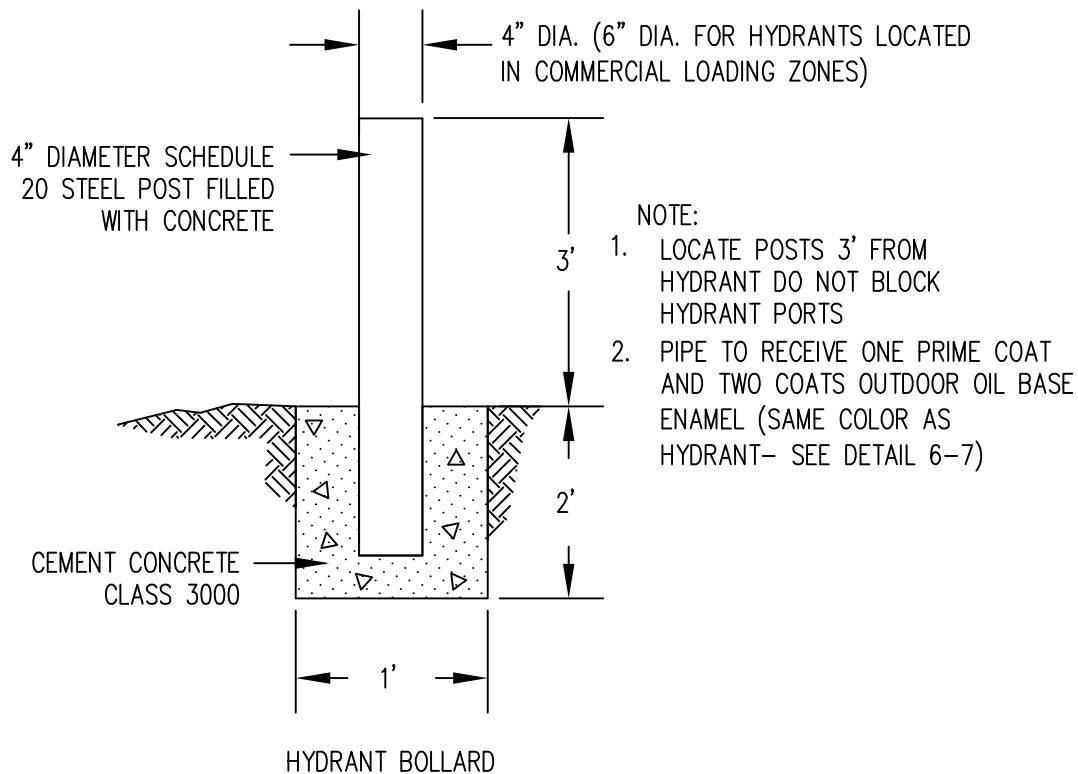
DWG. NO.

4-10

DATE
12/2016



VALVE MARKER POST



CITY OF YELM

VALVE MARKER POST & HYDRANT BOLLARD DETAIL

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

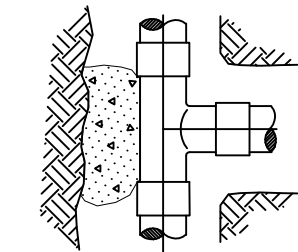
DES. MKD

DWN. MKD

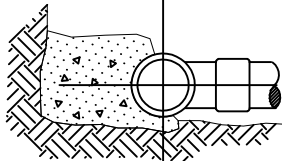
CKD. JEG

DWG. NO.
4-12

DATE
12/2016

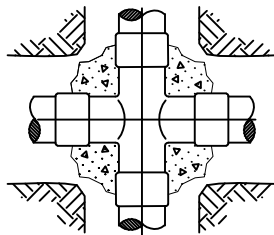


TOP VIEW

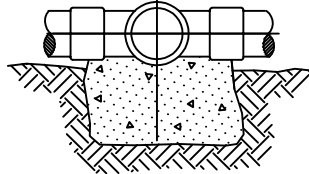


SIDE VIEW

TEE

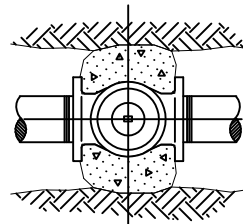


TOP VIEW

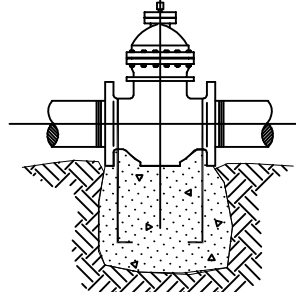


SIDE VIEW

CROSS

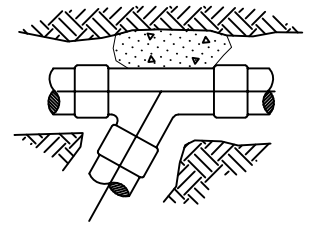


TOP VIEW

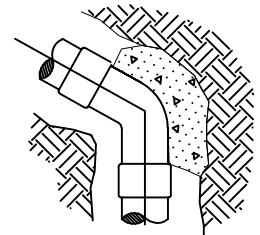


SIDE VIEW

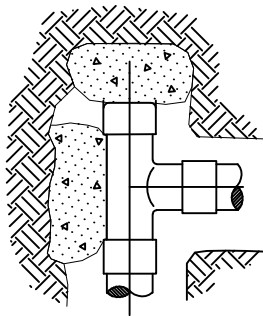
GATE VALVE



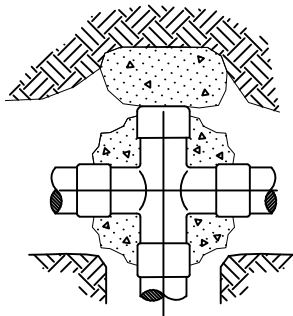
WYE



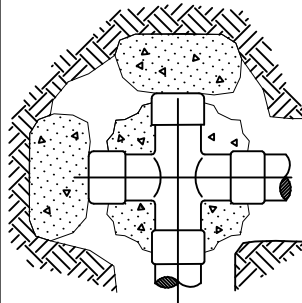
HORIZ. BEND



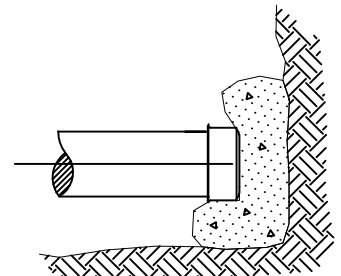
TEE WITH
PLUG



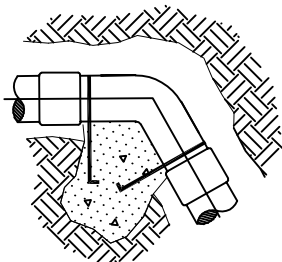
CROSS WITH
PLUG



CROSS WITH
PLUGS



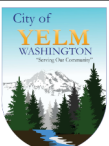
PLUG OR CAP



45° - 90°
VERTICAL BEND

NOTES:

1. CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
2. PLASTIC BARRIER SHALL BE PLACED BETWEEN ALL THRUST BLOCKS & FITTINGS.
3. ANCHOR REBAR SHALL BE 5/8" MINIMUM DIAMETER.



CITY OF YELM

STANDARD BLOCKING DETAIL

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. JEG

DWG. NO.
4-13

DATE
12/2016

THRUST LOADS

THRUST AT FITTINGS IN POUNDS AT 200 POUNDS PER SQUARE INCH OF WATER PRESSURE

PIPE DIAMETER	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	DEAD END OR TEE
4"	3,600	2,000	1,000	500	2,600
6"	8,000	4,400	2,300	1,200	5,700
8"	14,300	7,700	4,000	2,000	10,100
10"	22,300	12,100	6,200	3,100	15,800
12"	32,000	17,400	8,900	4,500	22,700
14"	43,600	23,600	12,100	6,100	30,800
16"	57,000	30,800	15,700	7,900	40,300

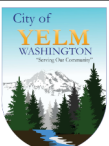
NOTES:

1. BLOCKING SHALL BE CEMENT CONCRETE CLASS 3000 POURED IN PLACE AGAINST UNDISTURBED EARTH. FITTING SHALL BE ISOLATED FROM CONCRETE THRUST BLOCK WITH PLASTIC OR SIMILAR MATERIAL.
2. TO DETERMINE THE BEARING AREA OF THE THRUST BLOCK IN SQUARE FEET (S.F.).
EXAMPLE : 12" - 90° BEND IN SAND AND GRAVEL $32,000 \text{ LBS} \div 3000 \text{ LB/S.F.} = 10.7 \text{ S.F. OF AREA}$
3. AREAS MUST BE ADJUSTED FOR OTHER PIPE SIZE, PRESSURES AND SOIL CONDITIONS.
4. BLOCKING SHALL BE ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.

SAFE SOIL BEARING LOADS

FOR HORIZONTAL THRUSTS WHEN THE DEPTH OF COVER OVER THE PIPE EXCEEDS 2 FEET

SOIL	POUNDS PER SQUARE FOOT
MUCK, PEAT	0
SOFT CLAY	1,000
SAND	2,000
SAND & GRAVEL	3,000
SAND & GRAVEL CEMENTED WITH CLAY	4,000
HARD SHALE	10,000



CITY OF YELM

THRUST LOADS

APPROVED BY

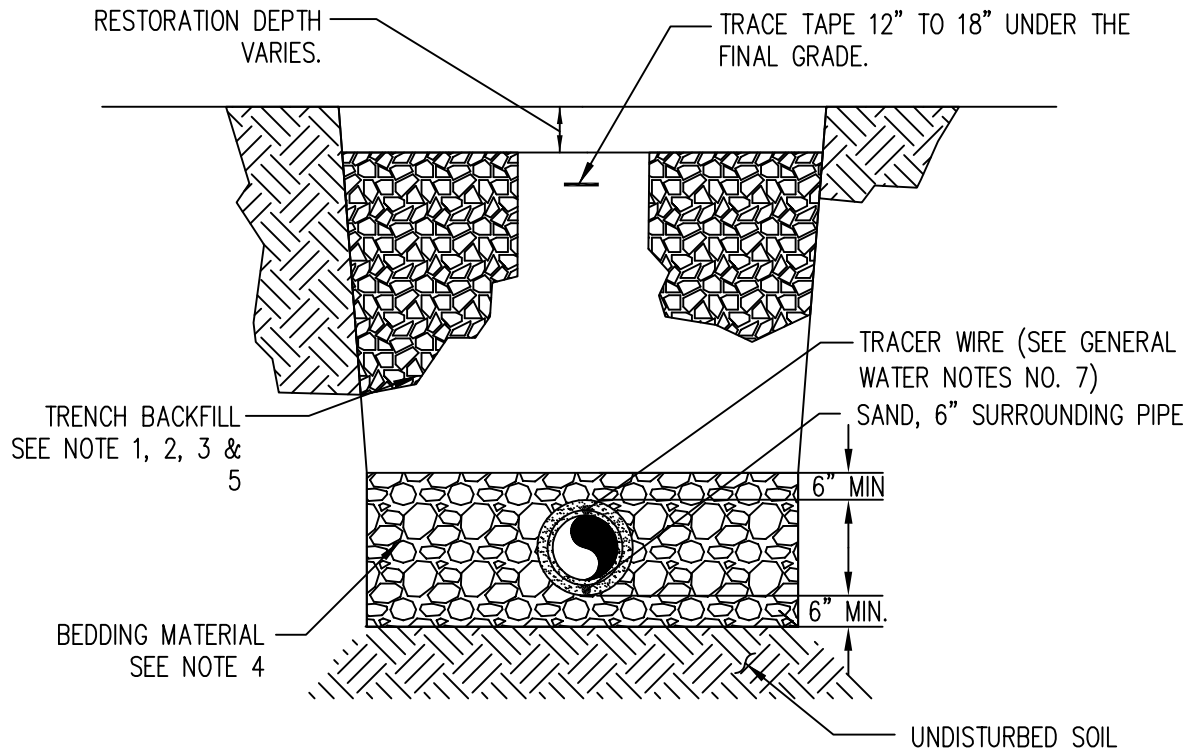
PUBLIC WORKS DIRECTOR DATE

DES. MKD DWN. MKD CKD. JEG

DWG. NO.

4-14

DATE
12/2016



NOTES:

1. A MINIMUM COVER OF 3.5' SHALL BE MAINTAINED, EXCEPT AS REQUIRED AT CONNECTION POINTS.
2. NATIVE BACKFILL SHALL CONSIST OF CRUSHED, PROCESSED, OR NATURALLY OCCURRING GRANULAR MATERIAL. IT SHALL BE ESSENTIALLY FREE FROM VARIOUS TYPES OF WOOD WASTE OR OTHER EXTRANEIOUS OR OBJECTIONABLE MATERIALS. IT SHALL HAVE SUCH CHARACTERISTICS OF SIZE AND SHAPE THAT IT WILL COMPACT READILY COMPACT.
3. NATIVE TRENCH BACKFILL MATERIAL SHALL BE SORTED OR SCREENED SO THAT THE MAXIMUM AGGREGATE SHALL IS 4-INCHES.
4. PIPE BEDDING MATERIAL SHALL BE SAND OR OTHER CITY APPROVED EQUAL. NO SUBSTUTIONS WILL BE ALLOWED WITHOUT WRITTEN AUTHORIZATION FROM THE CITY OF YELM.
5. WHERE NATIVE MATERIALS HAVE BEEN DEEMED UNACCEPTABLE BY THE CITY, TRENCH BACKFILL SHALL MEET THE WSDOT STANDARD SPECIFICATIONS FOR THE PIPE TYPE BEING SPECIFIED.



CITY OF YELM
**TYPICAL WATER MAIN TRENCH &
 BEDDING**

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

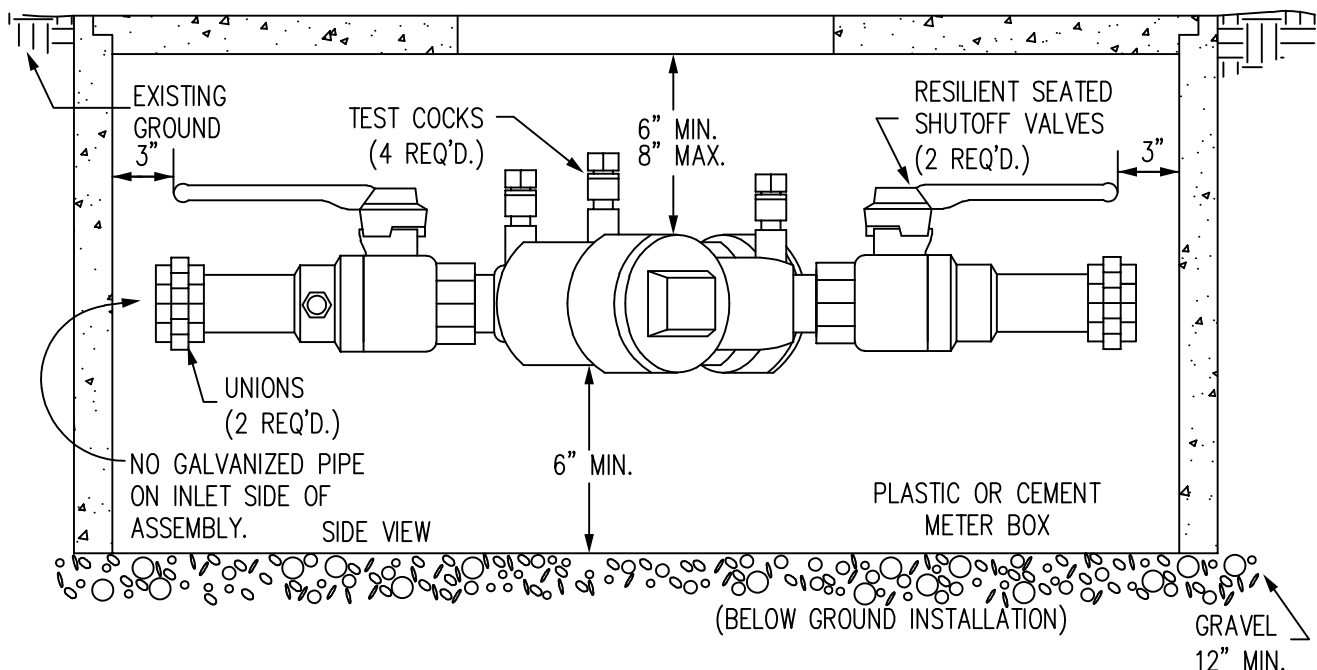
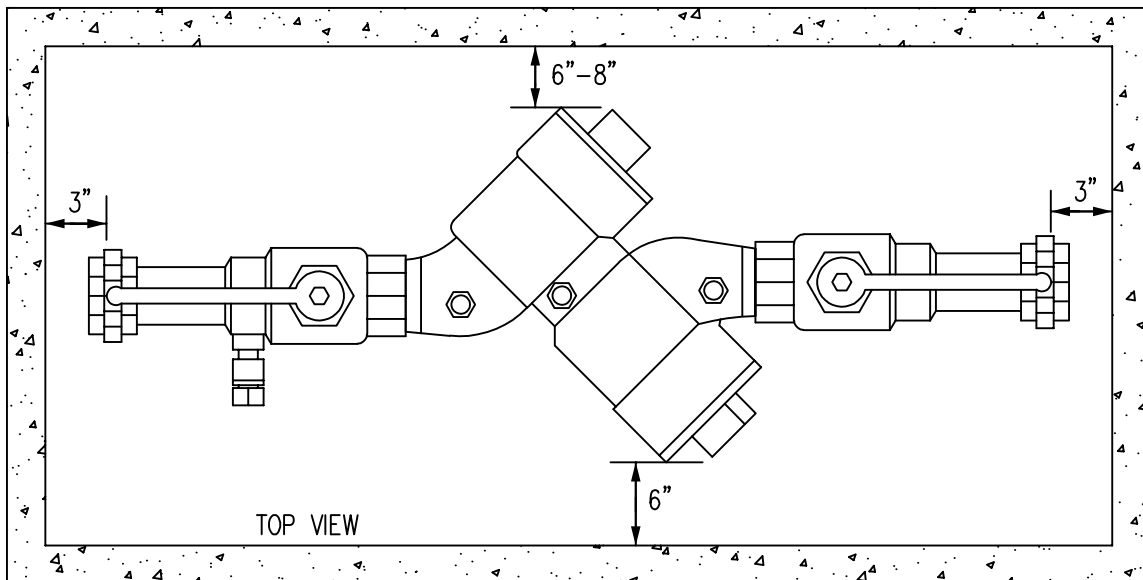
DES. MKD

DWN. MKD

CKD. JEG

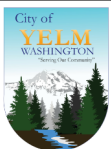
DWG. NO.
4-15

DATE
 12/2016



NOTE: ALL ITEMS SHALL COMPLY WITH THE FOLLOWING.

- APPROVED DOUBLE CHECK VALVE ASSEMBLY SHALL LAY HORIZONTAL WITH GROUND.
- DESIGNED FOR BACK SIPHONAGE AND BACK PRESSURE.
- THOROUGHLY FLUSH LINES PRIOR TO INSTALLATION OF BACK FLOW PREVENTER
- NO GALVANIZED PIPE BEFORE ASSEMBLY
- THE DCVA MAY BE INSTALLED ABOVE OR BELOW THE GROUND PROVIDED ALL CLEARANCES ARE MET.
- DO NOT INSTALL IN AN AREA SUBJECT TO FLOODING.
- VALVE SHALL BE PROTECTED FROM FREEZING CONDITIONS.
- THE BACK FLOW ASSEMBLY SHALL BE A CURRENT WASHINGTON STATE DEPT. HEALTH APPROVED MODEL.
- A PLUMBING PERMIT IS REQUIRED.



CITY OF YELM DOUBLE CHECK VALVE ASSEMBLY 2" AND SMALLER

APPROVED BY

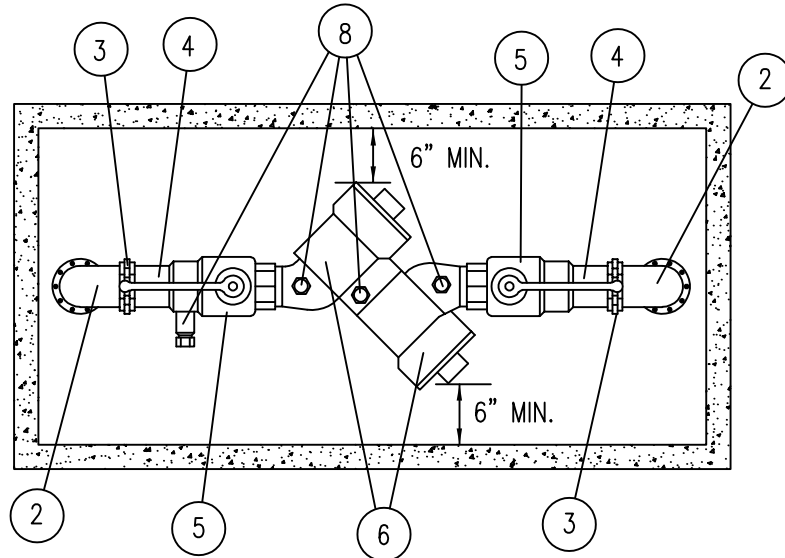
PUBLIC WORKS DIRECTOR DATE

DES. MKD DWN. MKD CKD. JEG

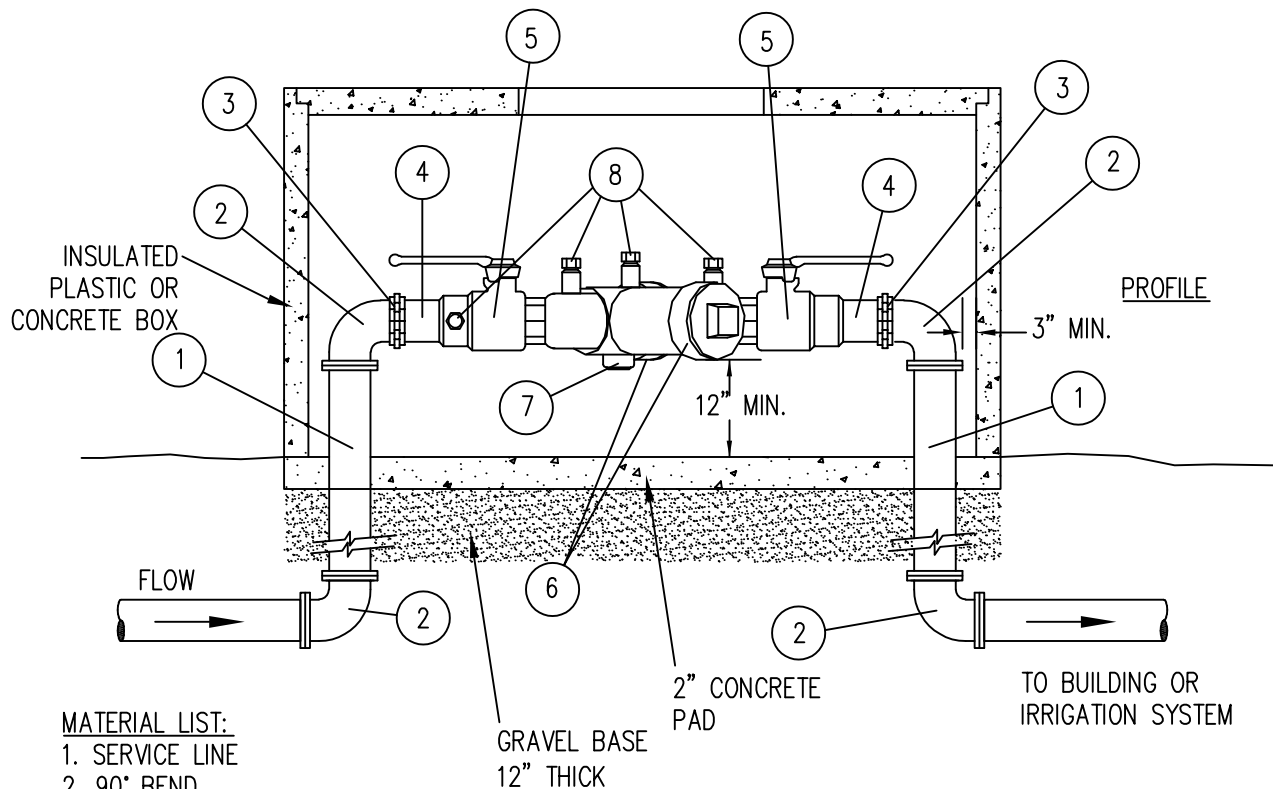
DWG. NO.

4-16

DATE
12/2016



PLAN



MATERIAL LIST:

1. SERVICE LINE
2. 90° BEND
3. UNION
4. NIPPLE
5. SHUT-OFF VALVE
6. CHECK VALVE (D.S.H.S. APPROVED)
7. RELIEF VALVE
8. TESTS COCKS
9. DRAIN TO DAYLIGHT
10. PLUGS IN TEST COCKS

GENERAL NOTES:

- A. THOROUGHLY FLUSH LINES PRIOR TO INSTALLATION.
- B. DIAMETER OF PIPE AND FITTINGS =
- C. REFER TO DEVELOPMENT GUIDELINES SECTION 6.110 FOR FURTHER INFORMATION.
- D. DO NOT INSTALL IN AREA SUBJECT TO FLOODING.



CITY OF YELM
**REDUCED PRESSURE BACKFLOW
ASSEMBLY FOR 2" OR SMALLER**

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

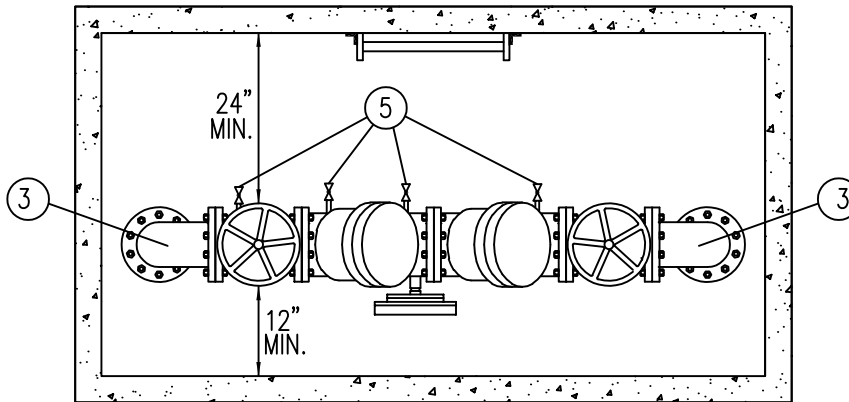
DWN. MKD

CKD. JEG

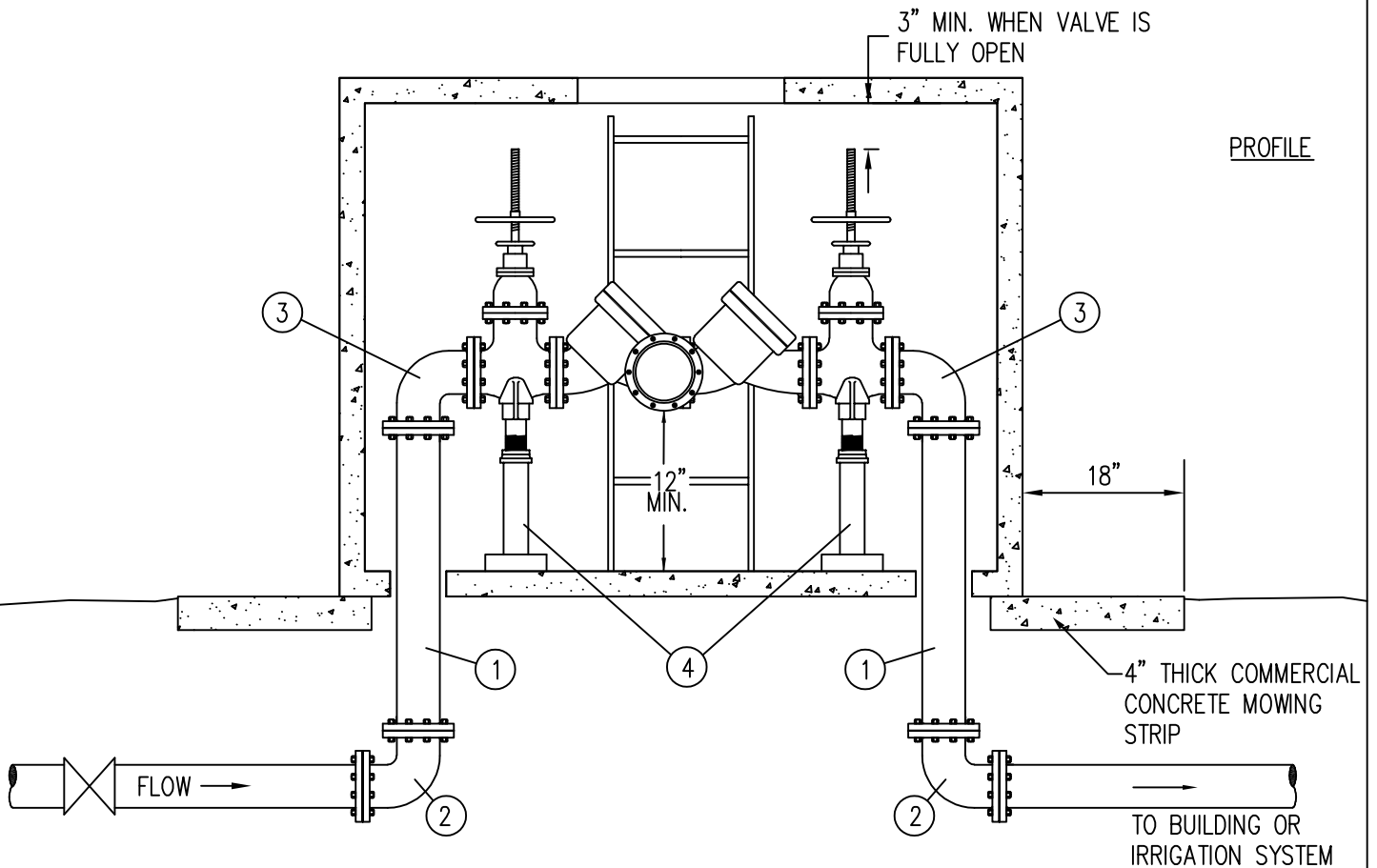
DWG. NO.

4-17

DATE
12/2016



PLAN



PROFILE

MATERIAL LIST:

1. PVC C900 OR CLASS 52 D.I. WALL PIPE FL X FL
2. 90° BEND FL X MEGALUG
3. 90° BEND FL
4. SUPPORT STANDS
5. TEST COCKS – 4 REQUIRED
6. PLUGS IN TEST COCKS

GENERAL NOTES:

A. WHERE PIPING PASSES THROUGH VAULT WALL, PROVIDE WATERPROOF MASTIC OR FLEXIBLE SEALANT.

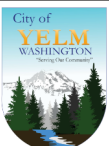
B. DIAMETER OF PIPE AND FITTINGS = _____

C. REFER TO DEVELOPMENT GUIDELINES SECTION 6.110 FOR FURTHER INFORMATION.

D. VAULT MUST BE EQUIPPED WITH AN ADEQUATELY SIZED FLOOR DRAIN OR TO ACCOMMODATE THE RELIEF VALVE DISCHARGE RATE.

E. THOROUGHLY FLUSH LINES PRIOR TO INSTALLING BACKFLOW ASSEMBLY.

MUST BE A FACTORY ASSEMBLY APPROVED BY DOH.



CITY OF YELM
REDUCED PRESSURE BACKFLOW
ASSEMBLY FOR 3" & GREATER

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. JEG

DWG. NO.

4-18

DATE
12/2016

YELM ENGINEERING SPECIFICATIONS AND STANDARD DETAILS

CHAPTER 5 SEWER

Table of Contents

CHAPTER 5.00 SEWER.....	2
5.00 GENERAL CONSIDERATIONS.....	2
5.00.010 GENERAL	2
5.00.020 DESIGN STANDARDS	3
GENERAL NOTES (SANITARY SEWER MAIN INSTALLATION)	4
5.10 STEP TANK SYSTEM	6
5.10.010 STEP TANKS	6
5.10.020 STEP TANK SIZING	6
5.10.030 LOADING CRITERIA	9
5.10.040 FIBERGLASS TANKS	9
5.10.050 CONCRETE TANKS.....	11
5.20 STEP PIPELINES	13
5.20.010 GENERAL	13
5.30 CONSTRUCTION REQUIREMENTS – STEP TANKS/PIPELINES	13
5.30.010 GENERAL	13
5.30.020 PIPELINE AND SERVICE LINE MATERIALS.....	13
5.30.030 STEP TANK INSTALLATION	14
5.30.040 PIPELINE AND SERVICE LINE INSTALLATION	16
5.40 STEP PUMP ASSEMBLIES	23
5.40.010 MATERIALS AND INSTALLATION	23
5.40.020 EFFLUENT PUMP - 4" SUBMERSIBLE PUMPS.....	24
5.40.030 PUMP VAULT, RISER, AND LID	26
5.40.040 INTERNAL SPLICE BOX	27
5.40.050 LEVEL CONTROL AND ALARM FLOATS	28
5.40.060 HOSE AND VALVE ASSEMBLY	29
5.40.070 ADDITIONAL MATERIAL REQUIREMENTS	29
5.40.080 ELECTRICAL CONNECTIONS.....	29
5.50 GRAVITY SEWER.....	32
5.50.010 GENERAL	32
5.50.020 SIDE SEWERS.....	32
5.60 RESTORATION	32
5.60.010 GENERAL	32
5.60.020 CRUSHED SURFACING.....	33
5.70 INSPECTION GUIDE FOR STEP SEWER INSTALLATION	33
LIST OF DRAWINGS - SEWER	34

CHAPTER 5.00 SEWER

5.00 GENERAL CONSIDERATIONS

5.00.010 General

The City of Yelm Technical Specifications were developed for use with onsite Septic Tank Effluent Pump (STEP) tank installations, onsite wastewater disposal system installations that are to be converted to STEP, and STEP collection line installations.

The City of Yelm Technical Specifications are subject to change as new regulations come into effect.

Within the corporate City limits where a public sewer is available it must be used. Where public sewer is not available within the City limits, connection is required provided that the premises are within 200 feet of the public sewer measured from the lot line closest to the existing portion of the City's collection system, except in the case of private residential or commercial developments. In this case, connection of all structures generating sewage shall be required to connect to the public sewer regardless of distance from the public sewer.

Prior to the release of any water meters, or operation of any STEP systems, all Public Works improvements must be completed and approved and all applicable fees must be paid.

See Section 13.08.010 YMC for definitions of specific sewers. Maintenance of the building or side sewer shall be the responsibility of the property owner. Maintenance of the lateral shall be the responsibility of the property owner.

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

Ownership, operation and maintenance of the tank, pump, and pump controls shall be the responsibility of the City only after the system has been inspected and approved and an easement is granted, and ownership of the STEP component conveyed to the City and the warranty period of one year has expired. It is required by the City that the easements for a new development be granted on the plat, otherwise, an easement for each lot will have to be granted at the time of connection.

Power shall be provided by the customer. The customer shall be responsible for notifying the City when the control panel alarm buzzer is activated. All sewer pipe, drains and plumbing between the tank and the building shall be the responsibility of the customer. The customer shall be responsible for curtailing water usage until City forces respond to the customer's notification. The City will accept no responsibility for damages resulting from a plumbing backup, such as may occur if water usage is not curtailed during an alarm condition or if the customer disables the alarm.

The owner of commercial or residential property(s) with a City of Yelm STEP sewer system(s) shall not undertake any alterations of the sewer system(s), including covering or obstructing STEP tank riser lids, cleanouts, pump control panels and lockout switches, without the prior written approval of the City. Any damage caused by the owner or their agents, including tree and bush roots or unmaintained trimming of the same, shall be repaired by the City of Yelm at the owners expense.

Currently, only the Orenco STEP Pump System shown in the drawing section of this chapter has been approved by the City. Any alternate must be reviewed and approved by the City.

5.00.020 Design Standards

The design of any STEP sewer system shall conform to City standards and the latest version of the Criteria for Sewage Works Design prepared by the Department of Ecology (hereinafter referred to as the DOE Design Manual). In case of conflict between the two Standards, the most stringent conditions shall apply.

The layout of extensions shall provide for the future continuation of the existing system as determined by the City. In addition, main extension shall be extended to and through the side of the affected property fronting the main. Individual service boxes shall be installed to serve each lot.

Pump, STEP tank, and pipeline sizing shall conform to the criteria as set forth herein.

The applicable General Notes on the following pages shall be included on any plans dealing with pressure sanitary sewer design.

GENERAL NOTES (SANITARY SEWER MAIN INSTALLATION)

- A. All workmanship and materials shall be in accordance with City of Yelm standards and the most current copy of the State of Washington Standard Specifications for Road, Bridge and Municipal Construction (WSDOT/APWA).
- B. All approvals and permits required by the City of Yelm shall be obtained by the contractor prior to the start of construction.
- C. If construction is to take place in the County Right-of-Way, the contractor shall notify the County and obtain all the required approvals and permits.
- D. A preconstruction meeting shall be held with the City of Yelm prior to the start of construction.
- E. The City of Yelm shall be notified a minimum of 48 hours in advance of a tap connection to an existing main. A City representative shall be present at the time of the tap.
- F. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility locations prior to construction by calling the Underground Locate Line at 1-800-424-5555 a minimum of 48 hours prior to any excavation.
- G. Side sewer services shall be PVC, ASTM D 3034 SDR 35 with flexible gasketed or solvent weld joints.
- H. All plastic pipe and services shall be installed with continuous tracer tape, installed 12" to 18" under the proposed subgrade. The marker shall be plastic non-biodegradable, metal core or backing marked "SEWER" which can be detected by a standard metal detector. In addition, step systems and force mains shall be installed with 14 gauge, heavy coated UF direct bury copper wire wrapped around all plastic pipe, brought up and tied off at valve body. Tape shall be Terra Tape "D" or approved equal. The tape and wire shall be furnished by the contractor.
- I. All buried power for STEP systems shall be installed with continuous tracer tape installed 12" above the buried power. The marker shall be plastic non-biodegradable, metal core backing marked "power". Tape shall be furnished by contractor.
- J. Bedding of the sewer main and all appurtenances shall be sand and compaction of the backfill material shall be required in accordance with the above mentioned specification (See general note 5.60-A).
- K. Temporary street patching shall be allowed for as approved by the City engineer. Temporary street patching shall be provided by placement and compaction of 2 inch minimum asphalt concrete cold mix. Contractor shall be responsible for maintenance as required.

- L. Erosion control measures shall be taken by the contractor during construction to prevent infiltration of existing and proposed storm drainage facilities and roadways.
- M. Provide traffic control plan(s) in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) as required.
- N. It shall be the responsibility of the contractor to have a copy of these approved plans on construction site at all times.
- O. Any changes to the design shall first be reviewed and approved by the City of Yelm.
- P. All STEP mains shall be hydrostatically tested in conformance with the above-referenced specification for testing water mains. (See note 1.) In addition, all STEP mains shall be pigged/cleaned in the presence of the City Inspector prior to placing STEP main in service.
- Q. Prior to backfill all mains and appurtenances shall be inspected and approved by the City of Yelm. Approval shall not relieve the contractor for correction of any deficiencies and/or failures as determined by subsequent testing and inspections. It shall be the contractor's responsibility to notify the City of Yelm for the required inspections.
- R. Pump control panels shall be located on garage wall or remote post, 5-feet from top of panel to finish grade, unless otherwise authorized by the City of Yelm.
- S. In the event that the Department of Labor and Industries or the city should require a separate "on-off" switch controlling power to the Pump Control Panel, said switch shall have a locking cover model # 5031-0 Rayntite Single Gang Weatherproof Cover 1.406" diameter.
- T. Inspections for onsite STEP installations are required. A 48 hour notice to the sewer department is required prior to the inspection.

Items needing inspection are:

- 1. Tank installation, ie; bedding and location
 - 2. Tank infiltration, exfiltration test
 - 3. S.S. pressure test
 - 4. Service line pressure test
 - 5. Final Inspection
- U. All posts used to support pump control panels, must be hot dip galvanized Unistrut or approved equal.

5.10 STEP TANK SYSTEM

5.10.010 STEP Tanks

STEP tanks shall be the size and type as denoted in these specifications and as shown on the standard drawings. Grease interceptors shall be sized in accordance with the EPA Design Manual (625/1-80-012) and shall be of a configuration consistent with industry standards. Grease interceptor vessels will be subject to requirements of the STEP tank.

STEP tanks with an influent pipe invert elevation of less than or equal to 4 feet, which are not placed in traffic bearing areas shall meet the loading criteria listed in section 5.10.030.

All models of tanks will be certified by a licensed structural engineer that they will meet the loading conditions specified herein. The Structural Engineer certifying each model of tank shall submit drawings including but not limiting to the following:

1. Plan view showing dimensions of tanks and the size and location of any openings in the tank.
2. Side section of tank showing dimensions and thickness.
3. End section of tank showing dimension and thickness.

STEP tanks with influent pipe inverts greater than 4 feet, and/or are subject to traffic bearing loading, shall meet the loading criteria listed in section 5.10.030.

All models of tanks will be designed by a licensed structural engineer. Calculations shall be submitted for review.

An inspection port will be required over the inlet baffle for all STEP tanks. A 24" diameter minimum riser inspection port/clean-out shall be required.

5.10.020 STEP Tank Sizing

STEP tanks for the City of Yelm will be sized and configured as outlined, and shall meet the DOE Design Manual criteria for vessel sizing and configuration.

TABLE 1 – STEP TANK SIZING	
<u>Descriptions</u>	<u>Tank Size</u>
Up to 4 bedroom home	Min 1,250 gallons liquid capacity
5/6 bedroom home/Duplex	Min 1,500 gallons liquid capacity

STEP tanks for any applications of institution, multi-family dwelling or, other structures not listed above shall be sized in accordance with the latest version of the DOE Design Manual. Peak-day flow for purposes of sizing STEP tanks shall be calculated using Table 2, Accepted Engineering Manual, or actual operating records, whichever is more stringent. All STEP tank configuration will be two compartment and shall meet requirements of the DOE Design Manual with the following additions:

- A. All concrete STEP tanks 1,250-3,000 gallons will be two compartment tanks divided by a baffle as shown in Drawing Detail 5-10 and 5-11. On 1,500 gallon tanks, install one 4-inch diameter hole centered on baffle wall 20 inches on center from bottom of floor. 3,000 gallon tanks will have one 4" diameter hole centered on tank baffle wall 29" on center from floor of tank.
- B. On 6,000-gallon tanks, install one 6-inch diameter hole centered across width of tank baffle 40 inches on center above floor of tank in each baffle.
- C. If approved by the Owner, 6,000-gallon tanks used in conjunction with a pump tank may not require a baffle depending on diameter.
- D. No tank larger than 6,000 gallons will be used in the City of Yelm STEP system.

Table 2 – Estimated Daily Sewer Flows	
Type of Establishment	Gallons per person per day (unless otherwise noted)
Airports (per passenger)	5
Apartments - multiple family (per resident)	65
Bathhouses and swimming pools	10
Camps:	
Campground with central comfort stations	35
With flush toilets, no showers	25
Construction camps (semi-permanent)	50
Day Camps (no meals served)	15
Resort camps (night and day) with limited plumbing	50
Luxury camps	100
Cottages & small dwellings with seasonal occupancy	50
Country clubs (per resident member)	100
Country clubs (per non-resident member present)	50
Dwellings:	
Boarding houses	50
additional for non-resident boarders	10
Luxury residences and estates	150

Multiple family dwellings (apartments)	65
Rooming houses	40
Single family dwellings	75
Factories (gallons per person, per shift, exclusive of industrial wastes)	35
Hospitals (per bed space)	250+
Hotels with private baths (2 persons per room)	60
Hotels without private baths	50
Institutions other than hospitals (per bed space)	125
Laundries, self-service (gallons per wash, i.e., per customer)	50
Mobile home parks (per space)	250
Motels with bath, toilet, and kitchen wastes (per bed space)	50
Motels (per bed space)	40
Picnic Parks (toilet wastes only) (per picnicker)	5
Picnic parks with bathhouses, showers, and flush toilets	10
Restaurants (toilet and kitchen wastes per patron)	10
Restaurants (kitchen wastes per meal serviced)	8
Restaurants additional for bars and cocktail lounges	2
Schools:	
Boarding	100
Day, without gyms, cafeterias, or showers	15
Day, with gyms, cafeterias, and showers	25
Day, with cafeteria, but without gyms, or showers	20
Service stations (per vehicle served)	10
Swimming pools and bathhouses	10
Theaters:	
Movie (per auditorium seat)	5
Drive-in (per car space)	5
Travel trailer parks w/o individual water and sewer hook-ups (per space)	50
Travel trailer parks with individual water and sewer hook-ups (per space)	100
Workers:	
Construction (at semi-permanent camps)	50
Day, at schools and offices (per shift)	15

All tanks install a 4-inch diameter hole within 1 inch of crown of baffle for venting or 11 ½ inch space between top of baffle wall and top of tank.

Designers to consult with Public Works Director prior to design of commercial STEP installation and tanks over 3,000 gallons to verify tank sizing, vault configuration, pump requirements, and electrical requirements.

Underestimating the wastewater flow anticipated to be received by either the STEP tank or primary tanks by the property owner or the owner's designer

based on estimated use will result in the property owner increasing the septic tank holding capacity to meet the above criteria. Refusal to increase the size of the septic tank to meet the design criteria will result in discontinuance of sewage collection services.

5.10.030 Loading Criteria

- A. 135 lb./cu. ft. weight of backfill.
- B. The water table is at ground level. Lateral loading is 85 lb.cu. ft., which includes hydrostatic water pressure.
- C. The tank will support a minimum 1000 lb. wheel load.
- D. Tanks designated as traffic bearing tanks shall be designed to withstand HS-20 truck loading with appropriate impact factors. All tanks shall be structurally sound and watertight and shall be guaranteed in writing by the tank manufacturer for a period of two (2) years from the date of final acceptance. The tank guarantee/warranty shall be furnished at the time of installation. Tank warranty shall not limit liability to replacement cost of the tanks.

5.10.040 Fiberglass Tanks

Unless superseded by the Standard Specifications, the fiberglass tanks will meet all requirements of IAMPO_1-87. If requested by the Owner, the manufacturer shall supply to the Owner, without charge, approved original laboratory report showing compliance with IAMPO PS 1-87 and requirements of the suppliers licensed Structural Engineer. All STEP tanks installed larger than 3,000 gallons shall be fiberglass tanks manufactured by either Containment Solutions Inc. or Xeres Inc. Any alternate must be approved by the City.

All fiberglass STEP tanks shall be installed by qualified installers, following the manufacturer test directions and shall be secured with tie-down straps with "Dead Men". Sizing and materials for Dead Men and strapping shall be per the manufacturer test recommendations.

A. Method of Calculations

Fiberglass tanks shall be analyzed using finite element analysis for buried structures.

Calculations shall address the following:

1. Strength with a safety factor of 2.5
2. Buckling with a safety factor of 2.5
3. Deflection of 5 percent of the tank diameter, based on service load (including long-term deflection lag).

4. Buoyancy

B. Performance Testing

In lieu of calculations for fiberglass tanks, the supplier may elect for in situ performance testing.

In situ testing of each tank model shall include use of strain gauges and deflection gauges. The tank will be subjected to external forces equal to twice the actual load.

Maximum initial deflection based on service loading shall not exceed 2 percent of the tank diameter.

Performance testing will be evaluated by a licensed Structural Engineer registered in the State of Washington. The Owner will have the sole responsibility to determine the maximum external loading on any of the tank models.

1. Inspections may be made by the Owner in the suppliers' yard, within the plant, upon delivery and again after installation. The wall thickness shall average at least 1/4 inch unless superseded by the requirements of the Structural Engineer. When less than 3/16 inch in thickness or any delamination is suspected within any portion of the tank wall for inspection purposes. If the required minimum 3/16-inch thickness is not found, repair, if feasible, shall be the responsibility of the Contractor. If repair is judged not feasible, the tank shall be rejected. If twenty percent or more of the tanks are rejected for any of the aforementioned reasons, each tank under this bid will become suspect of substandard quality and subject to rejection by the Owner. If the required minimum 3/16-inch thickness is found, and no delamination is present, the repair shall be the responsibility of the Owner.
2. The Structural Engineer shall specify the minimum weight of each tank model that will be allowed and submit those weights during the submittal process. The manufacturer will weight each tank and place that weight on the side of each tank in a manner that will not be affected by rain or inclement weather.
3. Holes required in the tank shall be provided by the manufacturer. Resin shall be properly applied to all cut or ground edges so that no glass fibers are exposed and all voids are filled.
4. Dual Tite or Ty-Seal neoprene gaskets, or equal, shall be used at the inlet to join the tank wall and the ABS inlet piping. ABS Schedule 40 pipe and fittings shall be used at the inlets.
5. Inlet plumbing shall penetrate 18-inches into the liquid from the

inlet flow line.

6. Each tank shall be water tested on the project site after assembly by the manufacturer and witnessed by the Owner. Every tank shall be assembled by the manufacturer and water raised to the brim of the manhole for a minimum of two (2) hours. The tank shall show no leakage from section seams, pin-holes or other imperfections. Any leakage is cause for rejection.
7. When leakage occurs, if the tank is not rejected by the Owner, an additional water test for a minimum of two (2) hours shall be made on the tank after repairs have been completed, upon request by the Owner. The manufacturer shall be responsible for making all corrective measures in production or assembly necessary to ensure a completely watertight tank.
8. After installation of tank with riser is completed each tank shall be filled with water 2" above the rim of the rider adapter ring installed into tank lid. Test shall hold for a two (2) hour period as per paragraph 6, to assure that there is no leakage. Every tank test shall be witnessed by the Owner.
9. Each tank will also include a serial number and date of manufacturer.
10. Installation shall be in accordance with the manufacturer's recommendations, and as shown on the contract plans, no variations.

5.10.050 Concrete Tanks

- A. Concrete tanks will be allowed in sizes up to 3,000-gallon capacity.
- B. Wall, bottom and top of reinforced-concrete tanks shall be designed across the shortest dimension using one-way slab analysis. Stresses in each face of monolithically-constructed tanks may be determined by analyzing the tank cross-section as a continuous fixed frame.
- C. The walls and bottom slab shall be poured monolithically; alternatively, water stops may be provided.
- D. Reinforcing steel shall be ASTM A-615 Grade 60, $f_y=60,000$ psi. Details and placement shall be in accordance with ACI-35 and ACI-318.
- E. Concrete shall be ready mix with cement conforming to ASTM C-150, Type II. It shall have a cement content of not less than six (6) sacks per cubic yard and maximum aggregate size of 3/4 inch. Water/cement ratio shall be kept low (0.35+), and concrete shall achieve a minimum compression strength of 4000 psi in 28 days. The

Contractor shall submit a concrete mix design to the Owner for review and approval. Three (3) concrete sample cylinders shall be taken and tested for each tank manufactured until the manufacturer and Owner are satisfied that the minimum compression strength is being obtained. To insure compliance, the manufacturer shall then make and test three (3) sample cylinders for a minimum of 20 percent of the remaining tanks at the discretion of the Owner. If the minimum compressive strength is not being obtained, the manufacturer shall be required to make and test sample cylinders for each tank manufactured. Calcium chloride will not be allowed in the mix design. The cost of testing cylinders shall be the tank manufacturer's responsibility. The tank manufacturer may supply a Swiss hammer for compressive testing in the field in lieu of sample cylinders.

- F. Form release used on tank molds shall be Nox-Crete or equal. Diesel or other petroleum products are not acceptable.
- G. Tanks shall not be moved from the manufacturing site to the job site until the tank has cured seven (7) days or has reached two-thirds of the design strength.
- H. Tanks shall be manufactured and furnished with access openings of the size and configuration to accommodate individual packaged pump systems. Modification of completed tanks will not be permitted.
- I. The septic tank and the top slab shall be sealed with a pre-formed flexible plastic gasket. The flexible plastic gasket shall be equal to the flexible butyl resin sealant conseal CS-102 or CS-202 as manufactured by Concrete Sealants, Inc. of New Carlisle, Ohio and shall conform to federal specification SS-S00210(210A) and AASHTO M-198.
- J. Tanks shall be furnished without concrete access hole lids and equipped with tank riser adapters as manufactured by Orenco Systems. In order to demonstrate water tightness, the tanks shall be tested as follows:
- K. Inlets to the septic tank will be water tight pipe seal as Ty Seal pipe seal or equal. Outlets for effluent filters shall be configured as shown on the contract plans.
 - 1. Factory Test: All of the tanks supplied by the precast manufacturer will be hydrostatically tested in the factory. The tank shall be tested by filling with clean water to the soffit and let stand for a minimum of 24 hours. After the 24-hour period, the water will be replaced to soffit. The water level shall be checked after 2 hours. Any water loss will not be acceptable.
 - 2. b. Field Tests: After the tanks have been set in place, but prior to

backfilling, each tank shall be tested for a 2-hour period. Any tank that fails the test as outlined in 12a shall be repaired and/or replaced until the tank passes said test. After backfilling, the tank shall be filled with water to 2 inches above riser and tank connection and tested for exfiltration over a two (2) hour period. No tank will be accepted if there is any leakage over the two (2) hour period.

3. The water required to fill a tank in order to conduct the tank pressure test and check for leaks shall be provided by the contractor and/or owner at their expense. This is a testing requirement associated with construction and considered "water for construction".

5.20 STEP PIPELINES

5.20.010 General

STEP pipelines constructed and sized within private developments and public Right-of-Way shall conform to the City of Yelm Sewer Comprehensive Plan and the DOE Design Manual, whichever is more stringent.

5.30 CONSTRUCTION REQUIREMENTS – STEP TANKS/PIPELINES

5.30.010 General

Installation and materials used for construction of the City of Yelm STEP system shall conform to the requirements of sections 13.08.030 through 13.08.080 of the Standard Specifications, unless amended herein.

All STEP tanks deemed commercial must utilize 2 inch piping for the service line.

5.30.020 Pipeline and Service Line Materials

- A. All pipe less than 2 inches shall meet the following requirements:

Schedule 40 PVC pipe shall be designed for solvent weld joints and shall comply with ASTM D 1785.

All pipe 2 inches and above shall meet the following requirements:

1. PVC 1PS 1120 SDR 21 Class 200 pipe shall have rubber ring gasket joints, shall comply with ASTM D 1784 and have a working pressure rating of 200 psi.
2. 2 inch service lines shall be schedule 40 PVC pipe designed for solvent weld joints and shall comply with ASTM D 1785.

- B. Bedding

1. Bedding shall be sand.
2. Bedding shall be installed as shown on the Standard Details.

C. Joints

1. Solvent Weld Joints

- a. Solvent cements and primer for joining PVC pipe and fittings shall comply with ASTM D 2564 and be as recommended by the pipe and fitting manufacturers. Primer shall be required for use on all solvent weld joints.

2. Rubber Ring Gasket Joints

- a. Rubber ring gaskets shall comply with ASTM D 1869 and ASTM D 3139 and shall be supplied by the pipe or fitting manufacturer with a sufficient amount of lubricant. The lubricant shall be water soluble, non-toxic, nonsupportive of bacterial growth and have no deteriorating effect on the PVC or gasket.

D. Fittings

All fittings shall have a minimum working pressure equal to the pipe with which they are connected.

1. Solvent Weld Fittings

- a. Solvent weld fittings for pipe less than 2 inches shall be socket type Schedule 40 fittings and shall comply with ASTM D 2466 and 2467.

2. Rubber Ring Gasket Fittings

- a. Rubber ring gasket fittings for pipe 2 inches and larger shall be PVC 1120 complying with ASTM F 477, as manufactured by Head Manufacturing Co., Preston, Idaho; Gault Fabrication Company, Stockton, California; Spears Fabrication, Stockton, California; or approved equal.

It is exceptable to use socket type 'T's on 2 inch Mainlines at the connection point for either a 2 Inch or 1 inch service connection.

5.30.030 STEP Tank Installation

It shall be the Contractor's responsibility to verify the location and the elevation of all existing sewer lines prior to installing the individual tank. STEP tanks shall be located in front of building unless otherwise approved by the City of Yelm.

It is anticipated that existing utility lines will be encountered during installation of the STEP tank and appurtenances. Prior to starting construction the Contractor will notify the proper utility for underground locations and also contact the property owner to determine location of foundation drains, electrical lines, etc.

The Contractor shall be responsible to obtain all necessary permits for work on public Right-of-Way such as street opening permit available at City hall. All cost for permits will be the Contractor's responsibility.

Excavations for all tanks shall be sufficient to leave a minimum of 6 inches of bedding (see tank bedding Detail Drawings 5-16 and 5-17).

Tanks set in holes with high water table issues or suspected high water table issues will be H-20 tanks with minimum 24 inches of cover (6" of sand bedding and 18" native backfill).

All tank installations shall adhere to the following:

- A. Location of the STEP tank site will be submitted to the City upon request for review and approval.
- B. All excavation and backfill of tanks shall conform to standard specification. Compaction for non traffic areas shall be 85 percent of maximum density. Compaction for traffic areas shall be 95 percent of maximum density.
- C. For work within public Right-of-Way, the contractor shall be responsible on a daily basis for providing ingress and egress for both pedestrian and vehicle traffic on all work sites. The contractor shall clean up his work area on a daily basis to avoid inconvenience to the public.
- D. For work within public Right-of-Way, the contractor shall safeguard his work on a daily basis to prevent possible injuries. The contractor shall submit to the City his method of safeguarding his work prior to beginning any construction on public Right-of-Way.
- E. Depth of Bury not to exceed 5 feet from invert elevation of influent pipe to finished grade on commercial systems.
- F. Any modifications resulting in an existing non-H20 tank ending up in a traffic/load bearing situation shall have a 6 inch concrete pad constructed over it. It shall extend 12 inches past all sides of tank and contain rebar/wire mesh embedded in concrete with aluminum rings and covers per detail DWG. No. 5-19.
- G. There shall be no hose bibs above pump control panels or disconnects and minimum of 2 feet separation from sides and bottom of disconnect and pump control panel.

- H. There shall be a hose bib within 50 feet of the farthest riser of the farthest tank for maintenance and pumping.
- I. STEP tanks shall not go under sidewalks, porches, porch overhangs, or roof eaves. Tanks shall be 5 feet minimum separation from property line, foundation of houses, and/or porch foundations, and located 2 feet on the side of the driveway closest to the inlet, and 2 feet minimum separation from utility easements.
- J. Residential non-traffic bearing risers shall be no higher than 24 inches from tank lid to finish grade, unless preapproved by the Director or their assigned designee.
- K. The owner of the property will have sole ownership and responsibility of side sewer and clean out from house to tank inlet.

Tanks in Driveways

- A. Tanks set in driveways shall be 5 feet from the building foundation, porch foundation, property line, and up to utility easement. Any undermined foundations will require backfill with controlled density fill (CDF).
- B. Access to tank risers shall have a traffic bearing lid set up according to sewer specifications, DWG. No. 5-19 with 12" of compacted crushed rock under concrete collars.
- C. Tanks under driveways shall be H-20 rated tanks.
- D. Concrete driveways shall be 4 inches thick with welded wire mesh placed in the concrete driveway. If a high water table is an issue, the concrete driveway shall be 6 inches thick with wire mesh to help with buoyancy of the tank when empty from pumping.
- E. The minimum depth of bury shall allow for the combination of an 18 inch riser, the thickness of the aluminum H-20 lid and 2-3 inches between fiberglass riser lid and bottom of aluminum H-20 lid.

5.30.040 Pipeline and Service Line Installation

A. Grade and Alignment

Service lines shall be placed a minimum of 18 inches of cover within private property. Deeper excavation may be required due to localized breaks in grade such as curbs, retaining walls, and terraced ground. Where required by the City of Yelm, the pipeline shall be laid to the profile or elevation shown, regardless of depth. Maximum cover of any mainline within public Right-of-Way or easement shall be 60", unless otherwise approved by the public works director or designee.

Sewer main line gate valves should be a distance of 1,000 feet on a case by case basis.

All ductile iron fittings shall be epoxy coated or P.E. lined both inside and outside. The coating material shall be designed for use with corrosive materials.

B. Trench Excavation and Backfill

Native material from trenches and excavations may be considered unsuitable for trench backfill. The City of Yelm shall determine the suitability of native material for trench backfill. If the native material is deemed unsuitable by the City, "Bank Run Gravel for Trench Backfill" shall be used. Bank run gravel shall be equal to Section 9-03.19 of the Standard Specifications.

The Contractor has the option of jacking or boring pressure sewer lines under existing improvements. The Contractor's proposed method of construction and material type shall be submitted for the City's approval prior to commencing work. Pipeline material shall be approved by the manufacturer for jacking or boring application. No jacking operation shall exceed 40 feet unless authorized by the City.

At locations where paved or graveled streets, shoulders, alleys, parking lots, driveways, patios, and sidewalks will be reconstructed over the trenches, the backfill shall be spread in layers not exceeding 8 inches in loose thickness and be compacted by mechanical tampers to 95 percent of maximum density. Proof of compaction is required. At locations where lawn, landscaping, and unimproved surfaces will be reconstructed over the trench, the backfill shall be spread in layers not exceeding 8 inches in loose thickness and be compacted by mechanical tampers to 85 percent of maximum density.

Maximum density and optimum-moisture content shall be determined using the modified Proctor maximum dry density procedure (AASHTO T180 or ASTM D 1557). In place density shall be determined using the Washington Densimeter method or Nuclear Gauge as outlined in the WSDOT Construction Manual.

C. Detectable Marking Tape

Heavy duty fourteen-gage insulated copper toning wire designed for direct-bury applications, shall be placed directly over all non-metallic pressure sewer lines and service lines. The Contractor shall bring the toning wire to the surface of the valve box and service boxes for purposes of attaching a utility detection device. All connection of the toning wire for service connections shall be stripped of insulation and

attached to the copper portion of the main line toning wire. The connection point shall be D.B.R. Direct Bury Splice Kits.

D. Hydrostatic Pressure Test

All sewer mains, service lines, and appurtenances shall be hydrostatically tested in lengths specified. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be accompanied with certifications of accuracy from a laboratory approved by the Owner.

The sewer pipeline shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the Contractor shall furnish and install temporary blocking and remove it after testing.

The sewer lines shall be filled with water and allowed to stand under pressure a sufficient length of time to allow the escape of air.

The test shall be accomplished by pumping the sewer line up to the required pressure, stop the pump for 15 minutes, and then pump the sewer line up to the test pressure again. During the test, the section being tested shall be observed to detect any visible leakage. There shall not be an appreciable or abrupt loss in pressure during the 15-minutes test period.

The quantity of water required to restore the pressure shall be accurately determined by pumping through a positive displacement water meter with a sweep unit hand registering one gallon per revolution. The meter shall be approved by the Owner.

The maximum allowable leakage for sewer lines shall be, according to AWWA C600, Section 4 Hydrostatic Testing, as follows:

Test	Pipe Diameter			
Pressure	3"	4"	6"	8"
150 PSI	No Loss	No Loss	No Loss	No Loss

Portions of the sewer line that are determined to be critical, or suspected of leaking, should be left with the joints exposed during the testing procedure to allow visual inspection. The use of dye in the testing water will assist the location of leaks if ground water is present in the trench. Any visible leakage detected shall be corrected by the Contractor regardless of the allowable leakage specified above.

Should the tested section fail to meet the pressure test successfully as specified, the Contractor shall, at his expense, locate and repair the defects and then retest the pipeline.

Prior to calling out the Owner to witness the pressure test, the Contractor shall have all equipment set up completely, ready for operation and shall have successfully performed the test to assure himself that the pipe is in a satisfactory condition.

Defective materials or workmanship, discovered as a result of a hydrostatic field test, shall be replaced by the Contractor at his expense. Whenever it is necessary to replace defective material or correct the workmanship, the hydrostatic test shall be rerun at the Contractor's expense until a satisfactory test is obtained.

Service lines shall be sleeved under driveways, sidewalks, and where the service line can make contact with any part of the tank.

The Contractor shall provide the water necessary to fill the pipelines for testing purposes. Water may be purchased from the Water Utility. Contractor to coordinate with the City of Yelm Water Utility. The Contractor will be responsible for transporting the water to the project site. The Contractor will also be responsible for furnishing a backflow prevention device or other Owner approved method to avoid contamination of the water supply during loading, an appropriate water meter and all other appurtenances required. Water meter and appurtenances shall be approved by the Owner.

The Contractor shall demonstrate to the satisfaction of the Owner that the air release valves and vacuum release valves are operating correctly.

1. Sewer Main Line Testing.

Sewer Main Lines shall be tested under a hydrostatic pressure equal to 150 psi.

After the sewer main test has been completed, each mainline valve shall be tested by closing valves in turn and relieving the pressure beyond. This test of the valves will be acceptable if there is no immediate loss of pressure on the gauge when the pressure comes against the valve being checked. The Contractor shall verify that the pressure differential across the valve does not exceed the rated working pressure of the valve.

When testing sewer main lines, they shall be tested against service line test valve at 150 psi for 15 minutes after that has passed pressure will be reduced to 80 psi and test valves will be opened one at a time to put pressure against check valve. This service line

between check valve and test valve shall be prefilled with water before testing to reduce initial pressure drop. After that, remaining pressure shall have no drop for one minute.

Prior to any main line testing, all service lines within the main line test area shall be installed, tested, and approved. The Contractor shall test no more than 500 linear feet for the first test to qualify crews and materials. Sections of collection main line to be tested shall not exceed 1,000 linear feet per each individual test. Once successful test results have been achieved, the Contractor may request in writing test sections greater than 1,000 linear feet for the Owner's approval. The Contractor is required to keep his pipe testing and service line testing concurrent with his pipeline laying operations.

2. Sewer Service Line Testing.

In order to test the service line, the ball valve (or self-tapping saddle if used) at the sewer main shall be closed and the test pump shall be attached at the end of service line with ball valve and check valve, if required. This portion of the service line shall be tested under a hydrostatic pressure of 70 psi. The test will be deemed successful if the pressure is constant for a minimum of 1 minute.

3. The contractor shall be responsible for replacing any shut-off valve or check valve in carson box, if it does not hold pressure during testing.

E. Air and Vacuum Release Valves

Air release valves and air/vacuum valves shall be located at the high points of the line. Profiles for each pipe run shall be submitted with the hydraulic gradeline for both static and dynamic flow conditions to show where the critical points are for air release valves. Vehicular access to air/vacuum valves is required for maintenance.

Because the air released by these valves will contain hydrogen sulfide, the valves and their enclosures have to be constructed of corrosion resistant materials. The air released from the valve will be quite odoriferous, thus, each vent will be equipped with an odor control system such as activated carbon filters impregnated with sodium hydroxide. All air release, vacuum release, and combination air release/vacuum release valves shall be a model D-021 combination air valve "MINI SAAR".

F. Pigging Ports/Cleanouts

A pipeline pig is a projectile that is forced through the inside of a pipe to clean pressure pipelines. A pigging port/cleanout is used as a point to send the pig (see Standard Detail 7-20).

Pigging ports are required:

1. At every 2-inch diameter change in pipeline size;
2. At the end of every dead end line;

Specific locations are subject to review and approval by the city.

G. Thrust Blocking

Location of thrust blocking shall be shown on plans. Thrust block concrete shall be Class B poured against undisturbed earth. A plastic barrier shall be placed between all thrust blocks and fittings.

See drawing numbers 4-13 and 4-14 in Chapter 4. Designed and approved restraining joint systems may be allowed in lieu of thrust blocking. Restraining joint brand, type and size shall be specified on the plans. Material shall be stainless steel, epoxy coated, or approved equal.

H. Service Connections

This work consists of installing the service line and appurtenances. The service connection at the sewer main includes a check valve and ball valve, without valve boxes, and a saddle or tee at the sewer main.

I. Service Interruption/Line Connections

The contractor shall give the City a minimum of 72 hours notice of any planned connection to an existing pipeline. This includes all cut-ins and live taps. Notice is required so any disruptions to existing services can be scheduled. The City will notify customers involved or affected of the sewer service interruption. The contractor shall make every effort to schedule sewer main construction with a minimum interruption of sewer service. In certain situations, the City may dictate scheduling of sewer main shutdowns so as not to impose unnecessary shutdowns during specific periods to existing customers.

All connections made to sewer lines 2" – 6 " can be live taps that can be performed by the contractor using SPEARS "Hot Tap Saddle", or saddle previously approved by the City. Any pipe greater than 6" or C900 pipe shall be performed by a certified tapping company. Tap installation must be inspected and approved by the City.

Tap installation shall be performed by a professional company that specializes in this work, and the company doing this work will first be approved by the sewer department. When tapping non-C900 main

lines (6" or less), "Hot Tap Saddles" as manufactured by Spears are acceptable and can be used by the underground sewer main installer with prior approval from the Sewer department and installation must be inspected by City Sewer Inspector.

5.40STEP PUMP ASSEMBLIES

5.40.010 Materials and Installation

A. General

This work shall include but not be limited to providing and installing pump assemblies, effluent filters, risers, electrical equipment and pump control and alarm assemblies in accordance with the plans and these specifications. The pump assemblies provided shall restrict the discharge to low flow over a wide range of head conditions to assure that solids remain in the STEP tank and not be transmitted into the pressure line. Pumps installed shall be protected by a screen to prevent solids greater than 1/8 of an inch entering the pressure line and prevent plugging the intake to the impeller or the flow restriction device.

B. Ball Valves

One-inch ball valves shall be PVC ball valves and shall comply with ASTM D 2846. It shall be designed for use with corrosive fluids, for low torque manual operation, and for a working pressure of 150 psi. The PVC material shall be Type 1 (NSF). The valve shall be Model No. LT-1000-S as manufactured by KBI (King Brothers Industries), or equal approved by the City.

C. Gate Valves

Gate valves for sewer systems shall be NRS gate valves, complying with AWWA C509. Buried valves shall have 2-inch square AWWA Standard operating nuts. Valve stem extensions, if necessary, shall be installed on valves deeper than 5 feet and provided by the same supplier as the gate valves. All Gate valves to be Resilient Wedge epoxy coated

All gate valves shall be equipped with operator extensions that bring the operating nut to within 24" inches of the surface for valves over 5 feet deep.

D. Check Valves

Check valves for sewer systems shall be PVC swing check valves designed for use with corrosive fluids and shall have a Buna-N seal on a swing gate which lifts to allow for unobstructed flow. The PVC material shall be Type 1 (NFS). The valve shall have no metallic parts. It shall have a working pressure of 150 psi and shall require only 1/2 psi back pressure for complete closure. It shall be as manufactured by KBI (King Brothers Industries), or equal approved by the Owner.

E. Valve Boxes

The word Sewer shall be cast into the lid. The top section shall be made of cast iron conforming to the following specifications: ASTM A 4876; WWP 401; and CS-88. It shall be slip type with top flange, weight 40 pounds or more, be at least 10 inches in length, have an inside diameter sufficient to house the bottom section, and have an average material tensile strength of 30,000 psi. It shall be Rich Model 910 heavy duty, or equal approved by the City. The bottom section of the valve box shall be 6-inch PVC pipe (ASTM 3034), white in color. the entire valve box top and bottom shall perform as a unit that has the ability to extend.

F. Saddles

Standard saddles shall be band-type saddles designed for use on PVC pipe. The material shall be UNS S 30400 stainless steel for the shell, bolts, washers, nuts, and tapped outlet. Gaskets shall be NBR compounded rubber complying with ASTM D 2000-343K515_E34. Saddles shall be Style 304, manufactured by Romac Industries, Inc., or equal approved by the City.

Self tapping saddles shall have a PVC body and be secured in place by four stainless steel bolts and nuts. After tapping, the tapping mechanism shall retain the coupon from the pipe and serve as a shut-off valve. The tapping mechanism shall be operated by a 5/8" allen head wrench and have a PVC cover to prevent fouling of the mechanism when not in use. The saddle shall have an O-ring seal glued in place by the manufacturer.

G. Standard Service Box

The Standard Service Box shall be made from a structural plastic, have extensions as required, and have a bolt down cover. It shall be Model No. 1419, as manufactured by Carson Industries, Inc. or equal approved by the City. Larger carson boxes for 2" services may be required as approved by City of Yelm

H. Traffic Bearing Service Boxes

All Traffic Bearing Service Boxes shall be a model MSBCF 1324-BCF-12", manufactured by Old Castle Manufacturing. Larger carson boxes for 2" services shall be model 1324-18-BCF by Old Castle Manufacturing.

I. Traffic bearing carson boxes shall have 6"-8" compacted crushed rock under base of box, per manufacturer's recommendation.

5.40.020 Effluent Pump - 4" Submersible Pumps

A. Simplex Pumps: Systems for tanks 1,500 gallons or less.

1. General - For Discharge to a STEP Collection System provide Orenco Model P10 05 11 or approved equal. Pumps shall be listed by an approved testing laboratory, e.g., UL or CSA or use as an effluent pump.

Pumps shall be stainless steel and/or thermoplastic.

All wetted fasteners shall be 300-series stainless steel.

2. Motors

Motors shall be permanent split phase-type operating at 3450 RPM. Motors shall be 1/2 HP, 115 volt, single phase, 60 Hz.

Motors shall be thermally-protected with an automatic-reset feature.

3. Operating Conditions

The effluent pump shall be of the submersible turbine type capable of delivering 5 gpm against a TDH of 105 feet, and with a shut-off head of not less than 160 feet. Pumps will be provided with an orifice installed in the discharge piping to restrict flow to a maximum of 9 gpm over any head condition. The supplier shall provide a head curve showing performance of the pump with the orifice installed.

4. Bypass

A 1/8" bypass orifice shall be drilled in the discharge head of the pump to allow for cooling pump motor during periods of no discharge.

5. No flow restrictors in 10 or 20 gpm pump discharge systems.

B. Duplex Pump Systems and Triplex Pump Systems for 3,000 Gallon Tanks or Larger.

1. General - For Discharge to a STEP Collection System

All STEP tanks housing more than one pump must utilize 2 inch piping for the service line.

Provide Orenco Model P20 05 11 or approved equal.

Pumps shall be listed by an approved testing laboratory e.g., UL or CSA for use as an effluent pump.

Pumps shall be stainless steel and/or thermoplastic.

All wetted fasteners shall be 300-series stainless steel.

2. Motors

Motors shall be permanent split phase-type operating at 3450 RPM. Motors shall be 1/2 HP, 115 volt, single phase, 60 Hz. The supplier shall provide a head curve showing performance of the pump with the orifice installed.

Motors shall be thermally-protected with an automatic-reset feature.

3. Operating Conditions

The effluent pump shall be of the submersible turbine type capable of delivering 20 gpm against a TDH of 105 feet, and with a shut-off head of not less than 160 feet.

4. Bypass

A 1/8" bypass orifice shall be drilled in the discharge head of the pump to allow for cooling pump motor during periods of no discharge.

5.40.030 Pump Vault, Riser, and Lid

A. General

Provide an internal pump vault which will be of sufficient size and structural integrity to house and support the pumping equipment necessary for transportation of effluent. The pump vault will have a screen to prevent solids larger than 1/8" from entering the pipeline and to protect the pump and flow restriction device from plugging. The internal vault will be removable for access into the STEP tank for septage pumping. All risers and connections to the septic tank with risers shall be water tight. Any hour meter for pump installed in pump control panel with more than 100 hours at the time of sewer final will be considered a used pump and meter and shall be replaced.

B. Internal Vault

Simplex pump assemblies shall be a Biotube Pump Vault as manufactured by Orenco Systems, Inc., Model Number X4S 1254-18 19. Vaults for duplex 4" submersible pump assemblies shall be a Biotube Pump Vault Model Number X4D 12xx-18 19 as manufactured by Orenco Systems, Inc., or equal.

C. Risers

Risers shall be required for access to internal vaults and access into the septic tanks for septage pumping. All risers shall be constructed of PVC, fiberglass, or polyethylene and shall be constructed water tight. Risers over pump vault shall be 30-inches in diameter. All risers shall be of sufficient length to meet minimum requirement of the latest version of the National Electric Code (NEC) and shall vary depending

on the depth of bury on the various tanks. The risers shall be attached to the tanks such that a watertight seal is provided. Epoxy required to adhere the PVC or fiberglass risers to fiberglass or concrete tanks shall be a two part epoxy as supplied by the manufacturer of the riser, or equal as approved by the City.

When applicable, Neoprene grommets shall be installed by the manufacturer for discharge piping, vent piping and/or the electrical conduit to assure a watertight seal. Neoprene grommets will not be allowed on risers not requiring discharge piping, etc.

Risers shall be Model RR24 (length as required) for solids chamber, and RR30 (length as required) for pump chamber as manufactured by Orenco Systems, Inc., or approved equal approved by the City.

D. Lids

1. Standard Lid: The standard lid shall be a flat fiberglass lid, green in color, with a non skid aggregate finish. The lid shall be the diameter required to fit the required riser and shall be supplied with a minimum of two stainless steel bolts and the lid shall have a gasket. Allen wrench will not be included as part of the pump packages but 2 wrenches will be included in the spare parts. Lids shall be as manufactured by Orenco Systems, Inc., Model Number FLD24XX or FLD30xx or equal approved by the City.
2. Traffic Bearing Lid: All traffic bearing lids shall be an HS-20 loading with all frames and covers to be constructed of aluminum composite material unless otherwise approved by the City. The cover shall have the words "YELM SEWER" cast into it. Reference EJ 1480 30" with quarter turn paddle lock and pick slot. Reference EJ 1584 36" with quarter turn paddle lock and pick slot.

5.40.040 Internal Splice Box

For applications with 5 or less residential units, each residential riser requiring electrical connections shall have a PVC splice box located in the interior of the riser. All splice boxes shall be installed within 1'0" of the riser lid for access purposes. The splice box shall be complete with cord grips and dual wall heat shrink with butt connectors. Splice boxes shall be UL listed for the application. The number of cord grips and heat shrink connectors shall be equivalent to the number of floats and electrical leads within the pump vaults. The splice box and accessories shall meet all requirements of labor and industries and shall be UL listed for wet locations.

For all Class I, Division I installations more than 5 residential units or non-residential applications, risers requiring electrical connections shall have two separate splice boxes. All splice boxes shall be installed 10" from the top of

the riser to center of conduit access for access purposes. One splice box shall be for the pump wire and one splice box shall be for the low voltage wire for the float system. The splice boxes for the pump leads shall meet all requirements of the Department of Labor and Industries for a Class I, Division I, Type D gas application. The splice box for the low voltage float leads on an intrinsically safe relay shall be a non-metallic PVC splice box. The PVC splice box shall be complete with cord grips and dual wall heat shrink butt connectors. The number of cord grips and heat-shrink butt connectors within the PVC splice box shall be equivalent to the number of floats. The pump wire splice box simplex assemblies shall be single gang Model SBX-S as supplied by Orenco Systems, Inc., and the splice box for duplex assemblies shall be two gang Model SBX-D as supplied by Orenco Systems, Inc. or equal as approved by the Owner. Mounting box shall be mounted to riser with stainless steel bolts. An explosion proof EY fitting shall be provided directly outside of the mounting box for the pump wire connection

5.40.050 Level Control and Alarm Floats

Level control floats shall be UL or CSA listed for use in effluent on an adjustable or preset PVC stem which attaches directly to the pump vault. Floats shall consist of high level alarm, on/off, model Super G. Level control floats shall be Model PG for simplex pump assemblies and Model P2GN for duplex pump assemblies as manufactured by Orenco System, Inc. or equal as approved by the City.

- A. Pump control and alarm panels for simplex pump assemblies shall be Model S1 RO ETMCT as manufactured by Orenco Systems, Inc. or equal as approved by the City. Pump control panels for simplex commercial and intrinsically safe applications shall be Model S1 1R RO ETMCT as manufactured by ORENCO or equal as approved by the City.
- B. Pump control and alarm panels for duplex pump assemblies shall be Model DAX1 IR2 RO ETMCT as manufactured by Orenco Systems, Inc. or equal as approved by the City.
- C. All pump control panels shall have NEMA 4x fiberglass enclosures, an audio and visual alarm, an elapsed time meter, event counter, stainless steel latch and internal 120-volt, 20-amp circuit breaker for each pump. Commercial and residential applications shall also include a 10-amp circuit breaker for controls.
- D. Residential float set-ups shall not have low level, redundant off floats or "T" floats. Electrician is still required to pull the lead wire from pump control panel to tank "J" box and use silicone filled wire nuts, heat shrink butt connectors, or pre-approved equal on each end of spare wire.

5.40.060 Hose and Valve Assembly

Hose and valve assembly for a 4" submersible shall include 1" diameter 100 psi PVC hose with PVC union and ball valve and anti-siphon valve Model Number HV100BASX as manufactured by Orenco Systems, Inc., or approved equal.

5.40.070 Additional Material Requirements

All equipment including but not limited to pump vault, riser, standard lid, bonding epoxy, splice box, discharge piping, control float assembly, pump(s), pump control and alarm panels, etc. shall be supplied by one single supplier or manufacturer as a packaged unit. The supplier or manufacturer shall upon request by the City, submit information on availability of replacement parts, maintenance records of operating pump assemblies. The package as supplied by the manufacturer or supplier will have a standard guarantee against material defect for a period of not less than 1 year. The date of guarantee shall begin on the date equipment is delivered on a particular site and may be a single guarantee incorporating all the components or individual guarantees on the various components. The manufacturer or supplier will be responsible to handle replacement or repair of defective parts.

5.40.080 Electrical Connections

All electrical equipment and materials shall be installed in conformance to requirements of the latest edition of the National Electrical Code as enforced by the State of Washington Labor and Industries Electrical Section. The Contractor shall be required to acquire all necessary permits and coordinate directly with the appropriate authority on the necessary inspection.

Splice boxes shall be installed in the STEP tank riser in accordance with the instruction from the supplier or manufacturer. The control panel shall be installed either on a remote post constructed of hot dipped galvanized unistrut or approved equal, or on the garage wall, unless approved by the City of Yelm. The panel shall be affixed by stainless steel screws to either the structure or the post. The screws shall be of sufficient size and length to securely fasten the panel.

Power and control wire from the splice box in the riser to the pump control shall be UL approved with a minimum of 12 gauge for each control or power wire. Power and control wire shall be color-coded for ease of tracing between the alarm panel and pumps and float switches. The Contractor shall submit type and size of cable for review and approval by the City and Labor & Industries. Cable attached to the exterior of the building shall be contained in approved electrical conduit. All wire connections shall be made with heat shrink butt connectors.

Power and control wire for commercial or intrinsically safe applications shall be contained in two IMC or rigid metal conduits for separation of low and high voltage lines between the control panel and pump vault and shall meet the requirements of Labor & Industries.

All exterior electrical wire shall be contained within PVC conduit. Exterior conduit and wire will be on the exterior of the house directly below the control panel and will be installed plumb and vertical. Underground electrical cable shall have a minimum of 24 inches of earth cover. All cable or wire shall be contained in PVC conduit.

Electrical: All materials used for control and electrical connections shall meet requirements of labor and industries and the Uniform Electrical Code.

The Pumping Assemblies shall comply with the latest State of Washington's Department of Labor and Industries Electrical Inspection Section Policy.

Power supply for I.R. Commercial Systems from house breaker panel to the pump control panel shall be a 20 amp dedicated circuit for each pump with separate neutral wires. A dedicated 10 amp circuit shall be required for the control system. Residential (non I.R.) Symplex applications shall have one dedicated 20 amp breaker in-house panel.

Disconnects are required for power to all Pump Control Panels. Symplex (non I.R.) applications shall use a model B-5V one gang weatherproof outlet box as manufactured by Intermatic and a single pole switch rated for 20 amp.

Duplex systems (2 pumps) shall use a Deep, one gang outlet box with 3 threaded outlets Model # DB-75V as manufactured by Intermatic. The switch shall be a three pole single throw, AC manual motor starting switch. Model # MS303 as manufactured by Leviton.

All disconnect switches shall include a Rayntite single Gang Weatherproof cover Model # 5031-0 as manufactured by Bell.

Surge arrestors shall be installed in the Pump Control Panel For all Class I Division I installations. Surge arrestors shall be a Model # AG2401 as manufactured by Intermatic, or equal approved by the City, and shall be installed on the power wire supplying power to the control circuit, and be installed within the pump Control Panel.

Buildings served by STEP sewer, utilizing on-site backup generators for power outages, must have electrical service installed in such a manner that the STEP system will also be supplied power by the auxiliary generator.

The pump control panels for all STEP tanks housing 2 or more pumps shall be fitted with the transfer switch model DT323 URK you are K as manufactured by Cutler Hammer or approved equal and a male plug, model

70530 AMB WP as manufactured by Byrant for use with the city's portable auxiliary generator or approved equal.

5.50 GRAVITY SEWER

5.50.010 General

The use of gravity sewer lines shall be limited to the collections of sewerage or transport of sewerage to the City STEP system. All gravity sewers shall be privately maintained. The City will maintain gravity sewer lines with prior arrangements and approval from the Director of Public Works.

5.50.020 Side Sewers

Minimum slope for any 4" gravity side sewer lines shall be no less than 2 percent or 1/4 inch of rise to 1 foot of run. Slopes less than 2 percent will only be allowed if approved by the City. Installation of gravity clean-outs shall meet the requirements of the City of Yelm, the uniform plumbing code (see Standard Detail 5-7). At a minimum, a gravity clean-out with a 2-way sanitary sweeping T will be required 2 ½ feet from the foundation of the structure.

Grade stakes will not be provided by the City for side sewers. It shall be the Contractor's responsibility to determine the differential in elevation between the invert to the STEP tank and the invert at the building side sewer. Based on that information the Contractor shall determine the percent of fall between the STEP tank and the connection point at the side sewer.

Side sewer clean-outs shall be installed per "Sewer Service" 7A.010, Definition of Terms per Yelm Ordinance 505 (YMC 13.08), "House Drain" or "Building Drain".

5.60 RESTORATION

5.60.010 General

This work shall consist of various types of surface restoration. As required by the City of Yelm for all work on public Right-of-Way, all surfaces and surface improvements effected by the Contractors operations shall be restored to conditions equal to or better than preconstruction conditions. The City shall be the sole judge as to the equality of materials and work when comparing post-construction conditions to preconstruction conditions.

Cement concrete sidewalk and driveway repair shall conform to the Standard Specifications and Standard Detail 5-3, except that the finish, dimensions, and joints shall be the same as the original work. Cement concrete driveways shall be defined so as to include cement concrete alleys and parking lots.

Curb repair shall conform to the Standard Specifications, except that the finish, dimensions, and joint shall be the same as the original work.

5.60.020 Crushed Surfacing

Shoulders, driveways and other graveled or crushed surfaced areas which are disturbed by the Contractor's operations shall be resurfaced with 2 inches of crushed surfacing. All work and material shall conform to the requirements of the Standard Specifications.

5.70 INSPECTION GUIDE FOR STEP SEWER INSTALLATION

A basic sketch of the proposed installation must be submitted to the Public Works Office prior to issuance of permit.

The City of Yelm Sewer Department will perform the following required inspections:

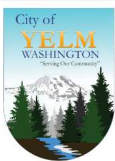
1. Tank placement (See tech. spec. for req)
2. Leak test tank (2 hours, no loss)
 Pressure test service line. (70 p.s.i. water for 1 minute)
 All pipe before backfill. (See bedding and toning wire req)
3. A final inspection is required after all work (including electrical) has been completed. A record drawing is required before system can be excepted.

Additional inspections beyond the 3 shown above will be at the Contractor's expense. We try to combine these 3 inspections into 3 trips to the site if possible. 48 hours notice is required for inspection. *We do however make every effort to be out sooner, if possible.* For inspection call the City of Yelm Inspection Hotline 458-8410 If no answer leave a detailed message.

LIST OF DRAWINGS - SEWER

Title	Drawing
Typical 1" Service Connection	5 - 1
Typical Double Service Connection.....	5 - 2
Typical Pipe Trench	5 - 3
Remote Post - Residential Pump Control Panel Installation.....	5 - 4
Typical Pump Control Panel Installation on Existing House	5 - 5
Typical Pump Control Panel	5 - 6
Typical Connection	5 - 7
Vacant	5 - 8
Typical Simplex STEP Tank Installation	5 - 9
1,000-1,500-Gallon STEP Tank	5 - 10
3,000 Gallon STEP Tank/Pump Tank	5 - 11
Typical Sewer Automatic Air Release Valve	5 - 12
Float Setting Vault Dimensions for a Simplex Pump Vault	5 - 13
Float Setting Vault Dimensions for a Duplex Pump Vault.....	5 - 14
Float Setting Vault Dimensions for a Triplex Pump Vault.....	5 - 15
Fiberglass Tank Bedding	5 - 16
Concrete Tank Bedding	5 - 17
Typical Riser	5 - 18
Traffic Bearing Lid	5 - 19
Typical End of Line Cleanout	5 - 20
Typical Sewer Mainline Gate Valve	5 - 21
Mainline Cleanout Plan	5 - 22
Mainline Pig Port Detail.....	5 - 23
Pig Launcher	5 - 24
Typical Duplex Effluent Pumping System	5 - 25

1. ALL SERVICE LINE CARSON BOXES SHALL BE LOCATED 4' FROM EDGE OF CURB TO CENTER OF CARSON BOX IN PLANTER STRIP ON BOTH SIDES OF ROADWAY.
2. GANG CARSON BOXES SHALL BE LOCATED 3' APART TO CENTER OF BOXES
3. BALL AND CHECK VALVES TO BE INSTALLED IN CARSON BOXES ACCORDING TO DRAWING.
4. NO THREADED CONNECTIONS IN SERVICE LINES UNLESS PRE-APPROVED BY THE DIRECTOR OF HIS/HER DESIGNER.



CITY OF YELM
TYPICAL 1" AND 2" SERVICE
CONNECTIONS

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

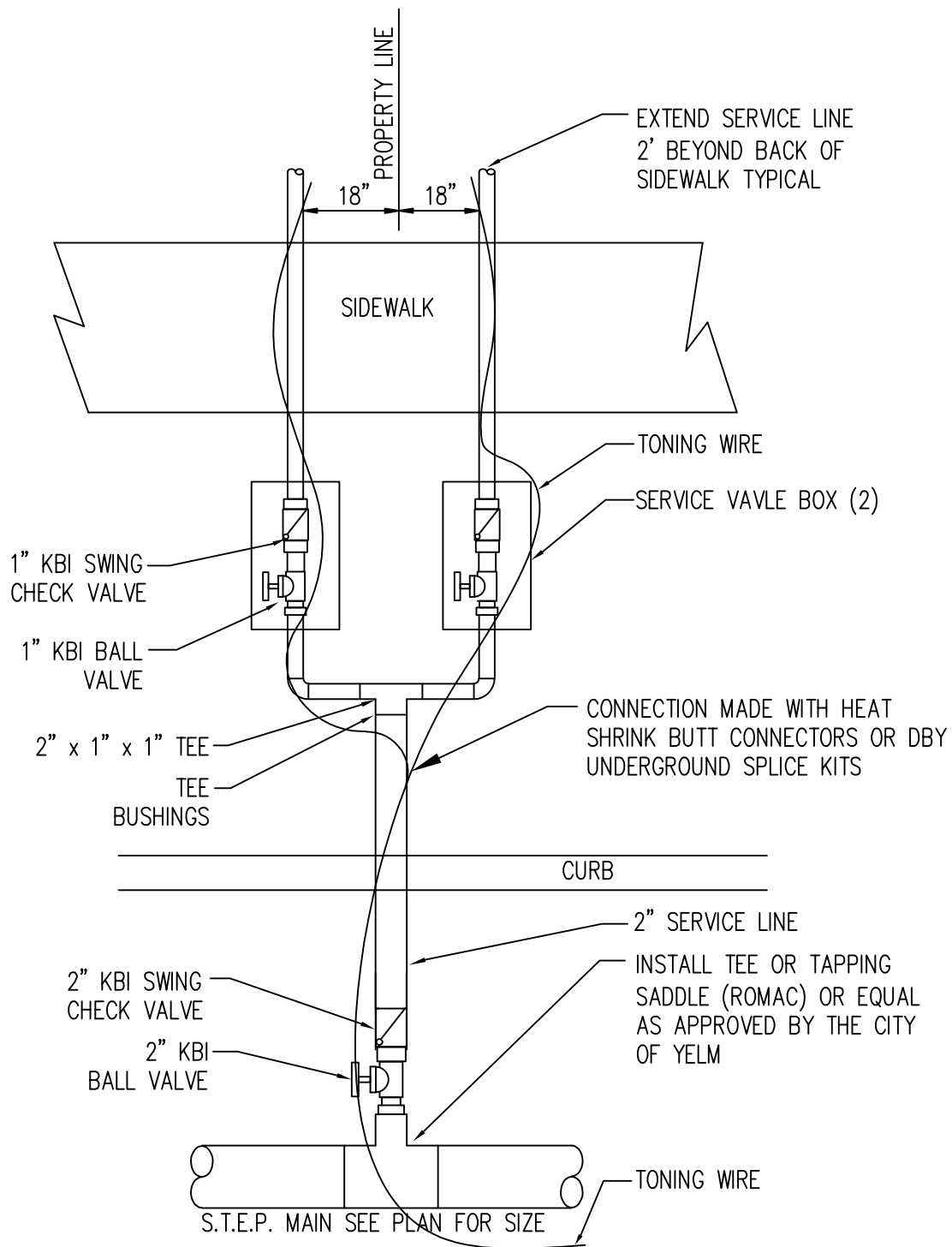
DWN.	MKD
------	-----

CKD.	DMM
------	-----

DWG. NO.

5-1

DATE 10/2019



CITY OF YELM

**TYPICAL DOUBLE SERVICE
CONNECTION**

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

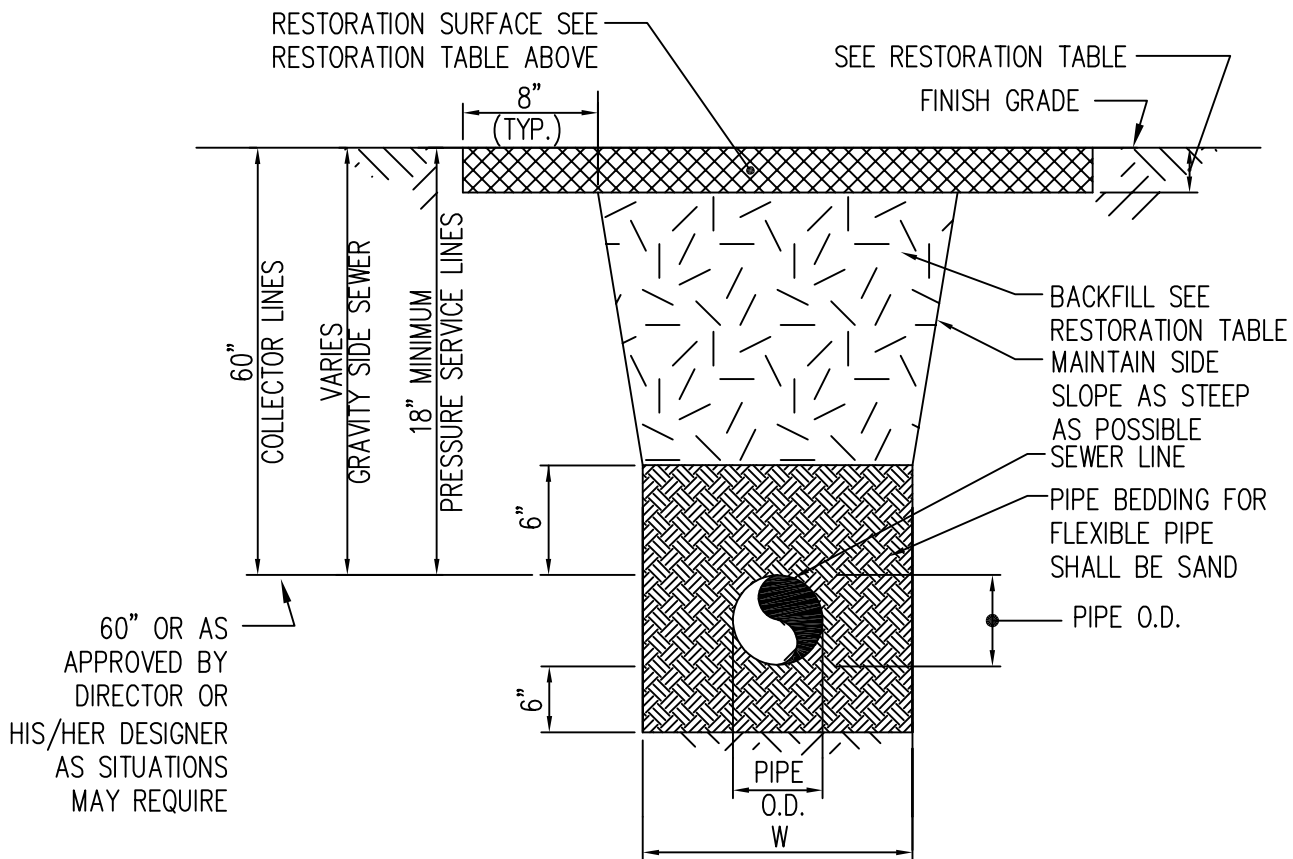
DWN. MKD

CKD. DMM

DWG. NO.

5-2

DATE
10/2019



RESTORATION TABLE 1

SURFACE TYPE	THICKNESS	BACKFILL/ COMPACTION REQMNTS.	COMMENTS/ OTHER REQUIREMENTS
CRUSHED SURFACE	4" CRUSHED SURFACE TOP COURSE	SELECT BACKFILL COMPACT TO 95%	FINISH GRADE SHALL BE SMOOTH & CONSISTANT WITH EXISTING
A.C. PAVEMENT OVER GRAVEL BASE	3" MIN. GRADE B A.C. PAVING OVER 4" CRUSHED SURFACE TOP COURSE	SELECT BACKFILL COMPACT TO 95%	FINISH ROADWAY TO CONFORM TO ALL EXISTING GRADES AND CURBS SLOPES SHALL MATCH
CONCRETE SURFACE (DRIVEWAY/SIDEWALK)	MATCH EXISTING CONCRETE THICKNESS	SELECT BACKFILL COMPACT TO 95%	MATCH EXISTING FINISH TEXTURE, AND GRADE.
LAWN/LANDSCAPE	HYDROSEED/ PLANTINGS OVER 4" MIN. TYPE A TOP SOIL	NATIVE BACKFILL COMPACT TO 85%	FINISH GRADE SHALL BE SMOOTH & CONSISTANT WITH EXISTING GRADE
UNIMPROVED SUFACE	N/A	NATIVE BACKFILL COMPACT TO 85%	MOUND BACKFILL 2" ABOVE EXISTING GRADE & SMOOTH

CSBC = CRUSHED SURFACE BASE COURSE
CSTC = CRUSHED SURFACE TOP COURSE



CITY OF YELM

TYPICAL PIPE TRENCH

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

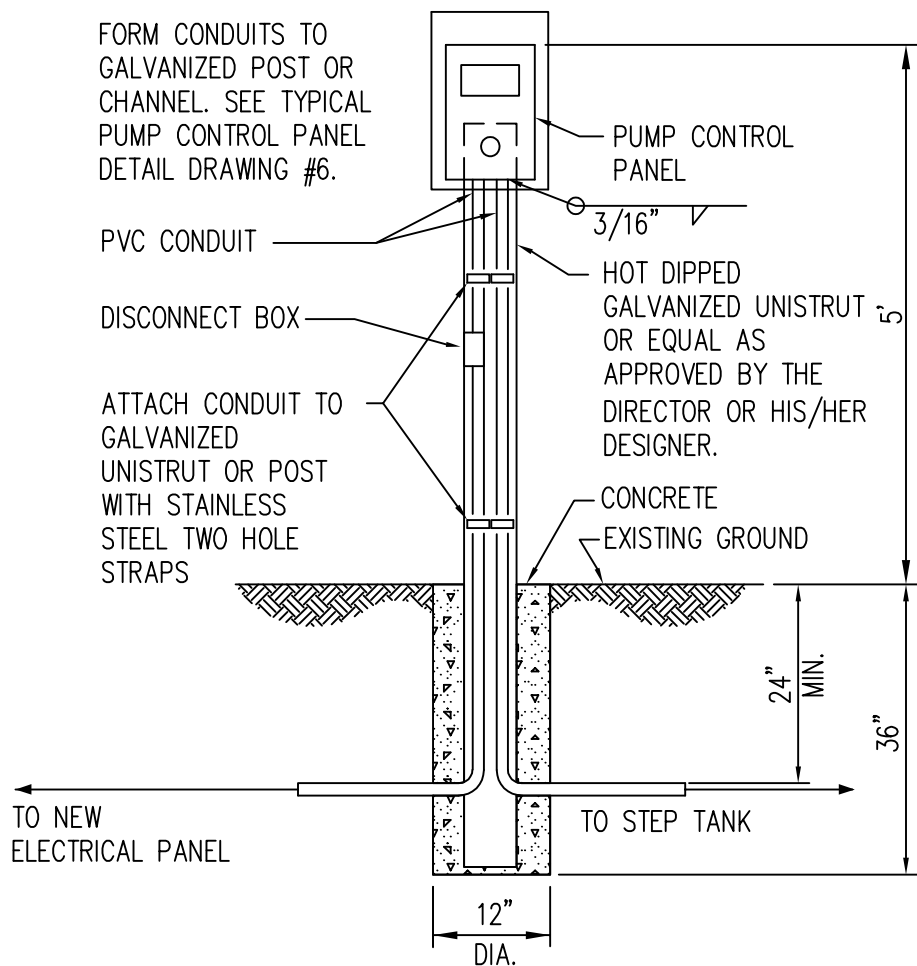
DWN. MKD

CKD. DMM

DWG. NO.

5-3

DATE
10/2019



NOTE:

1. DISCONNECT COVER SHALL BE 5031-0 RAYNTITE SINGLE GANG WEATHERPROOF COVER 1.406" DIAMETER.



CITY OF YELM
REMOTE POST - RESIDENTIAL PUMP
CONTROL PANEL INSTALLATION

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

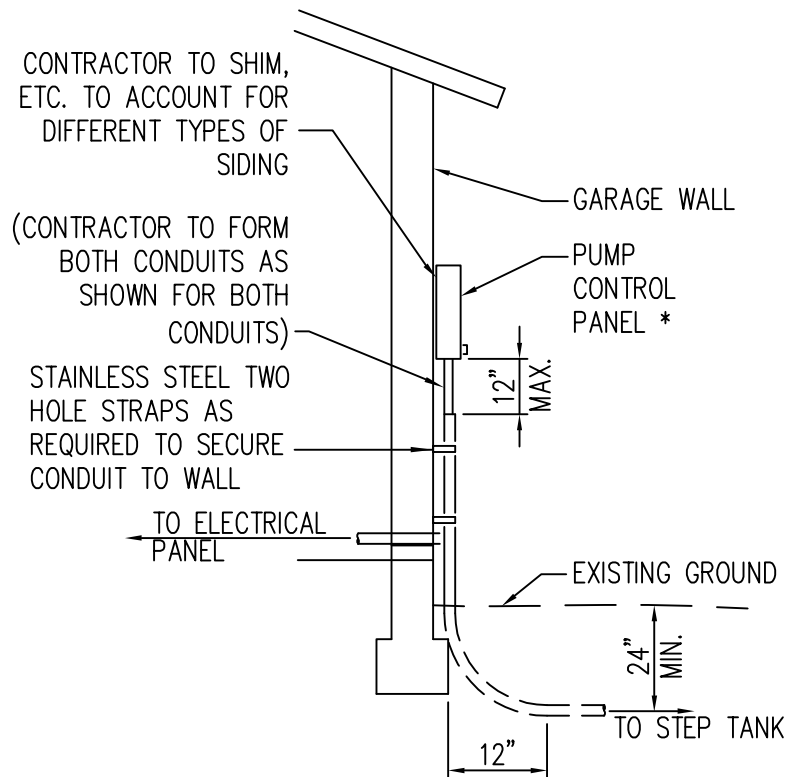
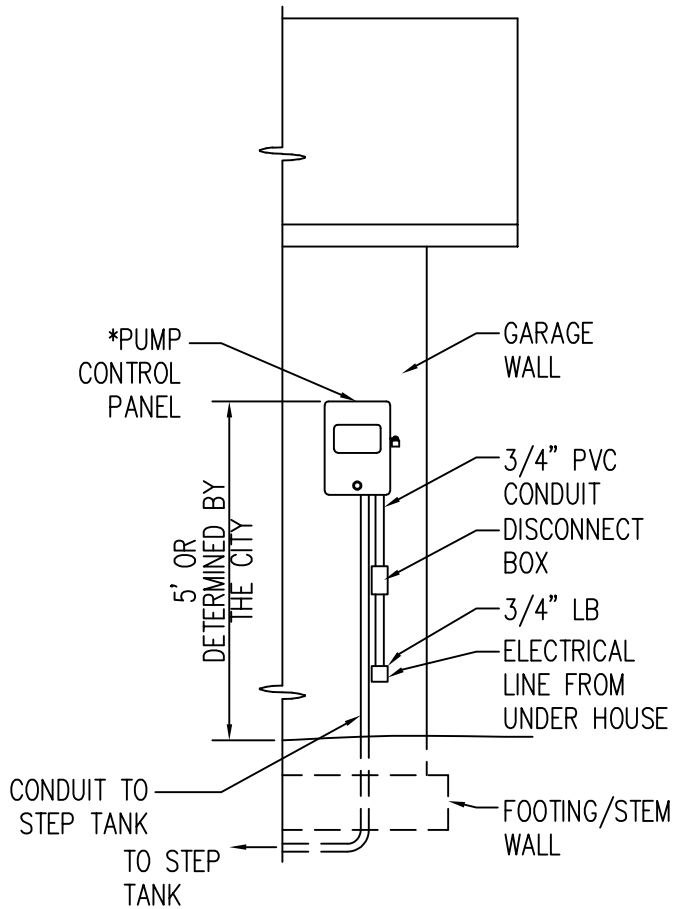
DWN. MKD

CKD. DMM

DWG. NO.

5-4

DATE
10/2019



NOTES:

1. PUMP CONTROL PANEL DOOR SHALL OPEN COMPLETELY FOR FULL ACCESS TO INSIDE OF PANEL.
2. LOCATION OTHER THAN GARAGE WALL OR REMOTE POST WILL BE CONSIDERED ON A CASE BY CASE BASIS.
3. DISCONNECT COVER SHALL BE 5031-0 RAYNTITE SINGLE GANG WEATHER PROOF COVER 1.406" DIAMETER.



CITY OF YELM
TYPICAL PUMP CONTROL PANEL
INSTALLATION ON EXISTING HOUSE

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. DMM

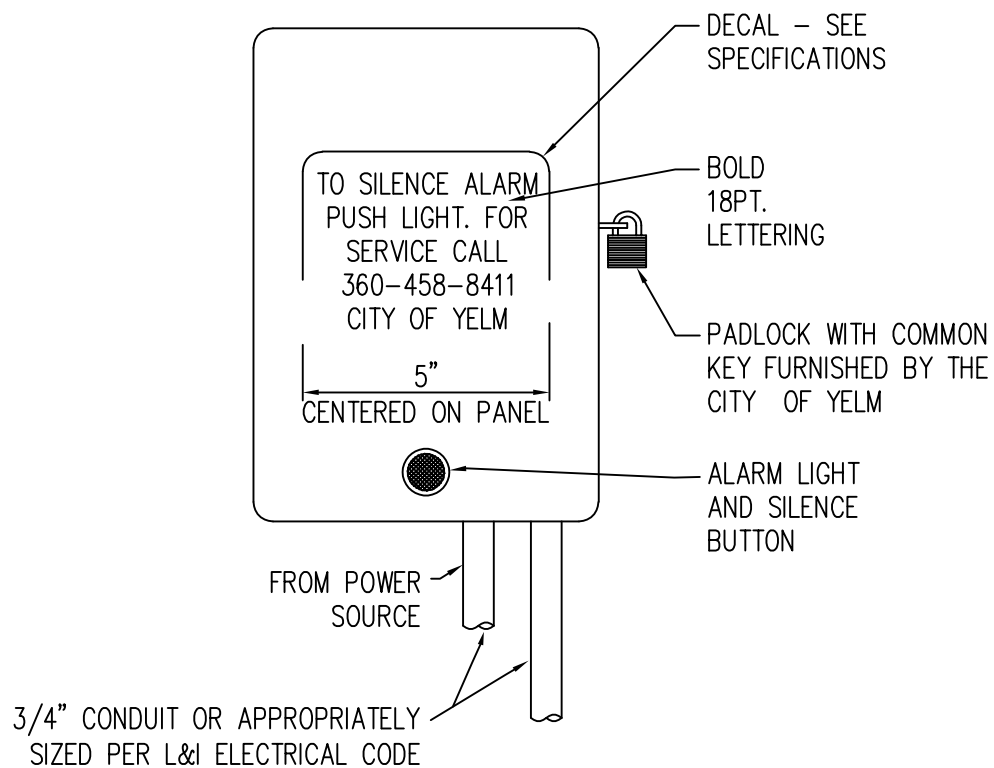
DWG. NO.

5-5

DATE
10/2019

TABLE FOR FEEDER WIRE RUN	
WIRE SIZE	MAXIMUM DISTANCE
#12 AWG COPPER	150 FEET
#10 AWG COPPER	250 FEET
#8 AWG COPPER	350 FEET

(SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION).



NOTE:
 PANEL SIZE MAY VARY
 DEPENDING ON APPLICATION.



CITY OF YELM

TYPICAL PUMP CONTROL PANEL

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. DMM

DWG. NO.

5-6

DATE
 10/2019



CITY OF YELM

TYPICAL CONNECTION

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

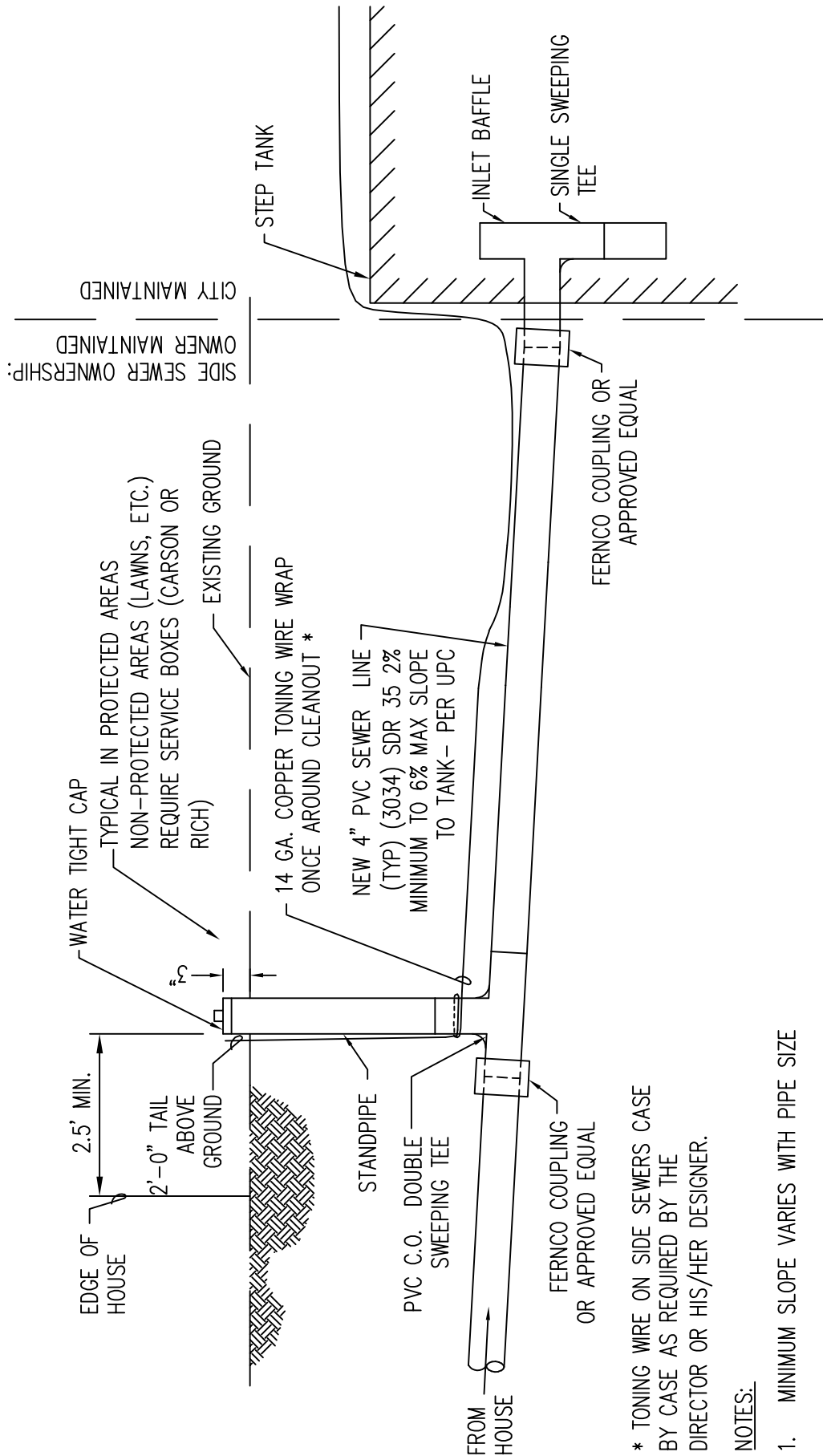
DWN. MKD

CKD. DMM

DWG. NO.

5-7

DATE
10/2019



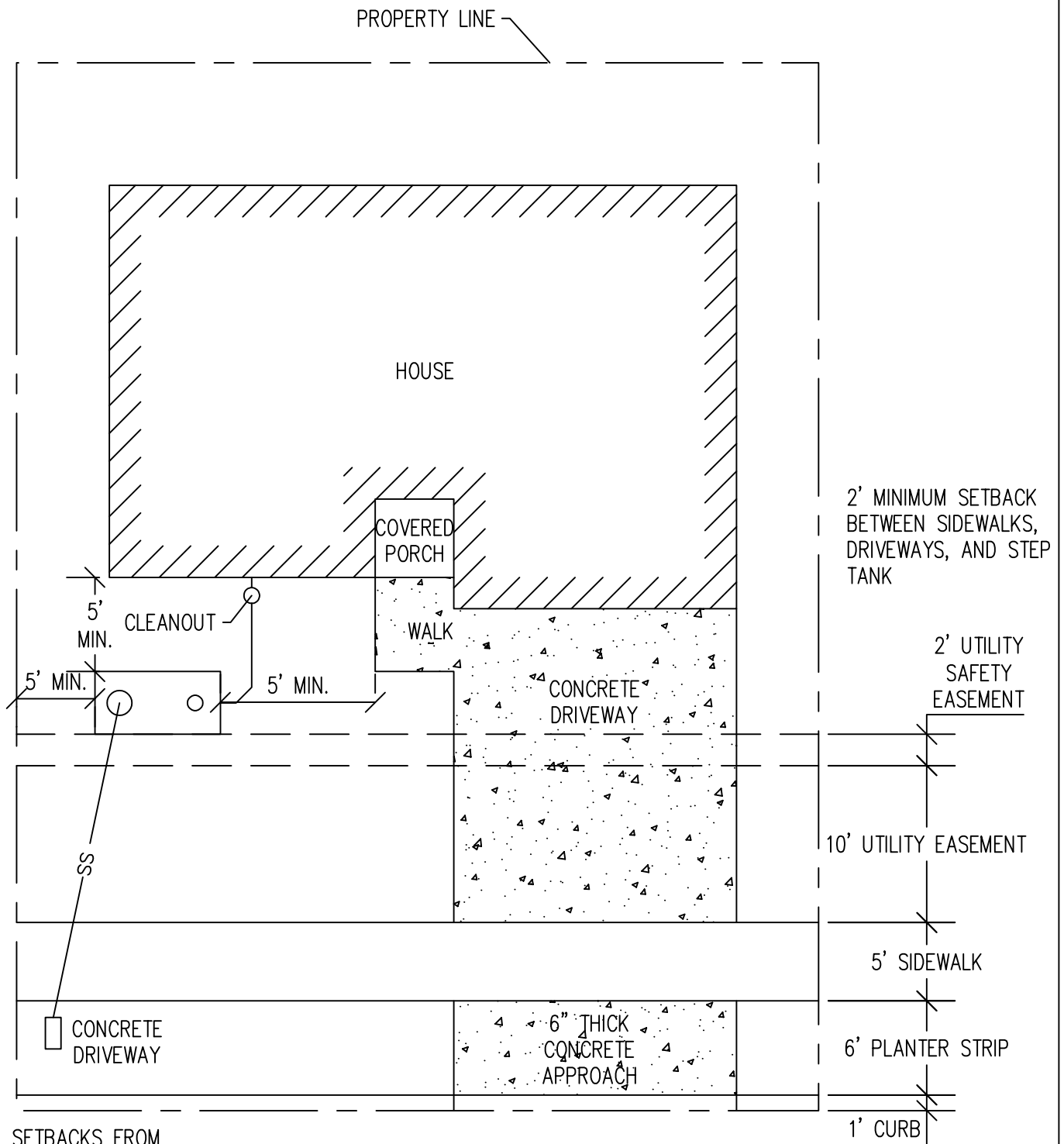
* TONING WIRE ON SIDE SEWERS CASE BY CASE AS REQUIRED BY THE DIRECTOR OR HIS/HER DESIGNER.

NOTES:

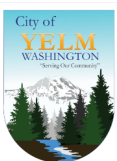
1. MINIMUM SLOPE VARIES WITH PIPE SIZE

HOUSE DRAIN DEFINITION:

"HOUSE DRAIN" PR "BUILDING DRAIN" MEANS THE PIPE USED FOR CONVEYING SEWAGE FROM THE BUILDING TO THE CLEAN-OUT OR TO A POINT 2.5' BEYOND THE OUTER LINE OF ANY FOOTING, PILING, BUILDING SUPPORT OR PORCH UNDER WHICH IT MAY RUN; WHETHER SUCH DRAIN CONSISTS OF ONE LINE EXTENDING FROM THE BUILDING OR OF TWO OR MORE SUCH LINES.

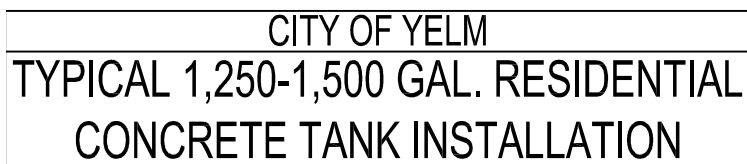
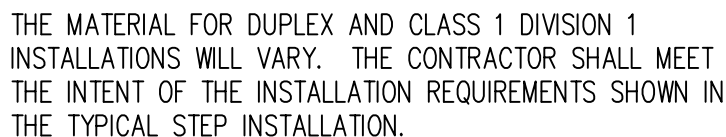


5' MINIMUM SETBACKS FROM
PROPERTY LINE, HOUSE
FOUNDATION, AND PORCH
FOUNDATION TO TANK

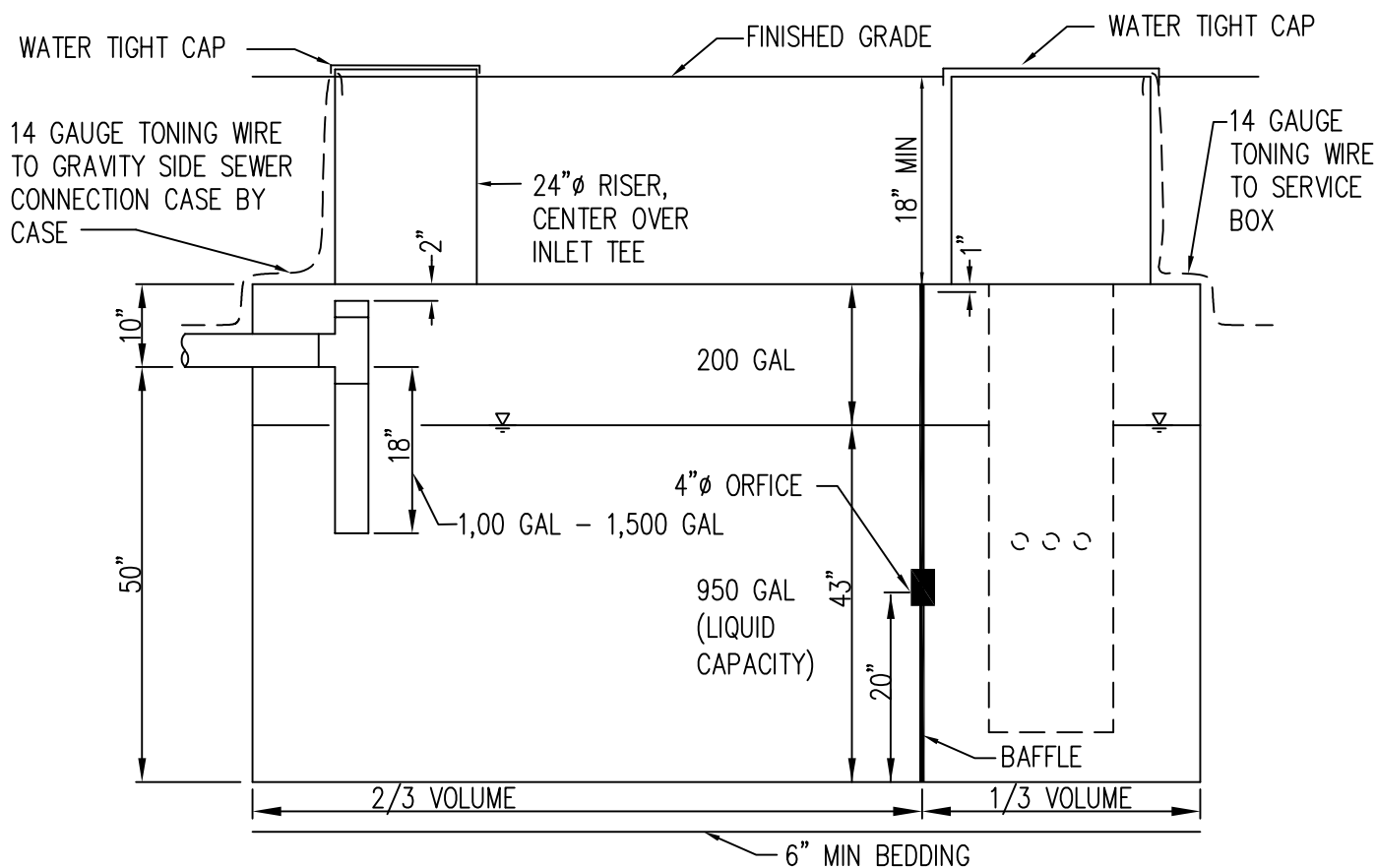


CITY OF YELM SETBACK DETAIL

APPROVED BY			DWG. NO.
PUBLIC WORKS DIRECTOR			5-8
DES. MKD	DWN. MKD	CKD. DMM	DATE
			10/2019



APPROVED BY			DWG. NO.
PUBLIC WORKS DIRECTOR DATE			5-9
DES. MKD	DWN. MKD	CKD. DMM	DATE 10/2019



NOTE:

1. FOR THE APPROPRIATE FLOAT LEVELS, SEE DRAWINGS #5-13, #5-14 AND #5-15 (SIMPLEX, DUPLEX AND TRIPLEX) AS THEY APPLY.



CITY OF YELM
1,250 GALLON - 1500 GALLON
CONCRETE STEP TANKS

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

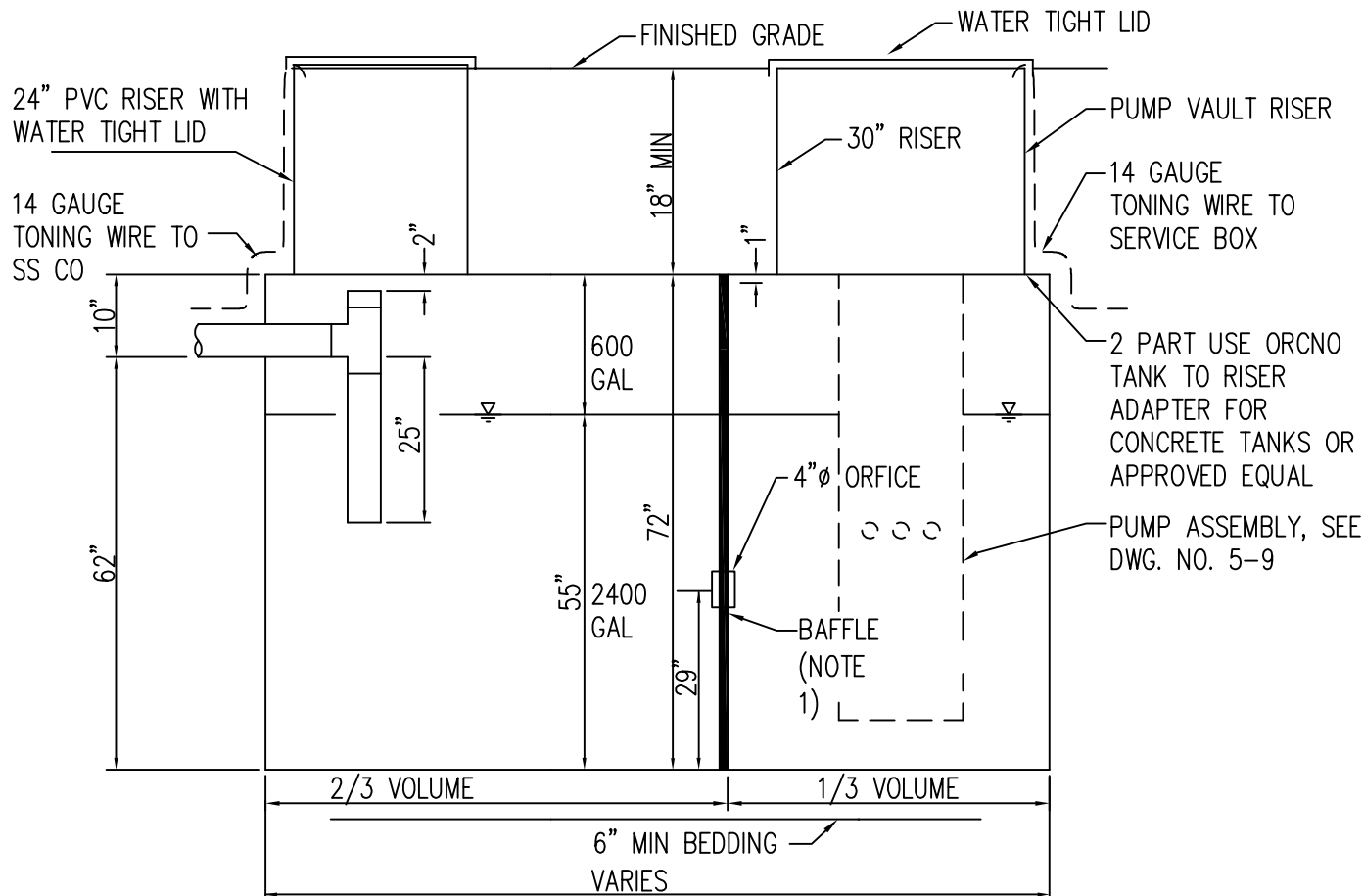
DWN. MKD

CKD. DMM

DWG. NO.

5-10

DATE
10/2019

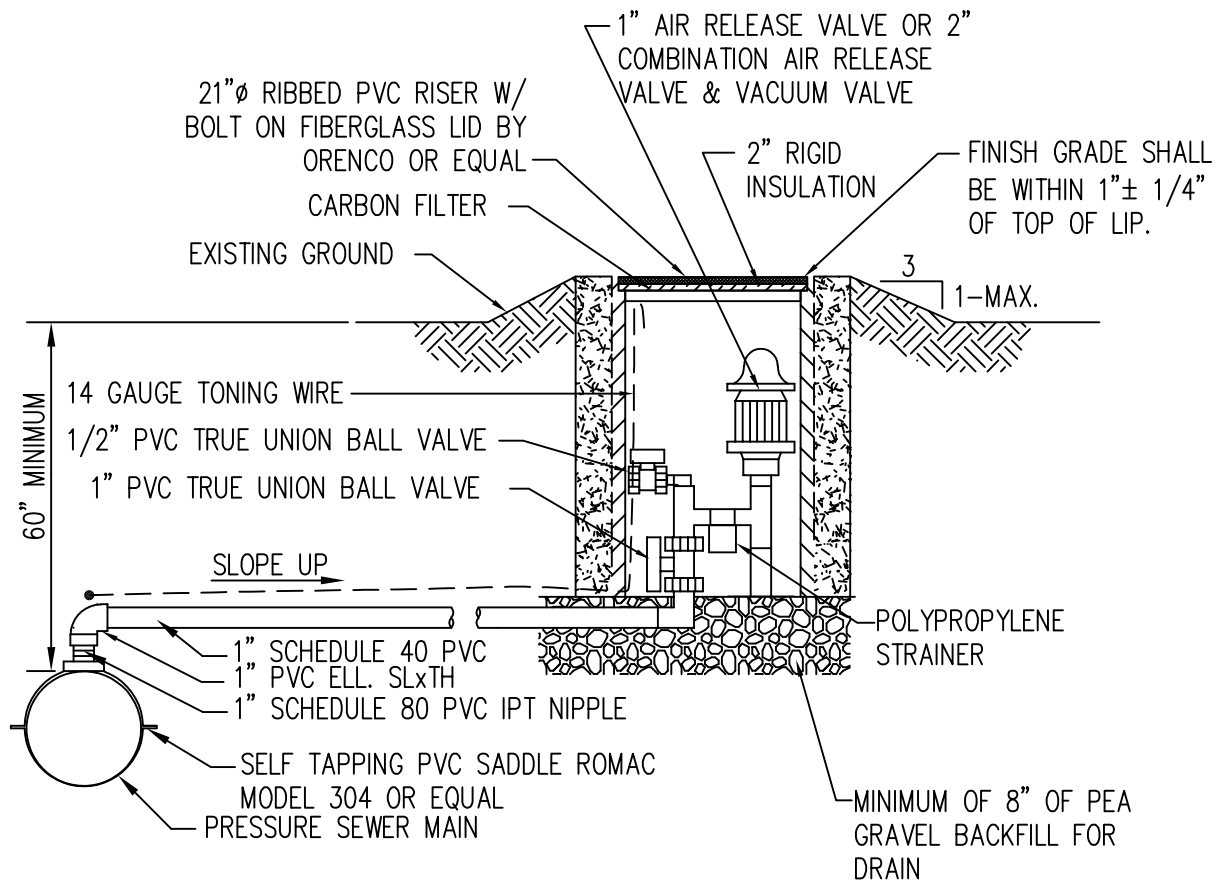


NOTES:

1. DELETE BAFFLE FOR A 3000 GALLON TANK UTILIZED AS A TRIPLEX PUMP VAULT.
2. THE OWNER WILL REVIEW TOLERANCES IN EXCESS OF DIMENSIONS SHOWN.
3. THE TRIPLEX PUMP VAULT REQUIRES TWO VAULTS AND TWO COMPLETE RISERS. ONE VAULT CONTAINS FLOATS AND ONE PUMP. THE SECOND VAULT CONTAINS TWO PUMPS.



CITY OF YELM 3, 000 GALLON STEP TANK/PUMP TANK	APPROVED BY			DWG. NO.
	PUBLIC WORKS DIRECTOR			DATE
	DES. MKD	DWN. MKD	CKD. DMM	DATE 10/2019



NOTE:

PLACE IN A NON-TRAFFIC AREA,
UNION JOINTS SHALL BE SOLVENT
WELDED. CITY TO FIELD LOCATE.



CITY OF YELM
TYPICAL SEWER AUTOMATIC AIR
RELEASE VALVE

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

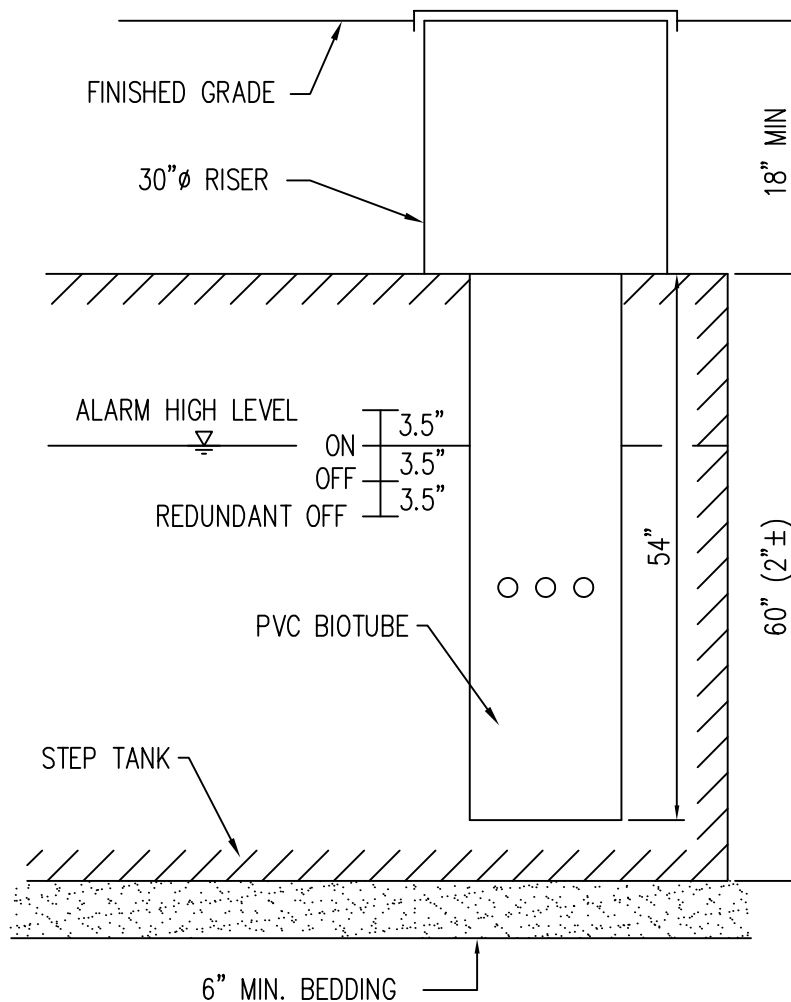
DWN. MKD

CKD. DMM

DWG. NO.

5-12

DATE
10/2019



NOTES:

- 1,000 – 1,500 GAL. TANKS



CITY OF YELM
FLOAT SETTING VAULT DIMENSIONS
FOR SIMPLEX PUMP VAULT

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

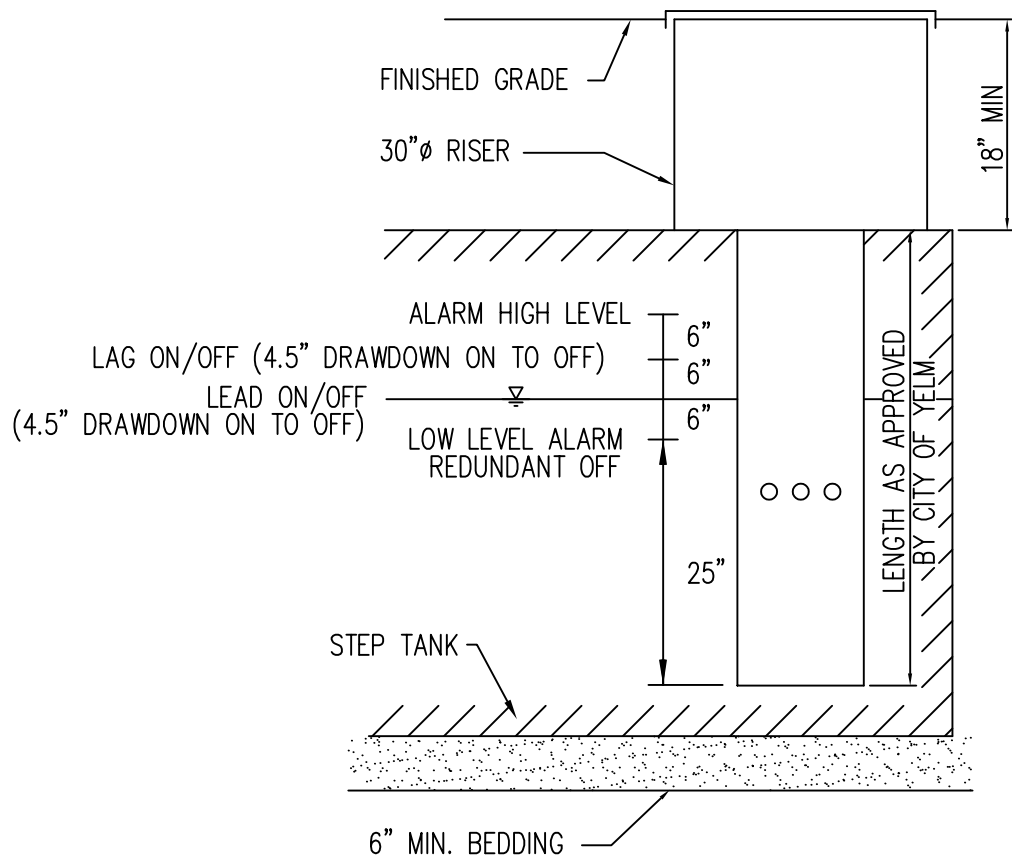
DES. MKD

DWN. MKD

CKD. DMM

DWG. NO.
5-13

DATE
 10/2019



CITY OF YELM

**FLOAT SETTING VAULT DIMENSIONS
FOR DUPLEX PUMP VAULT**

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

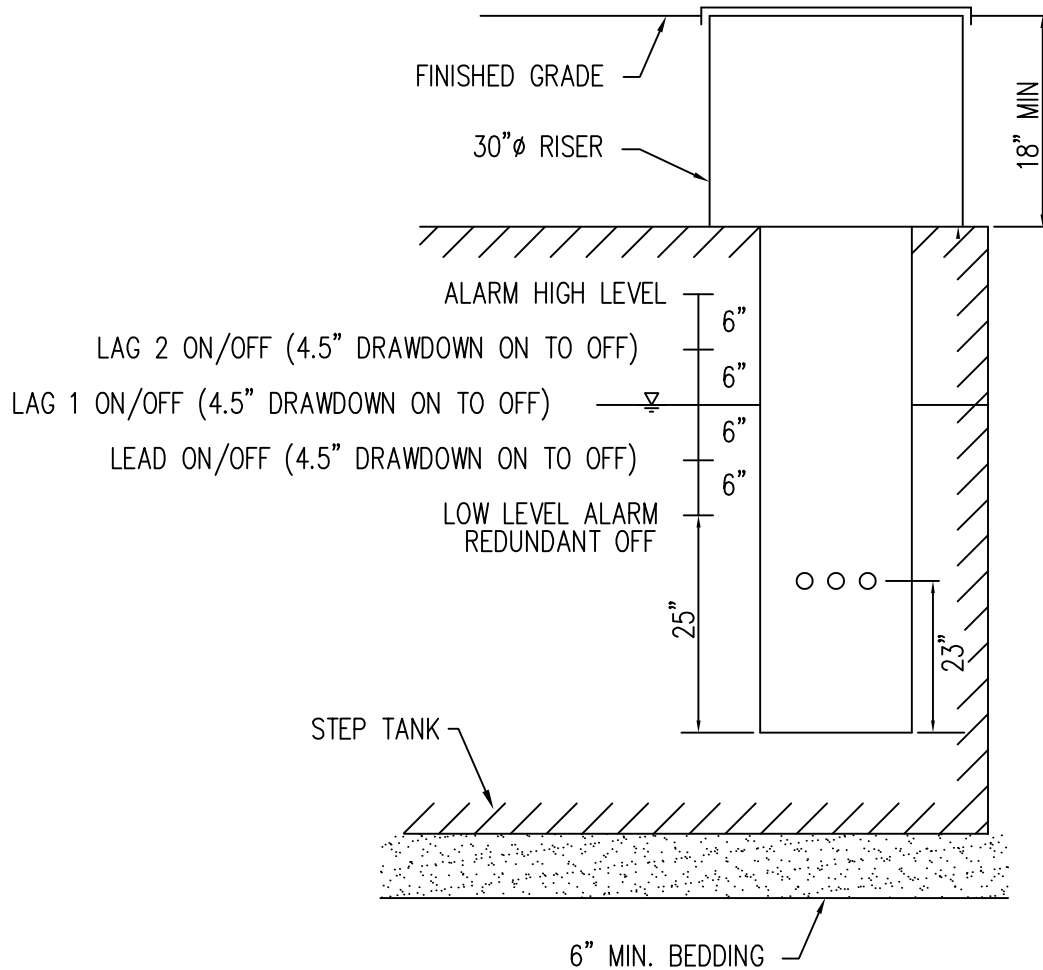
DWN. MKD

CKD. DMM

DWG. NO.

5-14

DATE
10/2019



NOTE:
 THE TRIPLEX PUMP VAULT REQUIRES TWO VAULTS
 AND TWO COMPLETE RISERS. ONE VAULT CONTAINS
 FLOATS AND ONE PUMP. THE SECOND VAULT
 CONTAINS TWO PUMPS.



CITY OF YELM
FLOAT SETTING VAULT DIMENSIONS
FOR TRIPLEX PUMP VAULT

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

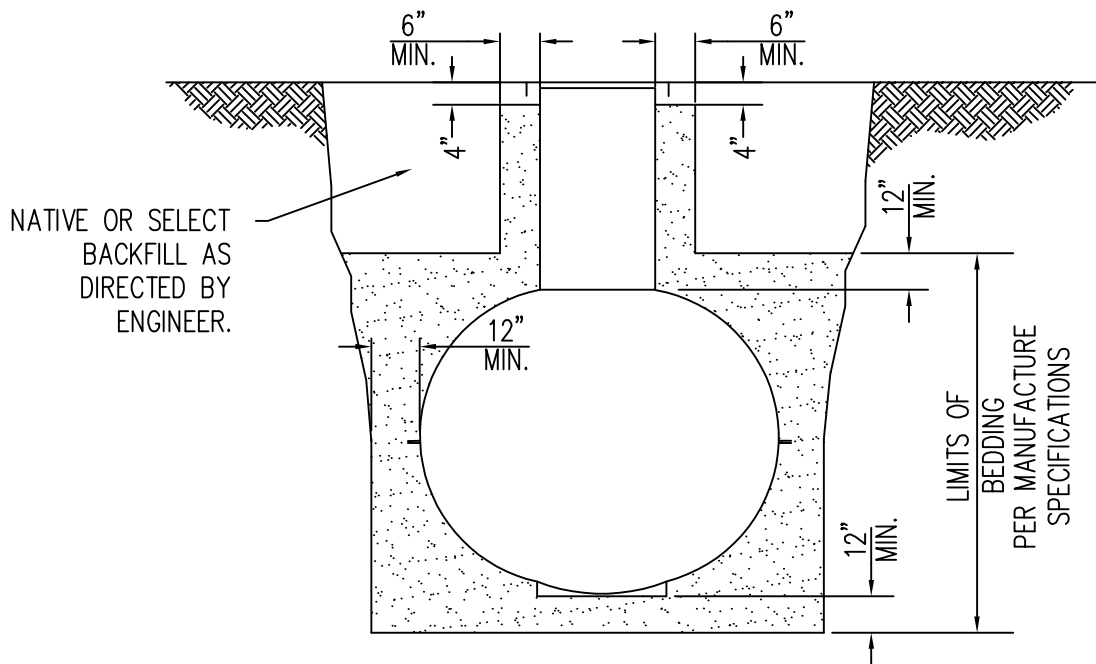
DWN. MKD

CKD. DMM

DWG. NO.

5-15

DATE
 10/2019



NOTES:

1. 12" MIN. PEA GRAVEL AROUND FIBERGLASS TANKS, PER MANUFACTURER.
2. 6" MIN. SAND AROUND ALL APPURTENANCES.



CITY OF YELM

FIBERGLASS TANK BEDDING

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

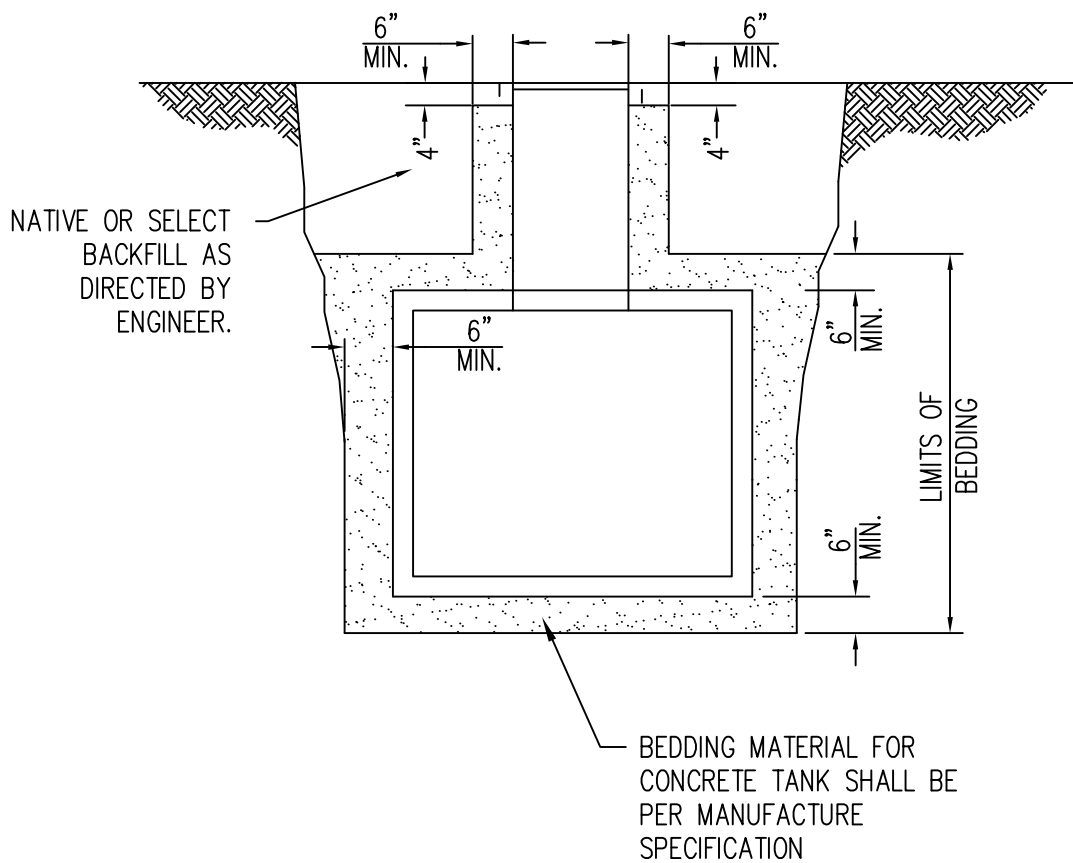
DWN. MKD

CKD. DMM

DWG. NO.

5-16

DATE
10/2019



CITY OF YELM CONCRETE TANK BEDDING

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

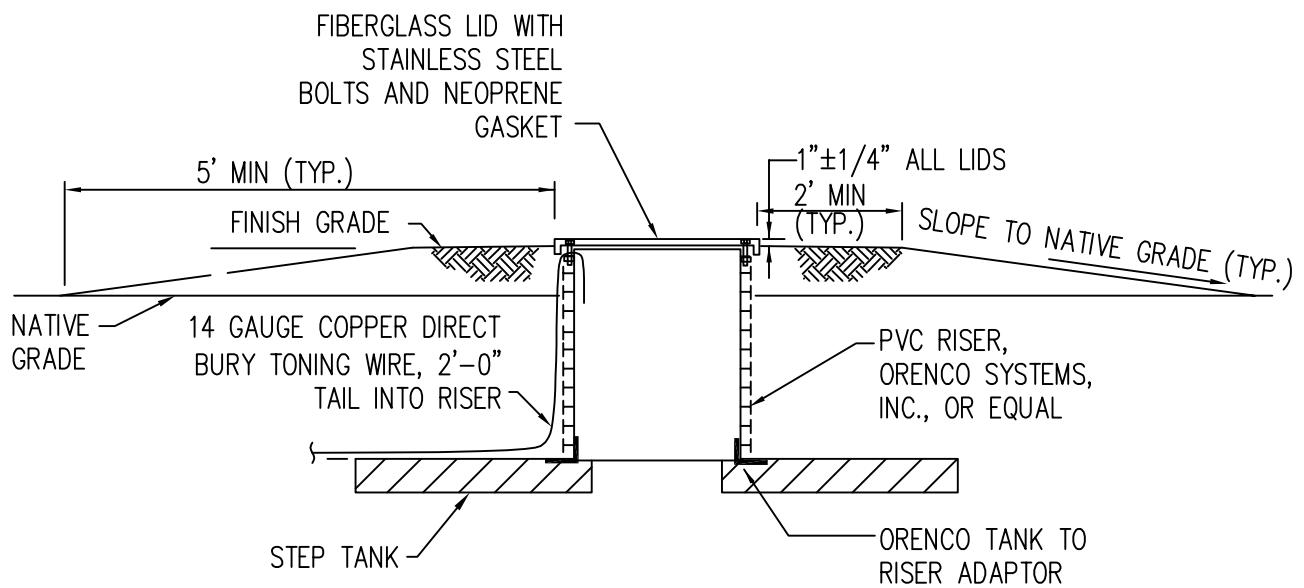
DES. MKD

DWN. MKD

CKD. DMM

DWG. NO.
5-17

DATE
10/2019



NOTE:

RISER AND LID SHALL BE 30" ON ALL PUMP VAULT INSTALLATIONS.



CITY OF YELM

RISER (NON-TRAFFIC RATED)

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

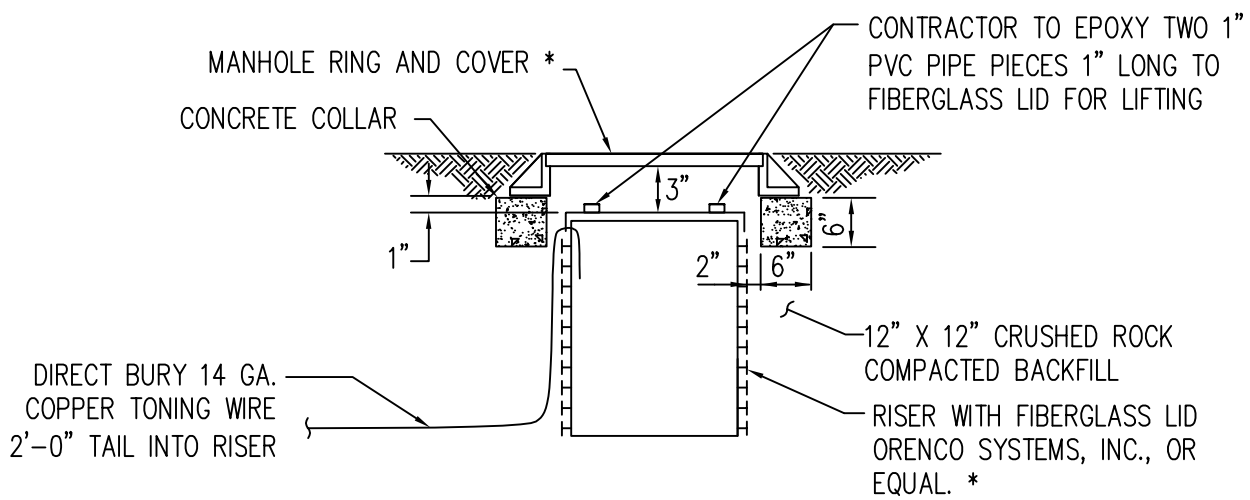
DWN. MKD

CKD. DMM

DWG. NO.

5-18

DATE
10/2019



MANHOLE RING AND COVER SIZES:

- *21" PVC RISER REQUIRES 24" RING & ALUMINUM COVER
- 24" PVC RISER REQUIRES 30" RING & ALUMINUM COVER
- 30" PVC RISER REQUIRES 36" RING & ALUMINUM COVER



CITY OF YELM

RISER (TRAFFIC RATED)

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

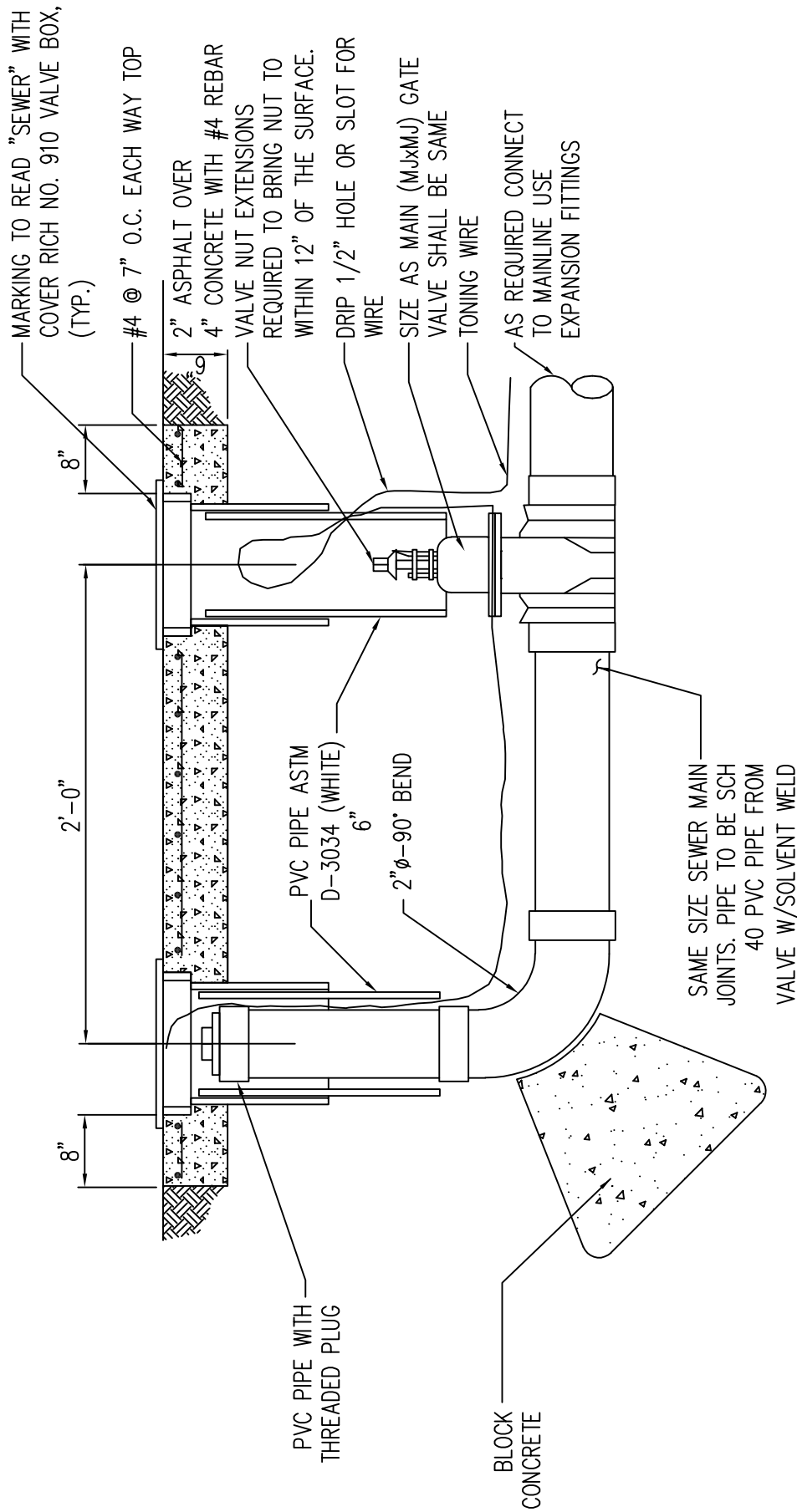
DWN. MKD

CKD. DMM

DWG. NO.

5-19

DATE
10/2019



CITY OF YELM END OF LINE CLEANOUT

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

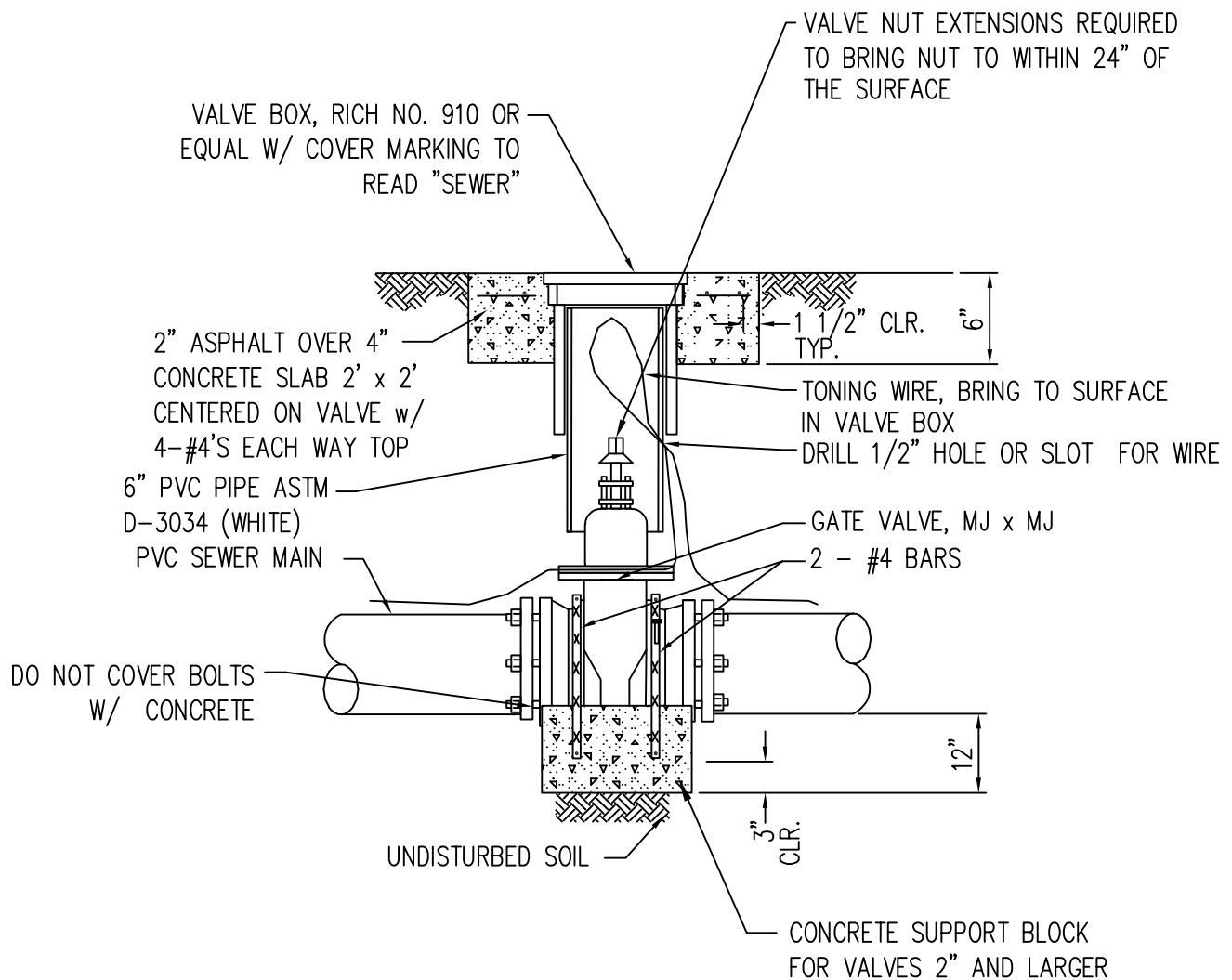
DWN. MKD

CKD. DMM

DWG. NO.

5-20

DATE
10/2019



CITY OF YELM
TYPICAL SEWER MAIN LINE GATE
VALVE

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

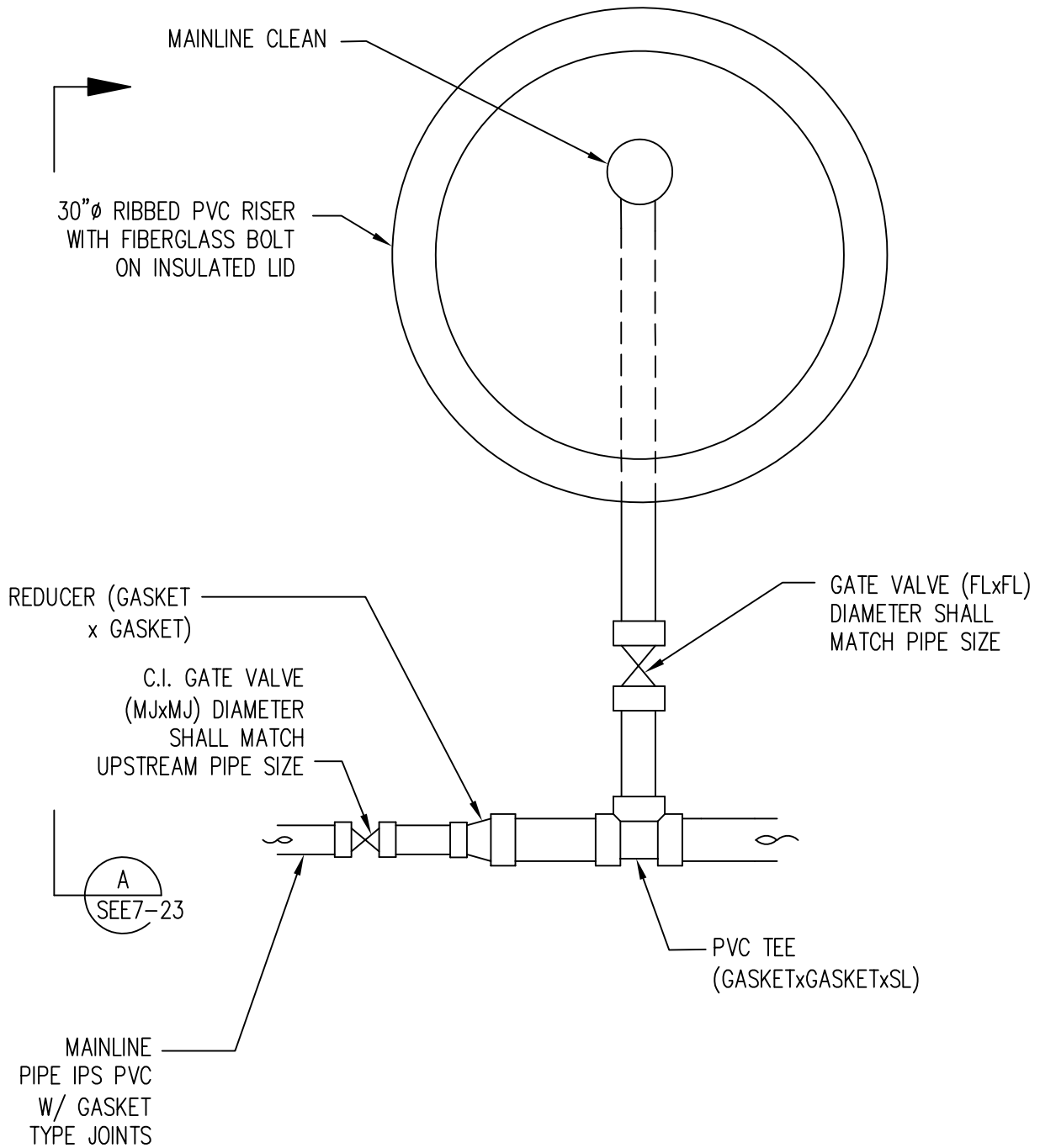
DWN. MKD

CKD. DMM

DWG. NO.

5-21

DATE
10/2019



CITY OF YELM

MAIN LINE CLEANOUT PLAN

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

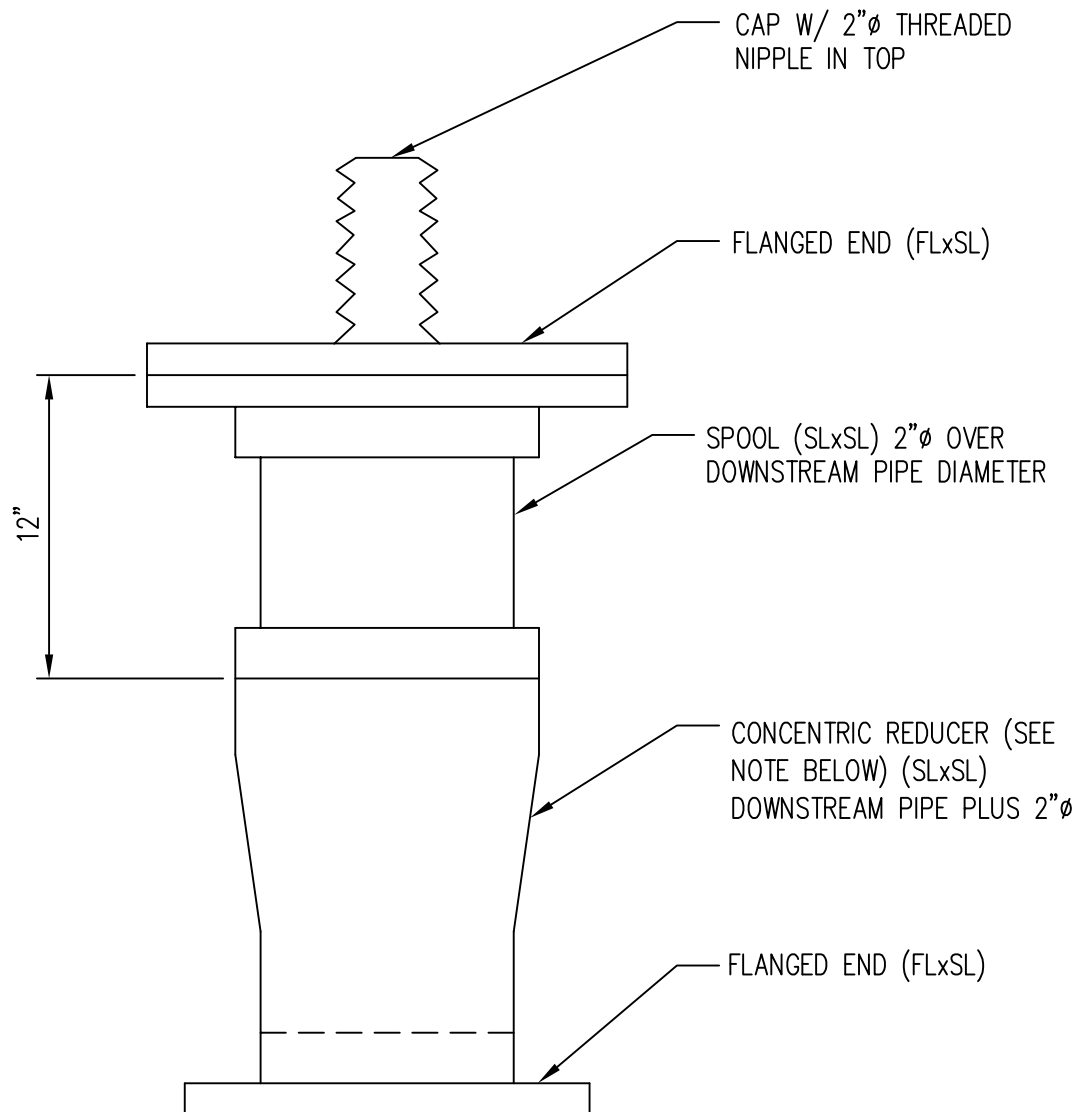
CKD. DMM

DWG. NO.

5-22

DATE
10/2019





NOTE:
 CONTRACTOR SHALL PROVIDE 1 LAUNCHER FOR EACH PIG PORT INSTALLED.
 USE SCH 80 PVC UNO SOLVENT WELD ALL FITTINGS.



CITY OF YELM

PIG LAUNCHER

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. DMM

DWG. NO.

5-24

DATE
10/2019

YELM ENGINEERING SPECIFICATIONS AND STANDARD DETAILS

CHAPTER 1 – GENERAL PUBLIC WORKS CONSIDERATION

Table of Contents

CHAPTER 1.00 - GENERAL PUBLIC WORKS CONSIDERATIONS	2
1.00.010 STANDARD SPECIFICATIONS	2
1.00.015 SHORTENED DESIGNATION.....	3
1.00.020 APPLICABILITY	3
1.00.025 DEFINITIONS	3
1.00.030 CHANGES TO STANDARDS	10
1.00.035 SEVERABILITY	10
1.00.040 CONSTRUCTION CONTROL	10
1.00.045 INSPECTION	10
1.00.050 BONDING	11
1.00.055 UTILITY LOCATIONS	12
1.00.060 UNDERGROUND INSTALLATION REQUIRED	12
1.00.065 EASEMENTS FOR PUBLIC UTILITIES.....	13
1.00.070 OBSTRUCTION OF STREETS.....	14
1.00.075 RESTORATION OF WORK SURFACE	14
1.00.080 BOND REQUIRED	15
1.00.085 EASEMENTS	15
1.00.090 LATECOMERS AGREEMENTS	16
1.00.095 UTILITY EXTENSION	16
1.00.100 ANNEXATION REQUIREMENT.....	16
1.00.105 TRAFFIC CONTROL.....	16
1.00.110 CALL BEFORE YOU DIG.....	17

CHAPTER 1.00 - GENERAL PUBLIC WORKS CONSIDERATIONS

1.00.010 Standard Specifications

Design detail, workmanship, and materials shall be in accordance with the current edition of the "Standard Specifications for Road, Bridge and Municipal Construction", the "APWA Amendments to Division One", and the "Standard Plans for Road, Bridge and Municipal Construction", all written and promulgated by the Washington State Chapter of the American Public Works Association and the Washington State Department of Transportation, except where these standards provide otherwise.

The following specifications shall be applicable when pertinent, when specifically cited in the standards, or when required by a higher funding authority.

- A. Conditions and standards as set forth in the latest edition of the City of Yelm's Water System Plan.
- B. Conditions and standards as set forth in the latest edition of the City of Yelm's General Sewer Plan.
- C. Conditions and standards as set forth in the latest edition of the City of Yelm's Comprehensive Plan.
- D. Rules and regulations as adopted in the Yelm Municipal Code.
- E. Conditions and standards as set forth in the Thurston County Coordinated Water System Plan.
- F. American Association of State Highway and Transportation Officials (AASHTO) A Policy on Geometric Design of Highways and Streets, latest edition. More commonly known as the "AASHTO Green Book".
- G. Criteria set forth in the Local Agency Guidelines as amended and approved by Washington State Department of Transportation.
- H. City and County Design Standards for the Construction of Urban and Rural Arterial and Collector Roads Promulgated by the City Engineers Association of Washington, May 24, 1989.
- I. Conditions and standards as set forth in the WSDOT Design Manual as amended and approved by WSDOT.
- J. U.S. Department of Transportation Manual on Uniform Traffic Control Devices (MUTCD), as amended and approved by Washington State Department of Transportation.
- K. DOT Construction Manual as amended and approved by Washington State Department of Transportation.

- L. Rules and regulations of the State Board of Health regarding public water supplies, as published by the State Department of Health.
- M. Conditions and standards as set forth in the State of Washington Department of Ecology "Criteria for Sewage Works Design", most current edition.
- N. Conditions and standards as set forth by the State of Washington, Department of Labor and Industries.
- O. Design criteria of federal agencies including Department of Housing and Urban Development and the Federal Housing Administration.
- P. Other specifications not listed above as may apply when required by the City of Yelm.

1.00.015 Shortened Designation

These City of Yelm Engineering Specifications and Standard Details shall be cited routinely in the text as the "Standards".

1.00.020 Applicability

These standards shall govern all new construction and upgrading of facilities both in the Right-of-Way and on-site for transportation and transportation related facilities; storm drainage facilities; sewer and water improvements; and park, recreation, and open-space facilities.

1.00.025 Definitions

"Assess" means to establish an amount or rate for the value of required improvements, fees or charges that are due for services provided which may become a lien on the property receiving such improvements or services.

"As-Builts" or "Record Drawing" means a drawing showing the horizontal and vertical location of the improvements as actually constructed; showing invert elevations, slopes of pipes, location of the pipes, tanks, controls, valves, depths of cover, type of material and any other feature different than shown on the design drawing.

"Average Daily Traffic" or ADT means the average number of vehicles passing a specified point during a 24 hour period. Annual average daily traffic (AADT) denotes that daily traffic that is averaged over one calendar year.

"Base Flow" means the flow associated with an Equivalent Residential Unit.

"B.O.D." The abbreviation for biochemical oxygen demand which means the quantity of oxygen utilized in the biochemical oxidation of organic matter under standard laboratory procedure in five days at 20 degrees centigrade, expressed in parts per million by weight. PROVIDED that, in the event an

alternative definition is utilized by or within the terms of a permit issued by a governmental agency under which the treatment system is required to operate, then such definition shall be deemed incorporated herein by reference.

"City Engineer" means the City Engineer or his duly authorized representative.

"City Standards" means the official design and engineering specifications of the City of Yelm adopted by the City Council and applying to the construction of facilities under the City's jurisdiction.

"Collection Lines" means a pressure or gravity sewage conveyance line and appurtenances as defined from time to time by the City Standards.

"Commercial Waste" See Industrial/Commercial waste.

"Cover" means the depth of earth material lying between the top of the sewer and the finished grade immediately above it.

"Developer" means any person, firm, partnership, association, joint venture, or corporation or any other entity responsible for a given project.

"Director of Public Works" The City of Yelm Public Works Director or his duly authorized representative.

"Down Spout" means the leader, whether pipe, chain, or otherwise, above ground which is installed to conduct water from the roof gutter.

"Drain" means any type of conduction of waste or surplus liquids.

"Easement" The right to use a defined area of property for specific purpose/purposes as set forth in the easement document, on a plat or short plat, or as required for purposes as set forth herein.

"Engineer" Any Washington State licensed professional engineer who represents the developer.

"Equivalent Residential Unit" or "ERU" means the unit of measurement determined by that quantity of flow associated with a single residential household, defined by the City of Yelm Municipal Code Chapter 13.04 as follows:

- A. E.R.U. measurement shall be an equivalent flow of 875 Cubic Feet, or less, per month, based on water meter in-flow, or sewer effluent meter when installed by owner with approval of Yelm Sewer Department.
- B. With respect to each residential structure, the number of E.R.U.'s and associated "base flow" will be based on Table 1A.

TABLE 1A

Type of Unit	ERUs/unit	Base Flow
Single Family Residence	1.00	875cf
Duplex Dwelling Unit	1.00	875cf
Triplex Dwelling Unit	0.90	788cf
Fourplex Dwelling Unit	0.80	700cf
Residential Structures > 4 Units	0.75	675cf

- C. With respect to uses other than residential, one E.R.U. shall be designated for each eight hundred seventy five (875) cubic feet of water consumed per month or sewage discharged as measured at source.

“Facilities” May include any or all of the following:

- a. Water: Public water facilities constructed within the City or connected to the City water system(s).
- b. Sewer: Public sewage facilities constructed within the City or connected to the City sewerage system and/or discharging into or through the City’s sewage system(s).
- c. Drainage: Public drainage facilities constructed within the City or connected to the City drainage system and/or discharging into or through the City’s drainage system(s).
- d. Streets: Public streets constructed within the public Right-of-Way or public easements within the City.
- e. Curb, gutter and sidewalk: Public curb, gutter and sidewalk constructed within public Right-of-Way within the City.
- f. Lighting: Street lighting facilities constructed within public Right-of-Way within the City.
- g. Transit: Transit facilities such as stops, stop pads, shelter pads, shelters, and bus pull outs often constructed within public Right-of-Way within the City.
- h. Signals: Public traffic signals constructed within public Right-of-Way within the City and other traffic signals for which the City shall assume maintenance responsibility.
- i. Other: Any other public facilities within the City of facilities connected to a City system.

“Garbage” Means solid waste which includes, but is not limited to, matter originating from the preparation, cooking, and dispensing of food; from

handling, sale, and storing of produce; from public places or from private ownership.

"Half-Street" Street constructed along an edge of development utilizing half the regular width of the Right-of-Way and permitted as an interim facility pending construction of the other half of the street by the adjacent owner.

"Health Officer" Means the official responsible for the public health of the citizens of Yelm or his/her designee. See Director.

"House Drain" or "Building Drain" - Means the pipe used for conveying sewage from the building to the clean-out or to a point 2 1/2 feet beyond the outer line of any footing, piling, building support, or porch under which it may run; whether such drain consists of one line extending from the building or of two or more such lines.

"Industrial/Commercial Waste" Means the wastes from an industrial or commercial process, as distinguished from sanitary sewage.

"Inspection" The field verification and documentation by the City of the construction of any facility.

"Licensed Sewer Contractor" Means any contractor licensed by the State of Washington who is duly registered as a "specialty contractor" or a "general contractor," and as such is licensed to construct, install, repair, reconstruct or excavate any sewers and to connect any building sewer to such public sewers, and who possesses a valid City of Yelm Business License.

"Lot of Street Frontage" The distance between the two points where the lot lines intersect the boundary of public street Right-of-Way.

"Maintenance Manager" See Director.

"Municipal Sewer Service Area" or "Sewer Service Area" Means the geographic area identified in the City of Yelm's Comprehensive Sewer Plan in which sewer service is currently available and planned to be served with sewer service in the future.

"Municipal Sewer System" Means the City of Yelm's sewer system and includes collectively: the STEP system, collection lines, treatment plant, discharge piping and outfall piping.

"N.P.D.E.S." An abbreviation for National Pollution Discharge Elimination System which is a Federal wastewater discharge permitting system that establishes discharge limits for facilities discharging wastewater to waters of the United States of America.

"Occupant" Means any person in physical possession of the building or structure to which sewer service is available, whether the owner, tenant, or other person holding a possessory interest.

"Onsite" Means that the majority of the component parts of a wastewater collection or soil absorption system are located on the private property where the wastewater is generated.

"Owner" means any person who holds fee title to the subject property.

"Ph" Means the logarithm of the reciprocal of the weight of hydrogen ions in grams per liter of solution.

"Person" Means any individual, firm, company, association, society, corporation, or group.

"Plans" The plans, profiles, cross sections, elevations, details, and supplementary specifications, sign by a licensed professional engineer and approved by the Director of Public Works, which show the location, character, dimensions, and details of the work to be performed.

"Plan Checking" The process performed by the City to check the completeness and accuracy of any drawings, calculations and other information submitted for public works approval and to review and confirm the facility satisfies and meets the intent of all City and other requirements.

"Pretreatment Ordinance" Means an ordinance adopted by the City of Yelm addressing the type or level of treatment that may be required prior to the discharge of sanitary sewage into the STEP system.

"Primary Treated Waste Water" Means wastewater that has been treated by a STEP tank.

"Private Street" Private vehicular access provided for by an access tract, easement, or other legal means to serve property that is privately owned and maintained.

"Project" General term encompassing all phases of the work to be performed and is synonymous to the term "improvement" or "work".

"Public Right-of-Way" A general term noting public land, property, or interest therein (e.g., an easement) acquired for or devoted to roads, alleys, streets, avenues, arterials, bridges, tunnels, highways, and other publicly owned grounds and places used for the free passage of vehicular and pedestrian traffic and other services, including utilities.

"Public Place" or "Public Area" Means any space dedicated to or acquired for the use of the general public or utilized with the permission of the owner or occupant on a continuing basis by the general public.

"Sanitary Sewage" Means the combination of the water-carried wastes from residences, business buildings, institutions, commercial and industrial establishments, which wastes contain polluted matter subject to treatment at the sewage treatment plant, i.e., sanitary sewer.

"Sanitary Sewer System" Means an integrated system of piping, pumps, valving and related structures constructed for the purpose of collecting and conveying domestic wastewater from sources to points of treatment.

"Senior Citizen" Means a head of household over the age of 65 who is retired and is below the median income as established by the City.

"Septic Tank" Means a tank designed to provide primary treatment of the wastewater, and sized according to the City of Yelm's "Technical Specifications STEP Onsite System". See "STEP Tank".

"Sewer" Means a pipe or conduit for conveyance of wastewater; and may be either gravity or pressure flow.

"Sewer Collection System" see "Sanitary Sewer System".

"Sewer Service Area" see "Municipal Sewer Service Area".

"Sewer System" Means the treatment plant, outfall, collection lines and STEP system as defined herein.

"Shall - May" For purposes of this Code, "Shall" shall be deemed to be mandatory and "May" permissive, unless the circumstances of the utilization thereof mandate otherwise.

"Side Sewers" Means the sewer pipe from the building drain to the STEP or Septic tank serving the particular building, beginning at a single discharge point 2 1/2 feet outside the foundation wall, or at the clean-out if closer than 2 1/2 feet outside the foundation wall but still outside the foundation wall, and ending at the inlet to the STEP or Septic tank. Side sewer maint. shall be the responsibility of the property owner.

"Site Plot" or "Site Map" Means a map of the side sewer location retained by the City in conjunction with any permit; the site plot or site map shall serve as a record of all matters pertaining to said permit.

"Slug" Shall mean any discharge of water, sewage or commercial/industrial wastewater which, for any period longer than 15 minutes, has a flow rate or concentration of any given constituent that exceeds more than five (5) times the average twenty-four (24) hour flow rate or concentration of normal operation.

"Soil Absorption System" Means a system designed to percolate primary treated wastewater into soil through the use of a drainfield, mound system or other land disposal system approved by the Thurston County Health Department.

"Standard Participation Contract" Shall mean the form of contract required by this Code to be entered into before properties which have not yet been

connected to or assessed for sewers or do not otherwise qualify for sewer service may nevertheless use the public sewers of the City of Yelm.

"Standard Specifications" Shall mean the latest version of the Standard Specifications for Road, Bridge, and Municipal Construction, prepared by the Washington State Department of Transportation and the American Public Works Association, Washington State Chapter, including the Division 1 APWA supplement.

"STEP" Shall mean the Septic Tank Effluent Pump System defined in the latest version of the Department of Ecology Criteria for Sewage Works Design.

"STEP System" Means all facilities from the building drain to the sewer collection lines including: the STEP tank, pump, screens, controls, alarms, electrical breakers, the effluent line, including the pipe, valves and valve box, and all miscellaneous appurtenances from the STEP tank to the sewer collection line.

"STEP Tank" Means a Septic Tank Effluent Pump Tank and appurtenances as defined by the City Standards.

"Public Street" Publicly owned and maintained street.

"City of Yelm Department of Public Works" - or "Public Works" Means the sewer function of the City of Yelm and the rules, regulations, boundaries, etc., relating to such sewer function. See Director.

"Road" Used interchangeably with street.

"Street" Used interchangeably with road.

"Suspended Solids" Means solids that either float on the surface of or are in suspension in water, sewage, or other liquids, and which are removable by the application of a treatment process.

"Third submittal" The third and any subsequent submittal of construction drawings, specifications, drainage calculations, and/or other information that requires additional plan checking pertaining to the construction of City facilities.

"Treatment Plant" Means the structures, equipment, and facilities required to receive, treat, reclaim, wastewater, including the outfall piping and structures.

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

"Utility" A company providing public service including, but not limited to, gas, oil, electric power, street lighting, telephone, telegraph, water, sewer, or cable television, whether or not such company is privately owned or owned by a governmental entity.

"YDS" Yelm Engineering Specifications and Standard Details.

"YMC" Yelm Municipal Code.

1.00.030 Changes to Standards

From time to time, changes may be needed to add, delete, or modify the provisions of these Standards. These Standards may be changed and, upon approval of the Director of Public Works, shall become effective and shall be incorporated into the existing provisions.

1.00.035 Severability

If any part of these Standards as established by ordinance shall be found invalid, all other parts shall remain in effect.

1.00.040 Construction Control

Work performed for the construction or improvement of City roads and utilities whether by or for a private developer, by City forces, or by a City contractor, shall be done to the satisfaction of the City and in accordance with approved plans. It is emphasized that no work shall be started until such plans are approved. Any revision to such plans shall be approved by the City before being implemented. Failure to receive the City's approval can result in removal or modification of construction at the contractors or developers expense to bring it into conformance with approved plans.

1.00.045 Inspection

All work performed within the public Right-of-Way or easements, or as described in these standards, whether by or for a private developer, by City forces, or by a City contractor, shall be done to the satisfaction of the City and in accordance with the WSDOT/APWA Standard Specifications, any approved plans and these standards. Unless otherwise approved, any revision to construction plans must be approved by the City before being implemented.

It is the responsibility of the developer, contractor, or their agents to notify the City in advance of the commencement of any authorized work. A preconstruction meeting and/or field review shall be required before the commencement of work. Inspection fees shall be paid on or before the preconstruction meeting. Any necessary easements or dedications are required before plan approval.

It is the responsibility of the developer, contractor or their agents to have an approved set of plans and any necessary permits on the job site whenever work is being accomplished.

The City shall have authority to enforce these standards as well as other referenced or pertinent specifications. The City will appoint project engineers, assistants and inspectors as necessary to inspect the work and they will exercise such authority as the City may delegate.

All specific inspections, test measurements or actions required of all work and materials are set forth in their respective chapters herein. Tests shall be performed at the developer's or contractor's expense.

Failure to comply with the provisions of these standards may result in stop work orders, removal of work accomplished, or other penalties as established by ordinance.

A project is considered final when a letter of acceptance is issued by the City to the party responsible for the project.

No water meters shall be released for any lot or building served by a project until final acceptance has been granted.

1.00.050 Bonding

Bonds or other allowable securities may be required by the City to guarantee the performance of or maintenance of required work. The type and amount of security shall be per resolution, or, if not specified, be at the discretion of the City. Types of securities include but are not limited to a bond with a surety qualified to do a bonding business in this state, a cash deposit, an assigned savings account, or a set aside letter.

The following are the most frequent bonds required:

- A. Performance Bond. No building permit shall be issued until all public improvements are completed or, with the approval of the Director of Public Works, a performance bond with a surety qualified to do business in this state, a cash deposit, assigned savings account or other security acceptable to the City, in an amount equal to one hundred fifty percent of the cost of the public works improvements is posted with the City. No certificate of occupancy shall be issued until all public works improvements are completed and approved unless otherwise allowed by the Director of Public Works.
- B. Maintenance bond. Prior to the commencement of work, the permittee or the contractor for the permittee shall post with the City a maintenance bond for guarantee of such public works improvements with a surety qualified to do business in this state, a cash deposit, an assigned savings account or other security acceptable to the City in an amount equal to

twenty percent of the estimated cost of the public works improvements for a period of one year after the completed job is accepted by the City. Release of bond or other security will occur one year from City acceptance if all maintenance has been accepted by the City.

1.00.055 Utility Locations

- A. Utilities within a Right-of-Way or easement on new roads or in roadways where existing utilities are not in conflict, shall be located as shown in typical sections on Drawings 2-1 through 2-7. Where existing utilities are in place, new utilities shall conform to these standards as nearly as practical and yet be compatible with the existing installations. Deviations of location shall be approved by the Director of Public Works. Existing utilities shall be shown using the best information available. This verification may require exploration/excavation (potholing) if utilities are in conflict with proposed design.

The contractor/developer shall be responsible for utility locates in conjunction with their project until final Public Works approval is given.

- B. When practicable all new utilities other than those located on private property shall be installed underground by the utility owning said facility and new and existing facilities shall comply with provisions as set forth in franchise agreements between the City and utility, the Underground Communication Facilities and Easements for Public Utilities sections. Utilities converted from overhead to underground on existing roadways may be located within the Right-of-Way.

The term electrical or communication facilities includes facilities carrying any electrical energy, including but not limited to, electric power, telephone, telegraph and cable television; provided, however, that the terms shall not include the following facilities:

1. Electric utility substations, surface mounted transformers and switching facilities;
2. Electric transmission systems of a voltage of 55kv or more and equivalent communication facilities;
3. Street lighting standards;
4. Telephone pedestals and other equivalent communications facilities;
5. Police and fire sirens or any similar municipal equipment, including traffic control equipment.

1.00.060 Underground installation required

- A. Transmission Lines. All electrical and communication facilities other than electrical or communication services located on private property shall be

installed underground by the utility owning said facility in the following cases:

1. When it becomes necessary to remove existing overhead facilities for a distance of five hundred feet because of a roadway widening project or other similar reason;
2. When existing overhead facilities for a distance of over five hundred feet are to be replaced; provided, however, this provision shall not apply to replacements due solely to casualty damage nor to replacement of wire only;
3. When any electrical or communication facilities are extended beyond those facilities existing on the effective date of this chapter; provided, however, that this subsection shall not apply to the extension by a cable television utility of facilities by the use of existing overhead poles of another utility.
4. When another utility having facilities along the same street or easement places its facilities underground for a distance of over five hundred feet.

All undergrounding of facilities initiated by a utility company must have approval of the City Council or its representative prior to undertaking such project.

B. Services. All electrical and communications services located on private property shall be installed underground by the owner of the property in the following cases:

1. All new electrical and communication services from an overhead or underground facility to service connections of structures shall be installed underground;
2. All rebuilt or relocated electrical or communication service lines from an overhead or underground facility to service connections of structures shall be installed underground unless such rebuilding or relocation involves a change in the overhead service line only without a change in the corresponding service entrance facilities;
3. All existing electrical and communication services shall be converted to underground by the owner or owners of the property upon which said services are located within 90 days after notification by the City in accordance with Section 35.96.050 RCW that underground facilities are available.

1.00.065 Easements for Public Utilities

Easements for public utilities shall be provided on each side of all rear lot lines and side lot lines where necessary. Such easements shall not be less than five feet wide on the half-width that is reserved from the rear of each of the adjacent lots. Insofar as possible, the easements shall be continuous and aligned from block to block within the subdivision and with adjoining subdivisions. Easements for existing or future utility lines which do not lie along rear or side lot lines shall be at least ten feet wide.

Easements for unusual facilities such as high voltage electrical lines, shall be of such widths as is adequate for the purpose, including any necessary maintenance roads.

A Right-of-Way access permit is required of any utility, except City owned facilities and utilities who hold a franchise agreement with the City, for any work done within the Right-of-Way.

1.00.070 Obstruction of Streets

Permit Required. Whenever any person, firm or corporation, intends to obstruct, excavate or install any facility in the City Right-of-Way, including the extension of City utilities, they shall first obtain a Right-of-Way access permit. Typical facilities covered by this chapter are signposts, utility poles, culverts, underground utilities, curbs, sidewalks, bus shelters, fences, street lights or any manner of obstruction and/or construction which occupies the Right-of-Way.

Permit exemptions. A Right-of-Way access permit shall not be required under the following conditions:

- A. When City employees perform work on behalf of the City within the Right-of-Way;
- B. When a public utility, under franchise agreement when the City, performs normal maintenance as defined in the franchise agreement in order to protect the existing utility system;
- C. When normal disasters or other emergencies make it impossible to obtain a permit prior to commencing work. In such event, the Director of Public Works shall be notified as soon as possible.

1.00.075 Restoration of work surface

All work undertaken, including but not limited to excavation, backfilling, surface restoration, protection of utilities, traffic control, safety precautions, noise and dust control and clean up, shall be performed in accordance with standard specifications. All work shall require restoration of the surface to original or better condition in accordance with such specifications. The permittee shall guarantee the work and condition of the street, sidewalk or

Right-of-Way for a period of one year after the completed job is accepted by the City.

Rules of all Washington state departments having jurisdiction shall be strictly adhered to with respect to safety construction methods and other state requirements.

1.00.080 Bond Required

Prior to commencement of the work under a permit granted pursuant to this chapter, the permittee or the contractor for the permittee shall post with the City a bond with surety qualified to do a bonding business in this state, a cash deposit or an assigned savings account or other security acceptable to the City in an amount equal to one hundred fifty percent of the cost of the work as estimated by the Director of Public Works. Such bond, deposit or other security shall be conditioned upon the permittee or its contractor performing the work pursuant to the terms of this chapter, including the restoration and/or replacement of the street, sidewalk, or other Right-of-Way within the time specified by the Director of Public Works, and a maintenance bond guaranteeing such work and replacement at ten percent of the estimated cost of surface restoration for a period of one year after the completed job is accepted by the City. For those public utilities which hold a franchise agreement, a maintenance bond is not required.

1.00.085 Easements

- A. Where public utilities and/or their conveyance systems cross private lands, an easement must be granted to the City. The City will generally process, record and file all easements. If the property is platted the easement may be conveyed when the short plat or final plat is filed. All easements not shown on a plat must be prepared by a licensed land surveyor or engineering firm capable of performing such work.
- B. Easement widths shall be 15 feet for a single utility and 20 feet for dual utilities. Construction easements shall be 30 feet minimum in total width, including the permanent easement. When trench depths dictate or where pipe diameter or vault widths exceed four feet, a wider easement may be required by the City.
- C. Easements are required to be submitted in draft, unsigned for review and approval prior to plan approval. Signed copies are required prior to plan approval. Any change in design which places an amenity, i.e., water, sewer, sidewalk, etc., outside of the easement may necessitate stopping of construction until plans and easements can be resubmitted and approved. Plan review fee shall be based on the rate as established for third submittal fee. Easements will be filed by the City upon satisfactory completion of the work.

1.00.090 Latecomers Agreements

Any person who constructs a water or sewer main extension at the direction of the City, in excess of that which is required to meet minimum standards or which meets minimum standards and will benefit properties abutting the new main, may, with the approval of the Director of Public Works, enter into a contract with the City which will allow the developer to be reimbursed for that portion of the construction cost that benefits the adjoining properties and/or is in excess of the minimum standard. This contract is commonly termed a "Latecomers Agreement." Application procedures are located in Title 13, YMC.

1.00.095 Utility Extension

- A. Anyone who wishes to extend any City utility should contact the Department of Public Works for an Extension/Connection Fee Estimate and any special extension requirements.
- B. Utility mains shall be extended to and through the extremes of the property being developed for loop closures and/or future development as determined by the City.

1.00.100 Annexation Requirement

Owners of properties lying outside of, but contiguous to City boundaries must apply for annexation of their property to the City prior to being served by a City owned utility. Owners of properties lying outside of but not contiguous to the City must legally commit their property to eventual annexation prior to being served by the City's utility system. Section 13.08.020(H) YMC.

These annexation requirements will be applied to all extensions of the City's utility to areas outside the City limits. Anyone who desires to extend the City's utility system should contact the Department of Public Works for specific annexation requirements.

1.00.105 Traffic Control

- A. The developer/contractor shall be responsible for interim traffic control during construction on or along traveled roadways. Traffic control shall follow the guidelines of the WSDOT/APWA Standard Specifications. All barricades, signs and flagging shall conform to the requirements of the MUTCD.
- B. City utilities constructed within Thurston County Right-of-Way shall follow all traffic control requirements as set forth by Thurston County Department of Public Works and MUTCD.

- C. Signs must be legible and visible and should be removed at the end of each work day if not applicable after construction hours.
- D. When road closures and detours cannot be avoided the contractor/developer shall notify the Department of Public Works / Development Review Engineer. The City may require a detour plan to be prepared, submitted and approved prior to closing any portion of a City roadway.
- E. A Right-of-Way Access Permit may be required before work in the road can commence. See requirements in Title 18 YMC, Unified Development Code.

1.00.110 Call Before You Dig

All developers/contractors are responsible for timely notification of all utilities in advance of any construction in Right-of-Way or utility easements. The utilities one-call Underground Location Center phone number is 1-800-424-5555.

YELM ENGINEERING SPECIFICATIONS AND STANDARD DETAILS

CHAPTER 2 TRANSPORTATION

Table of Contents

CHAPTER 2.00	TRANSPORTATION	3
2.00.010	GENERAL CONSIDERATIONS.....	3
CHAPTER 2.10	STREETS.....	3
2.10.010	DESIGN	3
2.10.020	GENERAL NOTES (STREET CONSTRUCTION)	4
2.10.030	FUNCTIONAL CLASSIFICATION	5
2.10.040	NAMING.....	8
2.10.050	SIGNING	9
2.10.060	RIGHT-OF-WAY	9
2.10.070	MEDIANS.....	10
2.10.080	INTERSECTIONS	10
2.10.090	SIGHT OBSTRUCTION	11
2.10.100	DRIVEWAYS.....	11
2.10.110	SURFACING REQUIREMENTS	12
2.10.130	TEMPORARY STREET PATCHING.....	14
2.10.140	TRENCH - PAVEMENT RESTORATION	14
2.10.150	STAKING.....	15
2.10.160	TESTING	16
CHAPTER 2.20	SIDEWALKS, CURBS, AND GUTTERS	17
2.20.010	SIDEWALKS	17
2.20.020	CURB; CURB AND GUTTER; ROLLED CONCRETE CURB AND GUTTER.....	17
2.20.030	CURB RAMPS	17
2.20.040	STAKING.....	17
CHAPTER 2.30	BIKEWAYS	19
2.30.010	GENERAL	19
2.30.020	DESIGN STANDARDS.	19
2.30.030	STAKING AND TESTING	19
CHAPTER 2.40	ILLUMINATION	20
2.40.010	DESIGN STANDARDS	20
2.40.020	DESIGN CRITERIA.	20
GENERAL NOTES (STREET LIGHT CONSTRUCTION)	22	
2.40.030	STAKING.....	24
2.40.040	TESTING	25
CHAPTER 2.50	SIGNALS	26
2.50.010	GENERAL	26
2.50.020	DESIGN STANDARDS.	26
2.50.030	INDUCTION LOOPS.....	26
2.50.040	STAKING.....	26
2.50.050	TESTING.	26
2.50.060	CHECK-OUT PROCEDURE.....	27
CHAPTER 2.60	ROADSIDE FEATURES.....	28
2.60.010	GENERAL	28
2.60.020	DESIGN STANDARDS.	28
2.60.030	STAKING.....	28

2.60.040	TESTING.	28
2.60.050	SURVEY MONUMENTS.	28
2.60.060	GUARD RAILS	29
2.60.070	RETAINING WALLS.....	29
2.60.080	PARKING LOTS.....	30
TRANSPORTATION.....		33
LIST OF DRAWINGS.....		33
TITLE	DRAWING.....	33

CHAPTER 2.00 TRANSPORTATION

2.00.010 General Considerations

The overall goal of this chapter is to encourage the uniform development of an integrated, fully accessible public transportation system that will facilitate present and future travel demand with minimal environmental impact to the community as a whole.

This chapter provides minimum development standards supplementing the applicable standards as set forth in Section 1.00.010.

CHAPTER 2.10 STREETS

2.10.010 Design

Street design must provide for the maximum loading conditions anticipated. The width and grade of the pavement must conform to specific standards set forth herein for safety and uniformity.

- A. Design Standards. The design of streets and roads shall depend upon their type and usage. The design elements of City streets shall conform to City standards as set forth herein and current design practice as set forth in Section 1.00.010. Standard design structures are shown on drawing numbers 2-1 through 2-8 at the end of this chapter. A design exception may be granted by the City based on the following criteria:
1. Reduction of carrying capacity as demonstrated by a Traffic Impact Analysis;
 2. When alternative methods of stormwater conveyance and treatment (other than swales) are proposed and in compliance with the Stormwater Manual;
 3. Future expansions / extensions of the proposed roadway are improbable due to physical constraints; and
 4. Meets the intent of Transportation Chapter 2.00
 5. Alternate structures may be used based on the criteria as outlined in Section 2.10.110.
- B. Alignment. Alignment of major arterials, minor arterials and collectors shall conform as nearly as possible with that shown in the Comprehensive Plan.
- C. Grade. Street grade should conform closely to the natural contour of the land. In some cases a different grade may be required by the City. The minimum allowable grade shall be 0.5 percent. The

maximum allowable grade shall be 15 percent, depending upon the street classification.

- D. Width. The pavement and Right-of-Way width depend upon the street classification. The table of Minimum Street Design Standards show the minimum widths allowed.
- E. Street widths shall be measured from face of curb to face of curb on streets with cement concrete curb and gutter, and from flow line to flow line on streets with cement concrete rolled curb and gutter.

The following General Notes shall be included on any plans dealing with street design in addition to all applicable requirements in Section 1.00.010.

2.10.020 GENERAL NOTES (STREET CONSTRUCTION)

- A. All workmanship and materials shall be in accordance with City of Yelm standards, and the most current copy of the State of Washington Standard Specifications for Road, Bridge, and Municipal Construction.
- B. The contractor shall be responsible for all traffic control in accordance with MUTCD. Prior to disruption of any traffic, traffic control plans shall be prepared and submitted to the City for approval. No work shall commence until all approved traffic control is in place.
- C. All curb and gutter, street grades, sidewalk grades, and any other vertical and/or horizontal alignment shall be staked by an engineering or surveying firm capable of performing such work.
- D. Where new asphalt joins existing, the existing asphalt shall be cut to a neat vertical edge and tacked with Asphalt Emulsion type CSS-1 in accordance with the standard specifications. The new asphalt shall be feathered back over existing to provide for a seal at the saw cut location and the joint sealed with grade AR-4000W paving asphalt.
- E. Compaction of subgrade, rock, and asphalt shall be in accordance with the standard specifications.
- F. Subgrade inspection shall be performed by an approved testing firm and forms shall be inspected for line and grade by an engineer before pouring concrete.
- G. Certification as to conformance shall be provided to the City prior to acceptance of work.
- H. The Contractor/Developer shall furnish and install all permanent signing.

2.10.030 Functional Classification

City streets are divided into boulevards, major arterials, urban arterials, commercial and neighborhood collectors, local access commercial, and residential streets and alleys in accordance with regional transportation needs, the functional use of each serves and Transportation Policy No 11. Function is the controlling element for classification and shall govern Right-of-Way, road width, and road geometrics. The following list is provided to assist the developer in determining the classification of a particular street. Streets not listed are classified as residential local access streets. New streets will be classified by the City. The intersection commonly known as Five Corners is described as Yelm Ave. (SR 507)/Bald Hill Rd. SE/Morris Rd. SE/NE Creek St./SR 507.

Boulevard Swale or w/Central Island

Berry Valley Road SW (beyond commercial section through SW Yelm annexation area)

Major Arterials

First Street (from Y-1/Y-2 intersection to Yelm Avenue)

Killion Road extension (so. to Berry Valley Road to Boulevard section)

Y-1 (SR-510)

Y-2 (SR-507)

Urban Arterial

Yelm Avenue East and West

Bald Hills Road (Y-9 improvements)

Canal Road (including Y-3 improvements)

First Street (north of Yelm Avenue)

Grove Road (including Y-3 improvements)

Stevens-Coates Connector (Y-4 improvements)

Commercial Collectors

Creek Street SE

Edwards Street NW (from Yelm Avenue to Coates Street SE)

Killion Road NW (adjacent to commercially zoned areas)

Morris Road SE

N. P. Road NW

Rhoton Road NW (from NE First Street to NW Rhoton Court)

Stevens Avenue NW

West Road SE

103rd Street NE (from Yelm Avenue to NE Creek Street)

Neighborhood Collectors

Burnett Road SE

Clark Road SE
Coates Street SE
Crystal Springs Road (including Y-6 improvements-upon opening of Y-3 west)
Cullens Road
Killion Road NW
Middle Road SE
Mill Road SE
Mosman Avenue SE
Mosman Avenue SW
Mountain View Road NW
Ordway Drive
Railway Street SE
Rhoton Road NW (from NW Rhoton Court to Canal Rd. SE)
Southwest Access (Y-7 improvements)
Vancil Road SE
Wilkensen Road
93rd Avenue SE
105th Avenue

Local Access Commercial

Edwards Street SW (from Yelm Avenue to Mosman Avenue)
Jefferson Avenue NE
Jefferson Avenue NW
Jones Street SE
Longmire Street SW (to Jones Street)
Mckenzie Avenue SE (from SR 507 to Second Street)
Railroad Street NW
Rice Street SW (from Jones Street SE to NW Jefferson Avenue)
Solberg (Jefferson to Coates)
Van Trump Street
Second Street SE
Solberg Street SW (from Jones Street SE to NW Jefferson Avenue)
Third Street SE (from Jones Street SE to NE Jefferson Avenue)

Local Access Residential

Flume Road SE
Fourth Street SE
Longmire Street SW (to Jones Street)
100th Way SE
103rd Street NE (from NE Creek Street to Canal Road SE)
All remaining roadways within the Yelm UGA

MINIMUM STREET DESIGN STANDARDS

ROADWAY FEATURES	BOULEVARD	MAJOR ARTERIAL	URBAN ARTERIAL	COMMERCIAL COLLECTOR	NEIGHBORHOOD COLLECTOR	LOCAL ACCESS COMMERCIAL	PRIVATE ROADWAY LOCAL ACCESS RESIDENTIAL
ADT	500 MIN	15000 MIN	6000-15000	6000-15000	500-6000	2000 MAX	500 MAX
DESIGN LIMITATIONS	No superelevation. Access and intersections should be limited. No on-street parking.			No superelevation No on street parking	No superelevation No on street parking	No superelevation	No superelevation
MINIMAL STRUCTURAL DESIGN	Special Design	Special Design	Special Design	4' AC 2' C.S.T.C. 8' Ballast	3' AC 2' C.S.T.C. 8' Ballast	4' AC 2' C.S.T.C. 8' Ballast	2' AC 2' C.S.T.C. 8' Ballast
MINIMUM RIGHT-OF-WAY	84' – 106'	94'	72'	56'	56'	58'	58'
PARKING LANE	NOT ALLOWED					Both Sides	Both Sides
MINIMUM MAXIMUM PROFILE GRADE	0.5% - 8.0%	0.5% - 8.0%	0.5% - 8.0%	0.5% - 10.0%	0.5% -12.0%	0.5% - 15.0%	0.5% - 15.0%
CURB	Curb	Curb & Gutter	Curb & Gutter	Curb & Gutter	Curb & Gutter	Curb & Gutter	Rolled Curb & Gutter
PLANTER STRIP	Two sides – 7'	Two sides – 8'	Two sides – 8'	Two sides – 7'	Two sides – 7'	Two sides – 6'	Two sides – 6'
SIDEWALKS	Two sides - 5'	Two sides - 6'	Two sides - 6'	Two sides - 5'	Two sides - 5'	Two sides - 5'	One side - 5'
CUL-DE-SAC RADIUS (PAVEMENT WIDTH)	Not applicable					50'	38' (or 47' with landscaped island radius of 17')
INTERSECTION CURB RADIUS	35'	35'	35'	35'	35'	35'	25'
DESIGN SPEED (MPH)	40	40	40	30	30	30	25
MINIMUM CENTERLINE RADIUS	Per AASHTO			150'	150'	150'	100'

2.10.040 Naming

Streets and roads shall be named according to specific criteria. All street addresses within the City shall be suffixed by the name of the quadrant within which the same is located. The City is divided into four districts as determined by the base lines described as follows:

- A. North-South Base Line. Commencing on the centerline of State Highway 507 where said centerline first intercepts the southerly limits of the urban growth boundary; thence continuing northeasterly along said centerline of State Highway 507 within the corporate limits of the City where the same becomes the centerline of First Street NE; thence continuing northeasterly along said centerline of First Street NE through the City to the point where the same joins the centerline of Rhoton Road NW; thence continuing northerly along the centerline of Rhoton Road NW to the most northerly corporate limit of the City;
- B. East-West Base Line. Commencing on the centerline of State Highway 510 where the same intercepts the westerly corporate limits of the City; thence proceeding southeasterly along said centerline of State Highway 510 into the City where the same becomes the centerline of Yelm Avenue; thence continuing southeasterly along the centerline of State Highway 507 (Yelm Avenue extended) lies adjacent to the corporate limits of the City. Section 12.20.050 YMC

The districts are described as follows:

- 1. Northeast (NE) shall indicate that portion of the City lying northerly of the east-west base line and easterly of the north-south base line;
 - 2. Northwest (NW) shall indicate that portion of the City lying northerly of the east-west base line and westerly of the north-south base line;
 - 3. Southeast (SE) shall indicate that portion of the City lying southerly of the east-west base line and easterly of the north-south base line;
 - 4. Southwest (SW) shall indicate that portion of the City lying southerly of the east-west base line and westerly of the north-south base line.
- C. The following street designations shall apply to public ways, street and road signs and addresses:
 - 1. "Avenues" shall indicate public ways (excluding alleys) running generally easterly and westerly;
 - 2. "Courts" shall indicate public ways in the form of a cul-de-sac,

which cannot be extended. Court shall be named or numbered and the address numbers thereon shall follow the address number of the street from which the court extends;

3. "Drives" shall indicate irregular or diagonal public ways (excluding alleys) not conforming to the grid pattern and not exceeding four City blocks in length;
4. "Lanes" shall indicate private ways in a private street subdivision;
5. "Loops" shall indicate a short loop-type public way which shall carry the name of the public way from which it originates;
6. "Places" shall indicate public ways (excluding alleys) running generally northerly and southerly, parallel to, but between streets and not connecting to avenues;
7. "Roads" shall indicate irregular or diagonal public ways not conforming to the grid pattern and exceeding four City blocks in length, which are arterial public ways;
8. "Streets" shall indicate public ways (excluding alleys) running generally northerly and southerly; and
9. "Ways" shall indicate public ways (excluding alleys) running generally easterly and westerly parallel to but between avenues and not connecting through streets. Section 12.20.070 YMC

An address number will be assigned to all new buildings at the time the building permit is issued. It is then the owner's responsibility to see that the house numbers are placed clearly and visibly at the main entrance to the property or at the principal place of ingress.

The developer must check with the Building Official regarding the naming of streets. This should be done at the time the preliminary land division is submitted and again upon approval of the final land division. The Building Official will insure that the name assigned to a new street is consistent with policies of the City.

2.10.050 Signing

The developer shall furnish and install all signage. All permanent signing shall comply with the provisions as established by the MUTCD, WSDOT Standard Specifications for Road, Bridge, and Municipal Construction and the WSDOT Sign Fabrication Manual. Street designation signs will display the street name as determined in Section 2.10.040 YDS.

2.10.060 Right-of-Way

Right-of-Way is determined by the functional classification of a street. See drawing numbers 2-1 through 2-8 for specific widths. See "Minimum Street Design Standards Table" Section 2.10.030 YDS for radius requirements at cul-de-sac "bulb". Right-of-Way at "bulb" shall be increased accordingly.

Right-of-Way requirements may be increased if additional lanes, pockets, transit lanes, bus loading zones, operational speed, bike lanes, utilities, schools or other factors are required as determined by the City.

Right-of-Way shall be conveyed to the City on a recorded land division map or by a Right-of-Way dedication deed.

2.10.070 Medians

A median shall be in addition to, not part of, the specified roadway width except on a road classed as a boulevard. Medians shall be designed so as not to limit turning radius or sight distance at intersections. Pedestrian access, landscaping, and irrigation shall be installed when directed by the City.

2.10.080 Intersections

Traffic control will be as specified in the Manual on Uniform Traffic Control Devices (MUTCD), or as modified by the City as a result of appropriate traffic engineering studies.

Street intersections shall be laid out so as to intersect as nearly as possible at right angles (within 15 degrees).

For safe design, the following types of intersection features should be avoided:

Intersections with more than four intersecting streets;

"Y" type intersections where streets meet at acute angles;

Intersections adjacent to bridges and other sight obstructions.

Spacing between adjacent intersecting streets, whether crossing or "T" should be as follows:

<u>When highest classification involved is</u>	<u>Minimum Centerline offset should be</u>
Major Arterial/Boulevard	350
Urban Arterial	300
Commercial Collector	200
Neighborhood Collector	200

Local Access	150
Private Roadway	150

When different class streets intersect, the higher standard shall apply on curb radii. Deviations to this may be allowed at the direction of the City.

On sloping approaches at an intersection, landings shall be provided with grade not to exceed one foot difference in elevation for a distance of 30 feet approaching any arterial or 20 feet approaching a collector or local access street, measured from nearest Right-of-Way line (extended) of intersecting street.

2.10.090 Sight Obstruction

Sight distance at intersections and road approaches shall be in conformance with the most current WSDOT Design Manual and the AASHTO Green Book.

Within the sight triangle, cut slopes, hedges, fences, trees, signs, utility poles, or anything large enough to constitute a sight obstruction should be removed or lowered. Parking should also be eliminated and signs offset so sight distance is not obstructed.

Sight obstructions that may be excluded from these requirements include: existing utility poles, regulatory signs, trees trimmed from the base to a height of 10 feet above the street, and preexisting buildings.

A sight distance maintenance easement must be granted to the City for all improvements including commercial and residential development, and land divisions. The sight distance maintenance easement is based upon the sight distance triangle calculations in the most current WSDOT Design Manual and the latest edition of the AASHTO Green Book.

2.10.100 Driveways

- A. All abandoned driveway areas shall be removed and the curbing and sidewalk or shoulder and ditch section shall be properly restored.
- B. All driveways constructed within street right of ways shall be constructed of Portland Cement Concrete and shall be subject to the same testing and inspection requirements as curb, gutter, and sidewalk construction.
- C. Grade breaks, including the tie to the roadway, shall be a maximum 8 percent on a crest and 12 percent in a sag.

- D. Road approach type accesses shall only be allowed when justified through an accepted traffic analysis and report, and approved by the City.
- E. Spacing criteria seek to achieve several objectives. One is to clearly identify which property the driveway is serving. Another is to leave a usable island between driveways for utility poles and traffic control devices.
- F. An additional factor concerns the spacing of high-volume driveways where deceleration or acceleration lanes are required. Examples would include driveways into community and regional shopping centers as well as those into major industrial, commercial, and apartment complexes. At least several hundred feet between major driveways is desirable. Factors to be considered include the speeds and volumes of entering and leaving traffic, the speeds of through traffic, and the resultant merging movements upstream and downstream.
- G. It is important that driveways be designed for the particular traffic characteristics anticipated and that upstream and downstream factors affecting a driveway location be considered in each instance. Drawing number 2-25 contains minimum spacing recommendations. All driveway spacing must be approved by the City.
- H. Driveways giving direct access onto arterials may be denied if alternate access is available. Deviations of these standards may be permitted by the City.

2.10.110 Surfacing Requirements

The following are the surfacing requirements for each application listed.

A. Boulevard and Arterial Streets

The engineer will provide a pavement design. The design of the pavement shall include a study of the native soils, their behavior under load, and the design of a structural section to carry the anticipated loads under all climate conditions. In no event shall the structural section be less than the minimums shown below:

Surfacing:	0.33' Class B Asphalt Concrete
Top Course:	0.17' Crushed Surfacing Top Course
Base:	1.00' Gravel Base

One soil sample per each 500 LF of centerline with 3 minimum per project representative of the roadway subgrade shall be taken to determine a statistical representation of the existing soil conditions at design grade.

The pavement design, signed and stamped by an engineer licensed by the State of Washington, shall be based on actual soils tests and submitted with the plans.

The following structural section may be used in lieu of a pavement design. The use of this section is subject to City approval of prepared subgrade.

B. Commercial Collector Streets

Surfacing: 0.33' Class B Asphalt Concrete
Top Course: 0.17' Crushed Surfacing Top Course
Base: 0.67' Gravel Base

Alternate

Surfacing: 0.33' Class B Asphalt Concrete
Base: 0.67' Asphalt Treated Base

C. Neighborhood Collector Streets

Surfacing: 0.25' Class B Asphalt Concrete
Top Course: 0.17' Crushed Surfacing Top Course
Base: 0.67' Gravel Base

Alternate

Surfacing: 0.25' Class B Asphalt Concrete
Base: 0.50' Asphalt Treated Base

D. Local Access Street

Surfacing: 0.17' Class B Asphalt Concrete
Top Course: 0.17' Crushed Surfacing Top Course
Base: 0.67' Gravel Base

Alternate

Surfacing: 0.17' Class B Asphalt Concrete
Base: 0.50' Asphalt Treated Base

E. Sidewalks

Surfacing: 4" Concrete Class 3000

Base: 1" Crushed Surfacing Top Course or well graded sand

Asphalt sidewalks will not be permitted unless specifically approved by the City.

Base may be omitted subject to City approval of prepared subgrade.

F. Driveway

Surfacing: 6" Concrete Class 3000

Base: 1" Crushed Surfacing Top Course or well graded sand

Base may be omitted subject to City approval of prepared subgrade.

G. Class I Bike Path

Surfacing:	4" Concrete Class 3000
Base:	1" Crushed Surfacing Top Course
Alternate:	
Surfacing:	2 1/2" Class B Asphalt Concrete
Base:	4" Gravel Base

2.10.130 Temporary Street Patching

Temporary restoration of trenches shall be accomplished by using 2" Class B Asphalt Concrete Pavement when available or 2" medium-curing (MC-250) Liquid Asphalt (cold mix), 2" Asphalt Treated Base (ATB), or steel plates.

ATB used for temporary restoration may be dumped directly into the trench, bladed and rolled. After rolling, the trench must be filled flush with ATB to provide a smooth riding surface.

All temporary patches shall be maintained by the contractor until such time as the permanent pavement patch is in place.

If the contractor is unable to maintain a patch for whatever reason, the City will patch it and the developer will be billed for actual cost of labor and materials plus overhead.

2.10.140 Trench - Pavement Restoration

Trench restoration shall be either by a patch or patch plus overlay as required by the City.

- A. All trench and pavement cuts shall be made by spade bladed jackhammer or sawcuts. The cuts shall be a minimum of 1 foot outside the trench width.
- B. All trenching shall be backfilled with crushed surfacing materials conforming to Section 4-04 of the WSDOT/APWA Standard Specifications. The trench shall be compacted to 95 percent maximum density, as described in Section 2-03 of the WSDOT/APWA Standard Specifications.

Replacement of the asphalt concrete or Portland Cement Concrete shall be of existing depth plus 1 inch or 3 inches, whichever is greater.

- C. Tack shall be applied to the existing pavement and edge of cut and shall be emulsified asphalt grade CSS-1 as specified in Section 9-02.1(6) of the WSDOT/APWA Standard Specifications. Tack coat shall be applied as specified in Section 5-04 of the WSDOT/APWA Standard Specifications.
- D. Asphalt concrete Class B shall be placed on the prepared surface in accordance with the applicable requirements of Section 5-04 of the

WSDOT/APWA Standard Specifications, except that longitudinal joints between successive layers of asphalt concrete shall be displaced laterally a minimum of 12 inches unless otherwise approved by the City. Fine and coarse aggregate shall be in accordance with Section 9-03.8 of the WSDOT/APWA Standard Specifications. Asphalt concrete over 2 inches thick shall be placed in equal lifts not to exceed 2 inches each.

All street surfaces, walks or driveways within the street trenching areas affected by the trenching shall be feathered and shimmed to an extent that provides a smooth-riding connection and expeditious drainage flow for the newly paved surface. Shimming and feathering as required by the City shall be accomplished by raking out the oversized aggregates from the Class B mix as appropriate.

Surface smoothness shall be per Section 5-04.3(13) of the WSDOT/APWA Standard Specifications. The paving shall be corrected by removal and repaving of the trench only.

- E. All joints shall be sealed using AR4000W.
- F. When trenching within the roadway shoulder(s), the shoulder shall be restored to its original or better condition.
- G. The final patch shall be completed as soon as possible and shall be completed within 30 days after first opening the trench. This time frame may be adjusted if delays are due to inclement paving weather, or other adverse conditions that may exist. However, delaying of final patch of overlay work is allowable only subject to the City's approval. The City may deem it necessary to complete the work within the 30 days' time frame and not allow any time extension. If this occurs, the Contractor shall perform the necessary work as directed by the City.

2.10.150 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

The minimum staking of streets shall be as directed by the City or as follows:

- A. Stake centerline every 50 feet in tangent sections and 25 feet in curved sections plus grade breaks, PVCs, PVTs, high points and low points, with cut and/or fill to subgrade.
- B. Stake top of ballast and top of crushed surfacing at centerline and edge of pavement at the above-described intervals.

- C. Stake top back of curb at the above-described intervals with cut or fill to finished grade.

2.10.160 Testing

Testing shall be required at the developers or contractors expense. The testing shall be ordered by the developer or contractor and chosen testing lab shall be approved by the City. Testing shall be done on all materials and construction as specified in the WSDOT/APWA Standard Specifications.

In addition, the City shall be notified before each phase that street construction commences (i.e. staking, grading, subgrade, ballast, base, top course, and surfacing).

CHAPTER 2.20 SIDEWALKS, CURBS, AND GUTTERS

2.20.010 Sidewalks

Sidewalks shall be constructed of Concrete Class 3000 4 inches thick. Sidewalks along streets with rolled curb and gutter shall be 6 inches thick. When the sidewalk, curb, and gutter are contiguous, the width of the sidewalk shall be measured from back of curb to back of sidewalk.

- A. See "Minimum Street Design Standards Table" Section 2.10.030 YDS for sidewalk requirements.
- B. The design and construction of all sidewalks, curbs, gutters, and walkways shall meet the following minimum standards:

The width of sidewalks shall be as shown in the street design drawings. Those sidewalks designated in the comprehensive bike plan of the City as bike paths shall, in addition, meet the minimum width requirements established for said bike paths. The City shall require that the design of all sidewalks provides for a gradual rather than an abrupt transition between sidewalks of different widths or alignments.

- C. Monolithic pour of curb and sidewalk will not be allowed.
- D. For driveway requirements, see Section 2.10.140 YDS.

2.20.020 Curb; Curb and Gutter; Rolled Concrete Curb and Gutter

Cement concrete curb, cement concrete curb and gutter, or rolled concrete curb and gutter (see standard road sections) shall be used for all street edges unless otherwise approved by the City. All curbs, gutters, and rolled concrete curb and gutter shall be constructed of concrete Class 3000 as shown on drawing number 2-13.

Form and subgrade inspection by the City are required before curb and gutter are poured as part of public roadways.

2.20.030 Curb Ramps

All sidewalks must be constructed to provide for curb ramps in accordance with the standards of state law.

Curb Ramps shall be constructed of concrete Class 3000. Form and subgrade inspection by the City are required before curb ramp is poured.

2.20.040 Staking

All surveying and staking shall be performed by an engineering, or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

The minimum staking of curb, gutter, and sidewalk shall be as follows:

- A. Stake top back of curb every 50 feet in tangent sections and 25 feet in curved sections plus grade breaks, PVCs, PVTs, high point and low points, with cut or fill to finished grade.
- B. The developer shall provide additional staking if necessary in order to construct curb, gutter, sidewalk, or other concrete items to minimum standards.

CHAPTER 2.30 BIKEWAYS

2.30.010 General

Bikeway or Urban Trail construction is required in conjunction with any new development, redevelopment, or land division approval, when the need for such a bikeway is indicated. See drawing numbers 2-14 and 2-15 for bike routes and classifications.

2.30.020 Design Standards.

The design of bicycle paths shall depend upon their type and usage. Bikeway surfacing shall be as outlined in section 2.10.160 YDS.

All minimum design standards as set forth in Section 1.00.010 YDS shall apply.

Normally, bikeways are shared with other transportation modes, although they may be provided exclusively for bicycle use. Bikeways are categorized in the WSDOT Design Manual, Section 1020.02.

Class I, II, III or IV Bikeways, as appropriate, shall be provided:

- A. Wherever called for in the Future Bikeways map (drawing number 2-14) located in the back of this Chapter, or
- B. When traffic analysis or traffic planning indicates substantial bicycle usage which would benefit from a designated bicycle facility as determined by the City except where noted herein.

2.30.030 Staking and Testing

Staking and testing shall be done in accordance with street staking and testing as outlined in sections 2.10.190 and 2.10.200 YDS.

CHAPTER 2.40 ILLUMINATION

2.40.010 Design Standards

A street lighting plan submitted by the applicant and approved by the City shall be required for all street light installations. Type of installation shall be as set forth in WSDOT/APWA/IES Standard Specifications, and as directed by the City except where noted herein.

All public street light designs shall be prepared by an engineering firm capable of performing such work. The engineer shall be licensed by the State of Washington. All developments shall submit the lighting plan. Line loss, spacing, and uniformity ratio calculations shall also be submitted. The calculations shall be performed following the methodology outlined in the latest edition of the WSDOT Traffic Manual. After the system is completed and approved, a set of "as built" Mylar's shall be submitted to the City as a permanent record.

Intersections and cul-de-sacs within new residential developments will be illuminated with one 100-watt high pressure sodium lamp mounted on a 30-foot pole. No other illumination is required. Concrete poles may be used inside subdivisions and shall be set plumb and have a consistent mounting height. Intersections with any street designated other than a local access residential will be illuminated according to the requirement of that higher street classification.

Luminaire pole spacing, uniformity ratio, and line loss calculations will be determined by using the following design criteria:

2.40.020 Design Criteria.

AVERAGE MAINTAINED HORIZONTAL ILLUMINATION (FOOT CANDLES)			
AREA CLASS			
Road Class	Residential	Industrial	Commercial
Local	0.4	0.8	1.0
Collector	0.6	1.0	1.2
Arterial	0.8	1.4	1.6
Boulevard	0.8	1.4	1.6
Uniformity ratio: 6:1 average: minimum for local 4:1 average: minimum for collector 3:1 average: minimum for arterial and boulevard			

Dirt Factor (DF)=0.85, Lamp Lumen Depreciation Factor (LF) = 0.73 Maintenance Factor (MF) = DF x LF = 0.62 Lamp Load Factor (LLF) = 1.2 Minimum Weak Point Light = 0.2fc except residential local street Average illumination at intersections 1.5 times the illumination required on the more highly illuminated street except on local access residential streets. Poles shall be located using a "staggered spacing" pattern across the roadway or the "same side of the roadway spacing" pattern.			
Mounting Height:			
Local	30 feet		
Collector	35 feet		
Arterial	40 feet		
Boulevard	40 feet		
Lumens			
400 Watt initial lamp lumens = 50,000			
200 Watt initial lamp lumens = 22,000			
150 Watt initial lamp lumens = 16,000			
100 Watt initial lamp lumens = 9,500			

Line loss calculations shall show that no more than five percent voltage drop occurs in any circuit. Lamps shall be high pressure sodium. Pole foundations shall be installed per WSDOT Standard Plans J-1b.

The pole mast arm shall be designed to place luminaire over the near edge of traveled way. The luminaire mast arm shall be Type I (See WSDOT Standard Plans J-1a) or City approved equal. Poles shall be manufactured by one of the following companies: General Electric, Lexington, HapCo, or Valmont.

All luminaires will be flat lens, medium cut off, IES Type III distribution, General Electric Power Door, or City approved equal.

All street light electrical installations including wiring conduit, and power connections shall be located underground.

The General Notes on the following page need to be included on any plans dealing with street light design in addition to all applicable requirements as set forth in Section 1.00.010.

GENERAL NOTES (STREET LIGHT CONSTRUCTION)

1. All workmanship, materials, and testing shall be in accordance with the most current Washington State Department of Transportation/American Public Work Association Standard Specifications for Road, Bridge, and Municipal Construction, National Electrical Code, and City of Yelm Engineering Specifications and Standard Details unless otherwise specified below. In cases of conflict the most stringent guideline shall apply. When the most stringent guideline is not clear, the City will make the determination. The Electrical Contractor shall be familiar with all above stated publications and guidelines as they will be strictly enforced by the City.
2. All safety standards and requirements shall be complied with as set forth by the State of Washington, Department of Labor and Industries.
3. The contractor shall be responsible for all traffic control in accordance with the Manual on Uniform Traffic Control Devices. Prior to disruption of any traffic, traffic control plans shall be prepared and submitted to the City for approval. No work shall commence until all approved traffic control is in place.
4. A pre-construction meeting shall be held with the City and Electrical Inspectors prior to the start of construction.
5. All approvals and permits required by the City shall be obtained by the contractor prior to the start of construction.
6. It shall be the responsibility of the contractor to have a copy of an approved set of plans on the construction site at all times.
7. All surveying and staking shall be done by a surveying or engineering firm licensed in the State of Washington.
8. Temporary erosion control/water pollution measures shall be required in accordance with section 1-07.15 of the WSDOT/APWA Standard Specifications and the Drainage Design and Erosion Control Manual for Thurston Region Washington. At no time will silts and debris be allowed to drain into an existing or newly installed facility.
9. If construction is to take place in the County Right-of-Way, the contractor shall notify the County and obtain all the required approvals and permits.
10. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility

locations prior to construction by calling the Underground Locate Line at 1-800-424-5555 a minimum of 48 hours prior to any excavation. The contractor will also be responsible for maintaining all locate marks once the utilities have been located.

11. Electrical permits and inspections are required for all street lighting installations within the City. The Contractor is responsible for obtaining said permits prior to any type of actual construction. These permits are available through Washington State Labor and Industries.

12. Prior to installation of any materials the Electrical Contractor shall submit for approval by the City two copies of material catalog cuts, specifications, shop drawings and/or wiring diagrams. Any materials purchased or labor performed prior to such approval shall be at the Contractor's risk. Mounting heights, arm length, power source, luminaire type and bolt patterns shall follow Section 2.40.020 YDS. Modifications of any portion of the lighting system will not be allowed without prior approval by the City.

13. A rated Service Disconnect shall be provided for every branch circuit. Light branch circuit breakers shall be 40-amp minimum. The location and installation of the disconnect shall conform to the National Electric Code (NEC) and City of Yelm Standards. The Service Disconnect shall be of a type equal to a "MYERS" MEUGL-M100C-UM or a "UNICORN" CPIIIB-0111A Service, 120/240 VAC, CALTRANS TYPE 3B or City approved equal, with two lighting relays, one three position test switch (Auto/Off/Manual) and one photocell. The photocell shall face north unless otherwise directed by the City.

14. Service Entrance Conductors shall be a minimum size of #6 copper. All lighting wire shall be stranded copper with a minimum size of #8 with insulation suitable for wet locations. Phasing Tape will not be allowed. All wire shall be installed in schedule 40 PVC conduit with a minimum diameter of 1-1/4 inches. All conduit shall be installed in the "Utility Ditch" or as otherwise directed by the City. A bushing or bell end shall be used at the end of every conduit. All splices shall be in the nearest junction box. Wire nuts will not be allowed. All splices will be made with Type C copper fittings, centered and encased in a 3-M Scotchcast epoxy kit, rated at 600 Volts, type 82-A1, 82-B1 or City approved equal. If more than one circuit passes through a Junction Box each is to have a PCV sleeve clearly identifying the circuit. (WSDOT Standard Specification 8-20.3). A 500-volt megger test will be performed by the City on each circuit between conductor and ground prior to acceptance of the lighting system. The insulation resistance shall not be less than 6 megaohms to ground 2,500 feet and over nor less than 8 megaohms under 2,500 feet. A functional test will be performed

by the City, in which it is demonstrated that each and every part of the system functions as specified or intended herein. (WSDOT Standard Specifications 8-20.3(11)).

15. Each luminaire pole shall have an in-line, fused, water tight electrical disconnect located at the base of the pole. Access to these fused disconnects shall be through the hand-hole on the pole. The hand-hole shall be facing away from on-coming traffic. Load side of in-line fuse to luminaire head shall be cable and pole bracket wire, 2 conductor, 19 strand copper #10 and shall be supported at the end of the luminaire arm by an approved means. Fuse size, disconnect installation and grounding in pole shall conform to WSDOT Standards.

16. City approved pull boxes or junction boxes shall be installed per WSDOT Standard Plan J-11a in all street lighting installations. Junction Boxes shall be incorporated into the back edge of sidewalk or as directed by City. A Junction Box shall be located within 10 feet of each luminaire pole and at every road crossing. No conduit shall be installed in the roadway except at designated road crossings. Conduit entering the Junction Box shall be perpendicular to the sides of the box and a minimum of 6 but no more than 8 inches below the lid. Boxes shall be clearly and indelibly marked as Lighting Boxes by the legend "L.T." or "LIGHTING". All J-Boxes shall be supported by a minimum 6-inch crushed gravel pad. A 3/8 inch expansion joint shall be installed between concrete sidewalk and Junction Box.

17. All lighting poles shall be as specified in section 2.40.020 YDS. In existing developed areas, the City may require the use of other poles to establish uniformity within the developed area. After installation and before acceptance by the City all poles shall be free of dents and marks. Sonotube shall be removed to below ground level. Pole bases shall be grouted and all luminaire heads shall be plumb and level.

18. Cement concrete bases shall follow WSDOT Standard Plan J-1b. Conduit shall extend between 3 and 6 inches above the concrete base.

19. Any modification to approved lighting plans shall be reviewed and approved by the City prior to installation. Any approved modifications shall be shown on a Mylar asbuilt supplied to the City after the lighting installation is completed and before final acceptance. It shall be the responsibility of the Electrical Contractor to ensure these as-builts are provided to the City.

2.40.030 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or

surveyor directing such work shall be licensed by the State of Washington.

The minimum staking of luminaires shall be as follows:

- A. Location and elevation to the center of every pole base.
- B. Location and elevation of each service disconnect.

2.40.040 Testing

All illumination systems shall be subject to an electrical inspection which shall include megger testing and functional test. Lamp, photocell and fixture shall be under warranty for a period of one year.

CHAPTER 2.50 SIGNALS

2.50.010 General

Signals shall be installed per the requirements set forth herein. This work shall consist of furnishing and installing a complete and functional traffic control system of controllers, signals and appurtenances as required by the City.

2.50.020 Design Standards.

Signal systems shall be designed in accordance with the specifications as set forth in the WSDOT Design Manual and the WSDOT/APWA Standard Specifications unless otherwise authorized by the City.

All public signal designs shall be prepared by an engineering firm capable of performing such work. The engineer shall be licensed by the State of Washington. All applicable requirements set forth in Section 1.00.010 shall be included.

2.50.030 Induction Loops.

Induction loops shall be constructed per WSDOT/APWA Standard Specification 8-20.3(14)C and Standard Plan J-8a.

2.50.040 Staking.

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed by the State of Washington.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of signals shall be as follows:

- A. Location, with cut or fill to center of all pole bases.
- B. Location of junction box.
- C. Location of all corners of controller base.
- D. Location of service disconnect.

2.50.050 Testing.

All signals shall be subject to any necessary electrical inspections as well as requirements as set forth in the WSDOT Design manual and the WSDOT/APWA Standard Specifications.

A signal system shall not be approved or accepted by the City until the signal has performed correctly to the City's satisfaction for a 30 day "check-out" period as outlined below.

Controller and cabinet shall be tested by WSDOT's Laboratory in Tumwater and/or the City. All specifications and material samples shall be submitted to the City for review and approval prior to installation.

2.50.060 Check-out Procedure

The contractor shall call for an intersection check-out after completing the controller cabinet installation along with all other signal equipment complete with wiring connections. All parts and workmanship shall be warranted for one year from date of acceptance.

New signals shall operate without any type of failure for a period of 30 days. The contractor shall have a person available to respond to system failure within 24 hours during the 30-day "check-out" period.

Failure of any control equipment or hardware within the "check-out" period shall restart the 30-day "check-out" period.

CHAPTER 2.60 ROADSIDE FEATURES

2.60.010 General

Miscellaneous features included herein shall be developed and constructed to encourage the uniform development and use of roadside features wherever possible.

2.60.020 Design Standards.

The design and placement of roadside features included herein shall adhere to the specific requirements as listed for each feature, and, when applicable, to the appropriate standards as set forth in section 1.00.010.

2.60.030 Staking.

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

2.60.040 Testing.

Testing shall be required at the developer's or contractor's expense on all materials and construction as specified in the WSDOT/APWA Standard Specifications and with a frequency as specified in the WSDOT Construction Manual.

2.60.050 Survey Monuments.

- A. All existing survey control monuments which will be disturbed, covered or destroyed during construction shall be referenced prior to construction and replaced or raised after construction by a Professional Land Surveyor licensed by the State of Washington. All applicable RCWs and WACs will be complied with, including but not limited to, WAC 332-120, WAC 332-130, and RCW 58.09. The monuments shall be replaced with a cast in place monument (drawing number 2-16) at the expense of the responsible builder or developer.
- B. Major Arterial, Minor Arterial, Bus Routes, and Truck Routes require a pre-cast concrete monument (Standard Plan H-7a) with cast iron monument case and cover (Standard Plan H-7) installed per WSDOT standards is required.
- C. Commercial Collector, Neighborhood Collector, and Local streets require a poured-in-place concrete surface monument (see drawing number 2-16) per City standards is required.
- D. Monument Locations. Appropriate monuments as outlined in B or C above shall be:

1. At all street intersections;
 2. At the PC and PTs of all horizontal curves or at the PI if it lies in the traveled roadway;
- E. The monument case shall be installed after the final course of surfacing has been placed.

2.60.060 Guard Rails

For purposes of design and location, all guardrails along roadways shall conform to the criteria of the WSDOT Design Manual as may be amended or revised.

2.60.070 Retaining Walls

- A. Rock walls may be used for erosion protection of cut or fill embankments up to a maximum height of 8 feet in stable soil conditions which will result in no significant foundation settlement or outward thrust upon the walls. For heights over 6 feet or when soil is unstable, structural wall of acceptable design stamped by a licensed structural engineer shall be used. Rock walls over 6 feet high shall be subject to inspection by a geotechnical engineer as outlined in the following paragraph.

Any rock wall over 30 inches high in a fill section shall require an engineered design by a geotechnical engineer. The geotechnical engineer shall continuously inspect the installation of the wall as it progresses and shall submit inspection reports, including compaction test results and photographs taken during the construction, documenting the techniques used and the degree of conformance to the geotechnical engineer's design.

In the absence of such a rock wall design, walls having heights over 6 feet or walls to be constructed in conditions when soil is unstable require a structural wall having a design approved by the City if outside the Right-of-Way. The design of structural walls shall be by a professional engineer qualified in retaining wall design. Structural walls require issuance of a Building Permit prior to construction.

- B. The rock material shall be as nearly rectangular as possible. No stone shall be used which does not extend through the wall. The rock material shall be hard, sound, durable and free from weathered portions, seams, cracks and other defects. The rock density shall be a minimum of 160 pounds per cubic foot.
- C. The rock wall shall be started by excavating a trench having a depth below subgrade of one half the base course or one foot (whichever is greater).

- D. Rock selection and placement shall be such that there will be minimum voids and, in the exposed face, no open voids over 6 inches across in any direction. The final course shall have a continuous appearance and shall be placed to minimize erosion of the backfill material. The larger rocks shall be placed at the base of the rockery so that the wall will be stable and have a stable appearance. The rocks shall be placed in a manner such that the longitudinal axis of the rock shall be at right angles or perpendicular to the rockery face. The rocks shall have all inclining faces sloping to the back of the rockery. Each course of rocks shall be seated as tightly and evenly as possible on the course beneath. After setting each course of rock, all voids between the rocks shall be chinked on the back with quarry rock to eliminate any void sufficient to pass a 2-inch square probe.
- E. The wall backfill shall consist of quarry spalls with a maximum size of 6 inches and a minimum size of 4 inches or as specified by a licensed engineer. This material shall be placed to a 12 inch minimum thickness between the entire wall and the cut or fill material. The backfill material shall be placed in lifts to an elevation approximately 6 inches below the top of each course of rocks as they are placed, until the uppermost course is placed. Any backfill material on the bearing surface of one rock course shall be removed before setting the next course.
- F. Perforated drainage pipe and filter fabric shall be installed as per drawing number 2-18. This pipe requirement may be waived by the Engineer upon a showing by the developer that no subsurface water problem exists.

2.60.080 Parking Lots

Standards for parking lot construction.

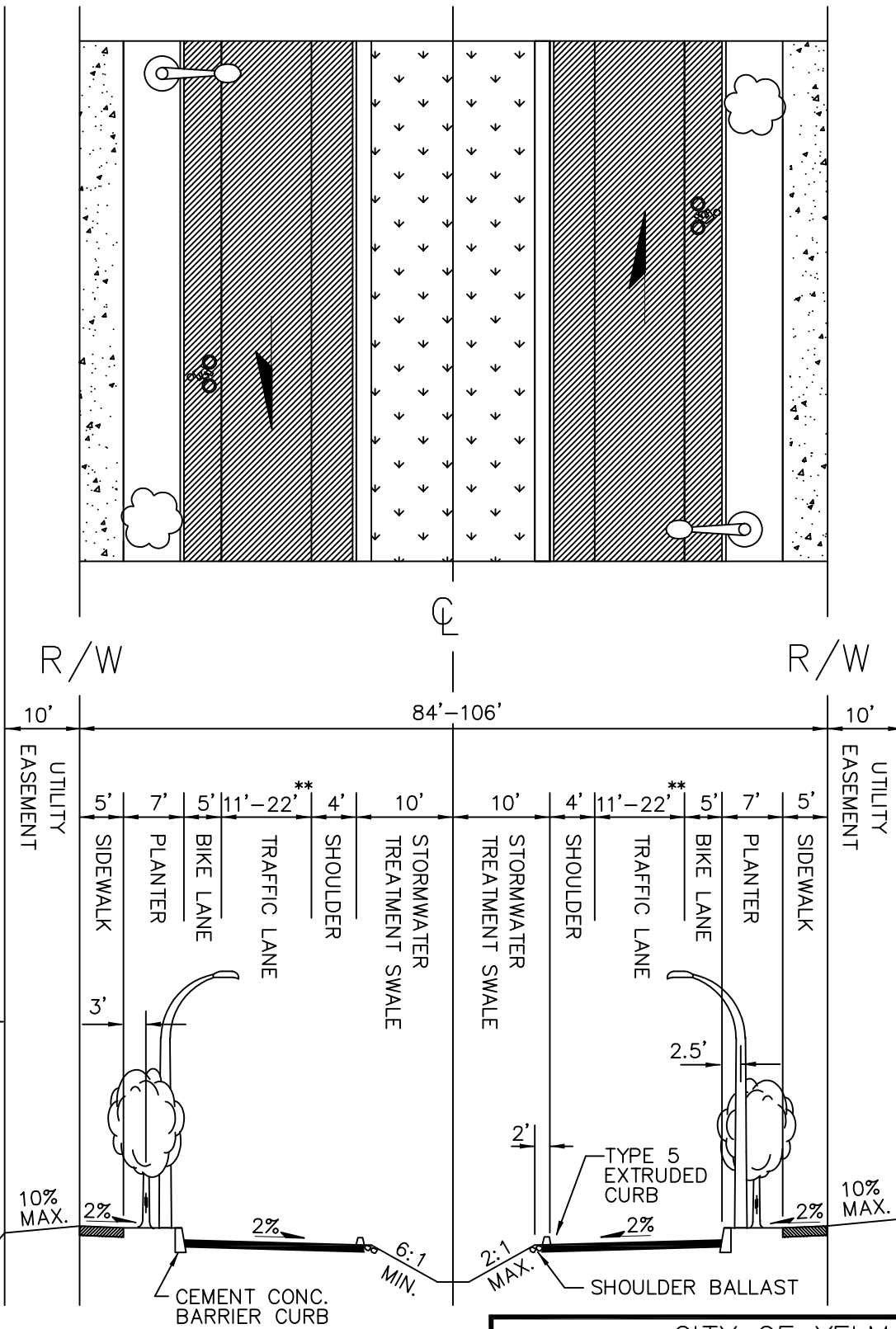
- A. Materials and Workmanship. Materials and workmanship for all parking lot construction regardless if a parking lot construction permit is required, must comply with City adopted standards and specifications. Parking lot surfacing materials shall satisfy the requirement for a permanent all weather surface. Asphalt concrete pavement and cement concrete pavement satisfy this requirement and are approved materials. Gravel surfaces are not acceptable or approved surface material types. Combination grass/paving systems are approved materials types, however, their use requires submittal of an overall parking lot paving plan showing the limits of the grass/paving system sand a description of how the systems will be irrigated and maintained. If the Public Works Director determines the grass/paving system is not appropriate for the

specific application, alternate approved surfacing materials shall be utilized.

- B. Other types of surfacing materials will be considered subject to the approval of the Public Works Director prior to construction.
- C. Non-Compliance--Removal--Lien. In the event that the construction covered under this section is not performed in accordance with the established specifications and the construction is not corrected as directed by the City Engineer, such construction may be removed and/or corrected by the City. Upon the failure of the owner to take such corrective steps as outlined within thirty days if notice in writing by the City Engineer, costs of such removal and/or correction or reconstruction as performed by the City shall be charged to the owner of the real property involved and shall become a lien against the premises until paid.
- D. Parking area construction shall include:
 - 1. Surfacing. All parking areas shall be surfaced with asphalt, concrete or similar pavement so as to provide a permanent all-weather surface that is durable and dust-free and shall be so graded and drained as to properly dispose of all surface water. Gravel surfaces are not acceptable or approved surface material.
 - 2. Subgrade Preparation. The subgrade shall be prepared for surfacing following the requirements outlined in Section 2-06 of the WSDOT Standard Specifications. Erosion/sedimentation control facilities shall be provided.
 - 3. Stormwater Runoff. All stormwater runoff shall be retained and disposed of on site or disposed of in a system designed for such runoff and which does not flood or damage adjacent properties. Stall Markings. Asphalt or concrete surfaced parking areas shall have parking stalls marked by surface paint lines or suitable substitute traffic marking material. Painted stall markings need not extend the full depth of the stall. If less than the full depth of the stall is painted, the combined stall depths and aisle width shall not be less than the appropriate unit parking depth. Wheel stops are required where a situation exists whereby a parked vehicle would encroach on an adjacent property or Right-of-Way or to protect landscaping. See drawing number 2-24 for approved stall markings and wheel stop locations.
- E. No certificate of occupancy shall be issued until all parking facilities are completed and approved unless otherwise allowed by the Director of Public Works.

TRANSPORTATION LIST OF DRAWINGS

Title	Drawing
Roadway Section	
Boulevard with swale	2-1A
Boulevard, with central island.....	2-1B
Major Arterial.....	2-2
Urban Arterial.....	2-3
Commercial Collector.....	2-4
Neighborhood Collector.....	2-5
Local Access Commercial.....	2-6
Local Access Residential.....	2-7
Pedestrian Oriented Street Section.....	2-8A
On-Street Parking Detail.....	2-8B
Cement Concrete Approach.....	2-9
Trench-Pavement Restoration Detail	2-10
Cement Concrete Sidewalk	2-11
Typical Curb Ramps	2-12
Cement Concrete Curbs.....	2-13
Future Bikeways Map	2-14
Bikeway Classes	2-15
Cast in Place Monument	2-16
Bus Pullout	2-17
Rock Wall	2-18
Street Tree	2-19
Street Design - Central Business District	2-20
Nomenclature of Off-Street Parking Area	2-21
Most Common Minimum Parking Area Dimensions	2-22
Examples of Off-Street Parking	2-23
Stall Markings and Wheel Stop Locations	2-24
Driveway Dimensions Measurements	2-25
Mailbox Cluster Detail	2-26



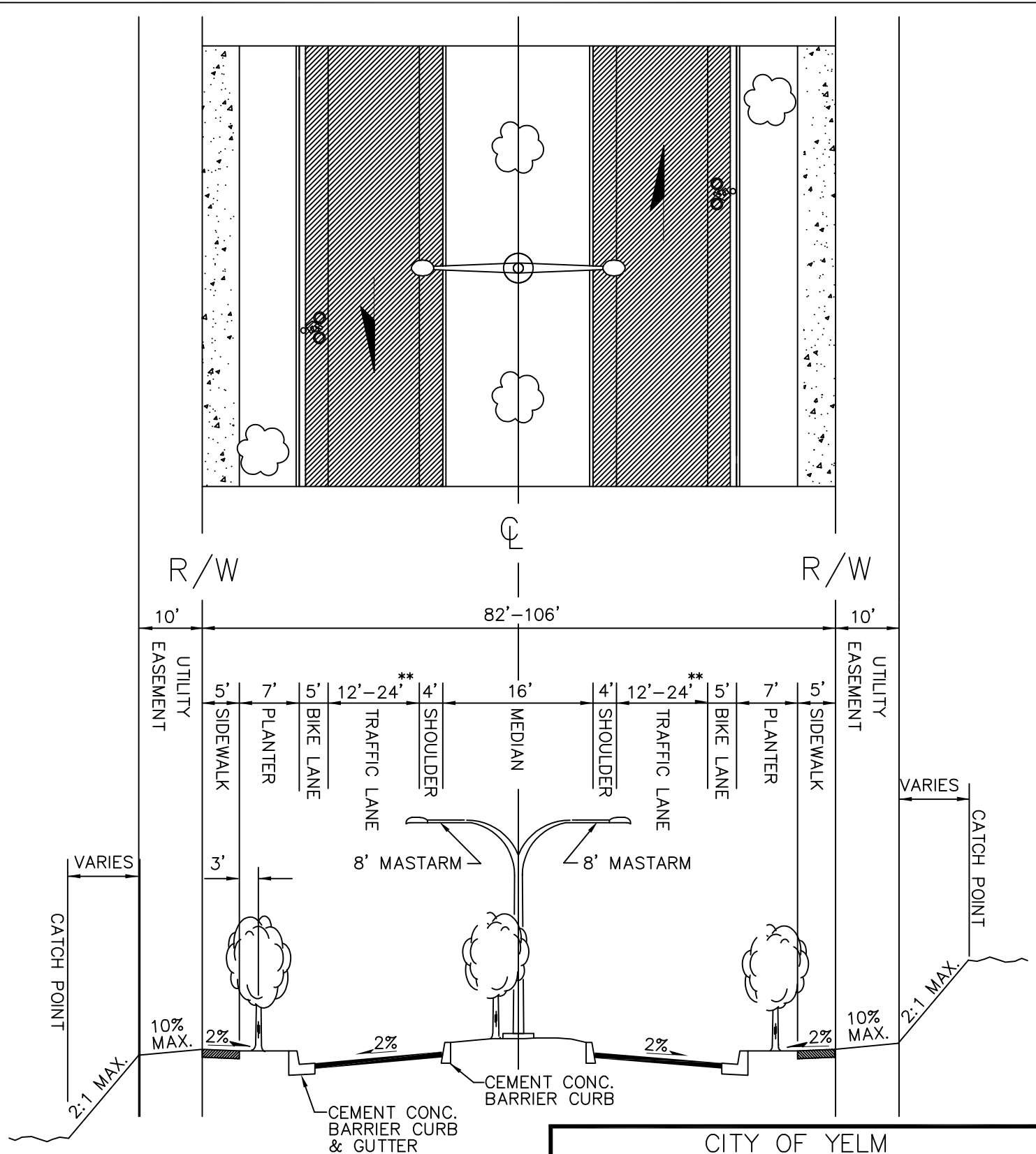
** 11' WITH 1 LANE
22' WITH 2 LANES

GENERAL NOTES:

1. NO "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ECT.

JEG

CITY OF YELM DEPT. OF PUBLIC WORKS			
BOULEVARD WITH SWALE			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			2-1A
DES.	DWN.	CKD.	DATE
			9/21/2000



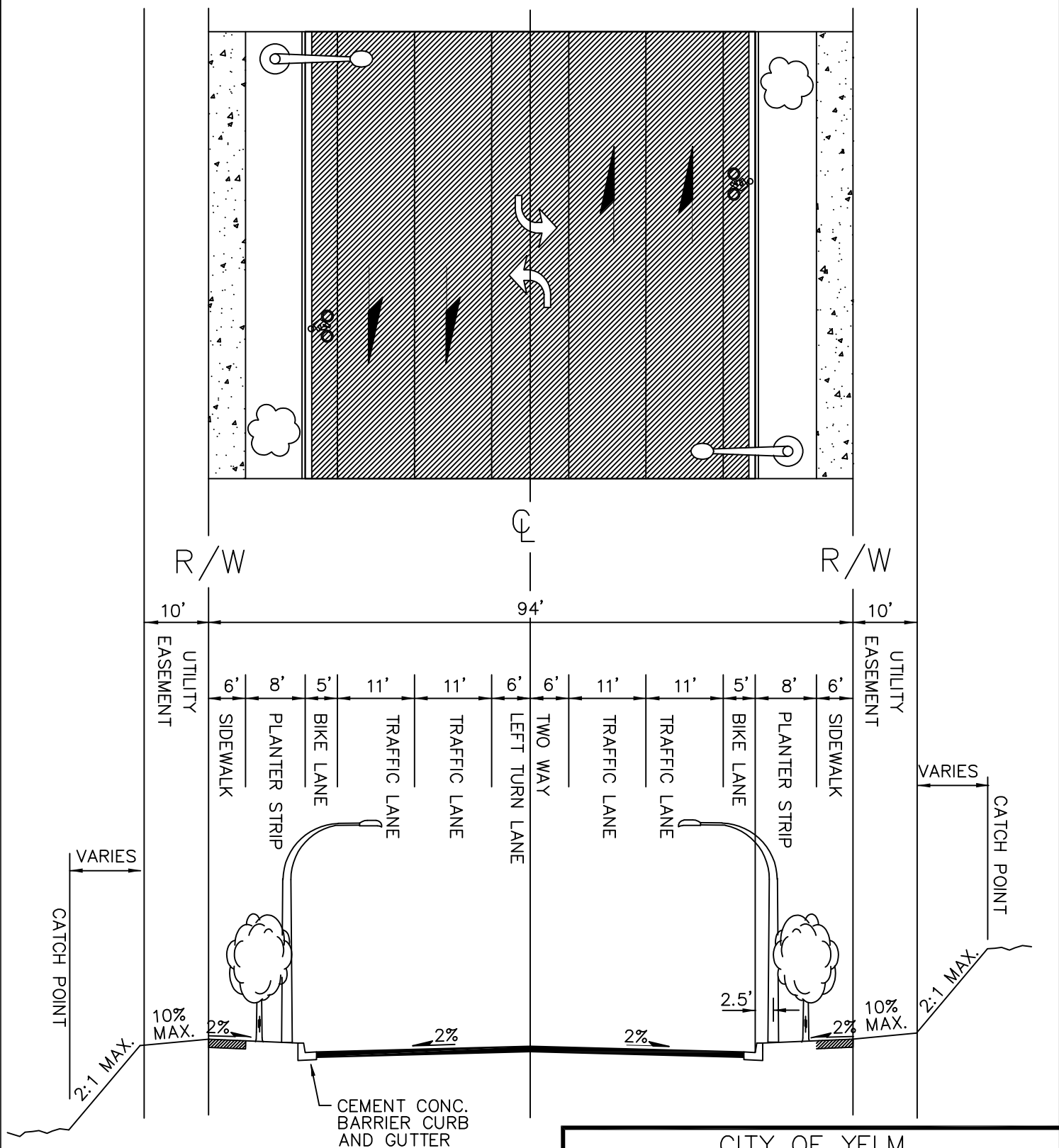
** 12' WITH 1 LANE
24' WITH 2 LANES

GENERAL NOTES:

1. NO "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ECT.

JEG

CITY OF YELM DEPT. OF PUBLIC WORKS			
BOULEVARD W/ CENTRAL ISLAND			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			2-1B
DES.	DWN.	CKD.	DATE
			9/21/2000

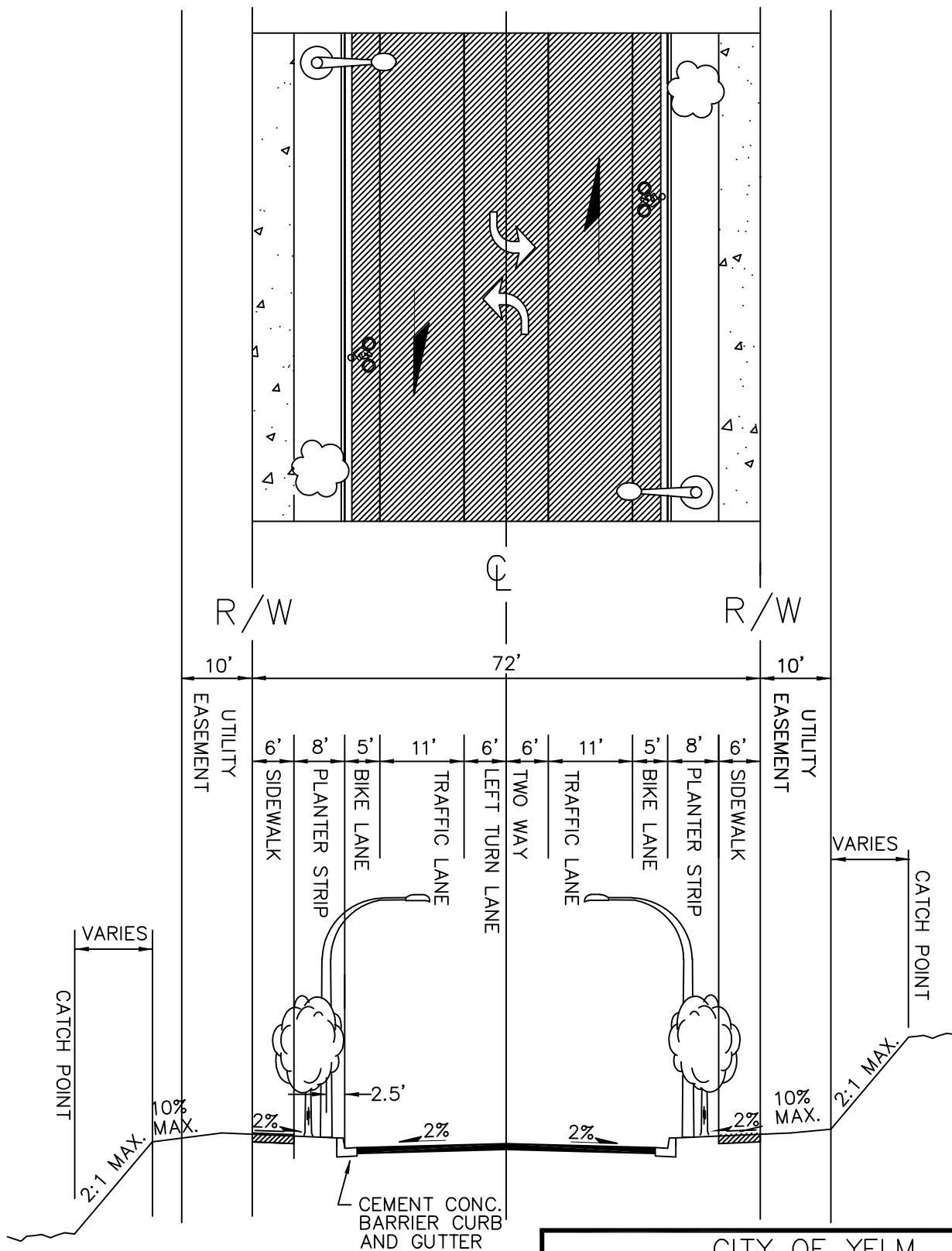


GENERAL NOTES:

1. NO "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ECT.

JEG

CITY OF YELM DEPT. OF PUBLIC WORKS			
MAJOR ARTERIAL			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			2-2
DES.	DWN.	CKD.	DATE
			9/21/2000

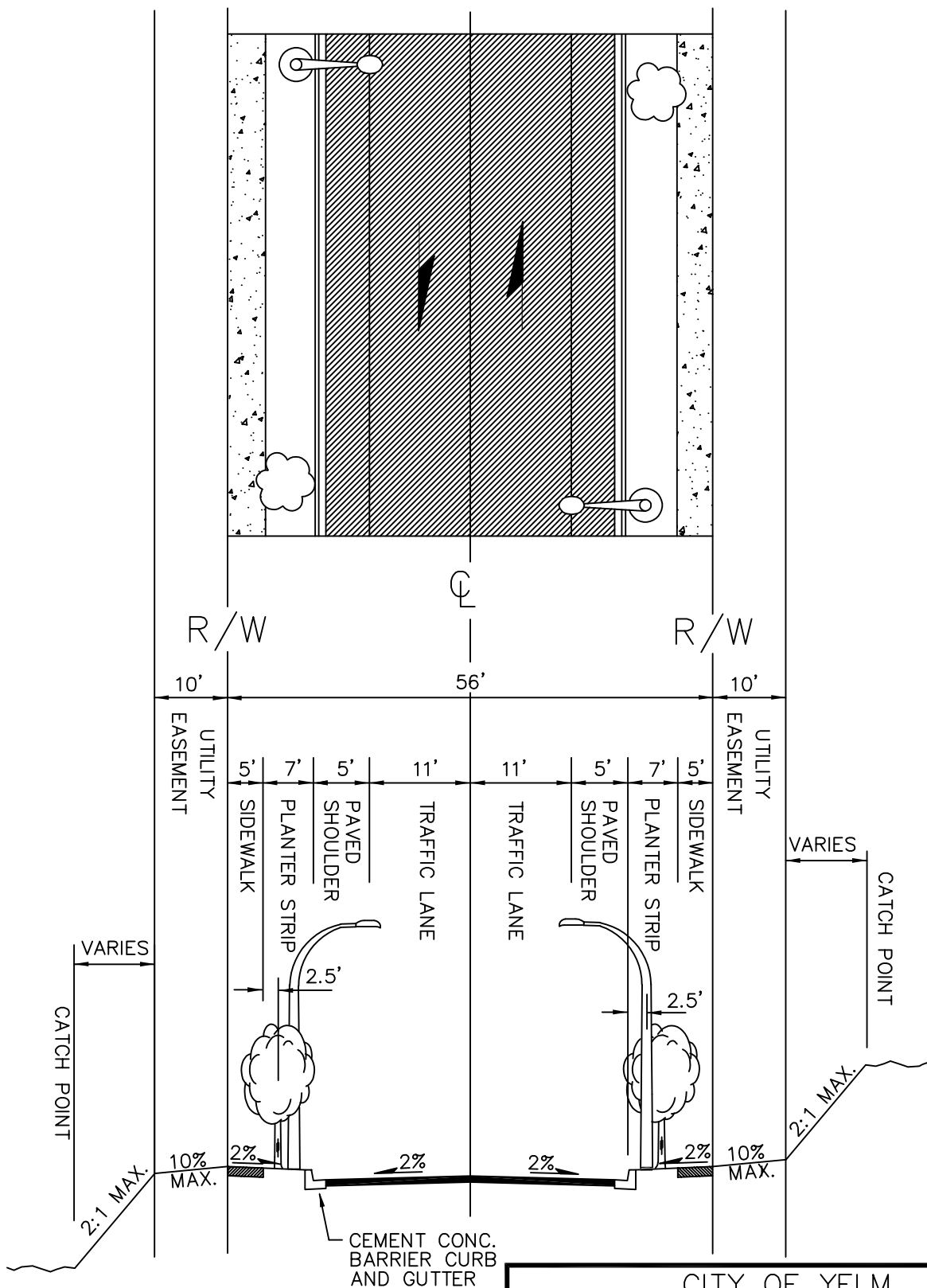


GENERAL NOTES:

1. NO "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ECT.

JEG

CITY OF YELM DEPT. OF PUBLIC WORKS			
URBAN ARTERIAL			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			2-3
DES.	DWN.	CKD.	DATE
			9/21/2000



GENERAL NOTES:

1. NO "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ECT.

CITY OF YELM
DEPT. OF PUBLIC WORKS

COMMERCIAL COLLECTOR

APPROVED

DWG. NO.

2-4

DES.

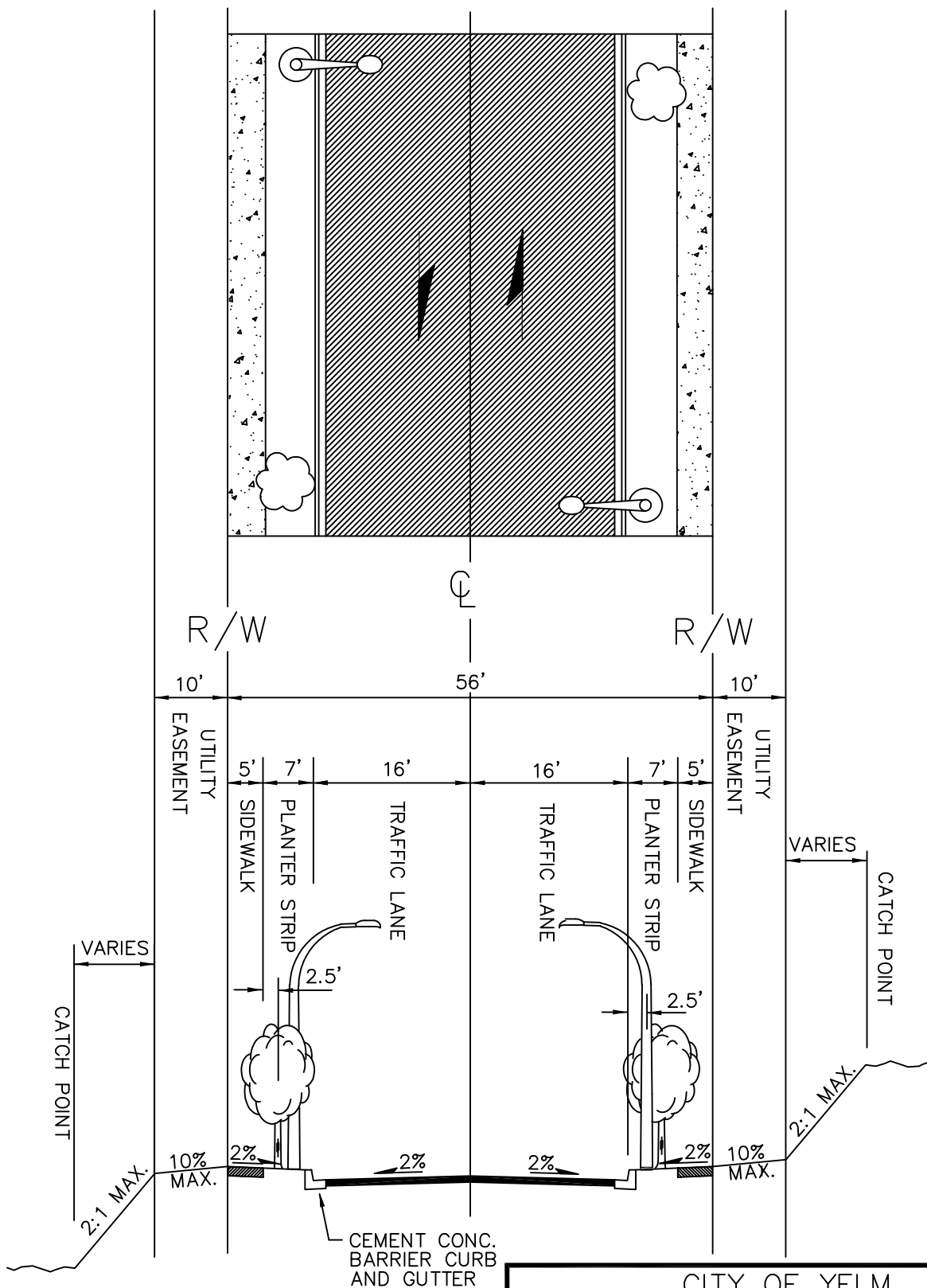
DWN.

CKD.

DATE

9/21/2000

JEG

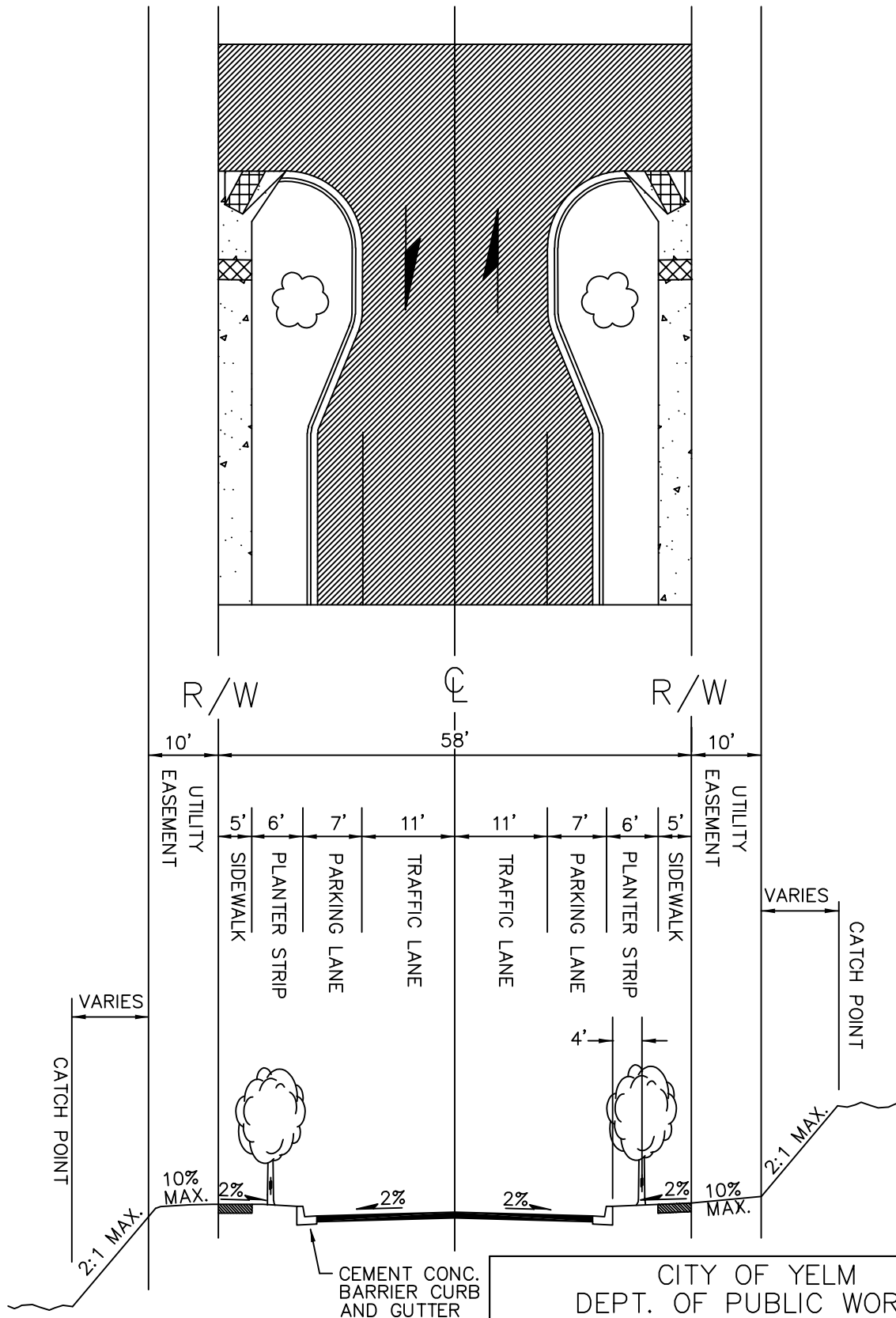


GENERAL NOTES:

1. NO "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ECT.

JEG

CITY OF YELM DEPT. OF PUBLIC WORKS			
NEIGHBORHOOD COLLECTOR			
APPROVED			DWG. NO. 2-5
DES.	DWN.	CKD.	DATE 9/21/2000



GENERAL NOTES:

1. "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ECT.

CITY OF YELM
DEPT. OF PUBLIC WORKS

LOCAL ACCESS COMMERCIAL

APPROVED

DWG. NO.

2-6

DES.

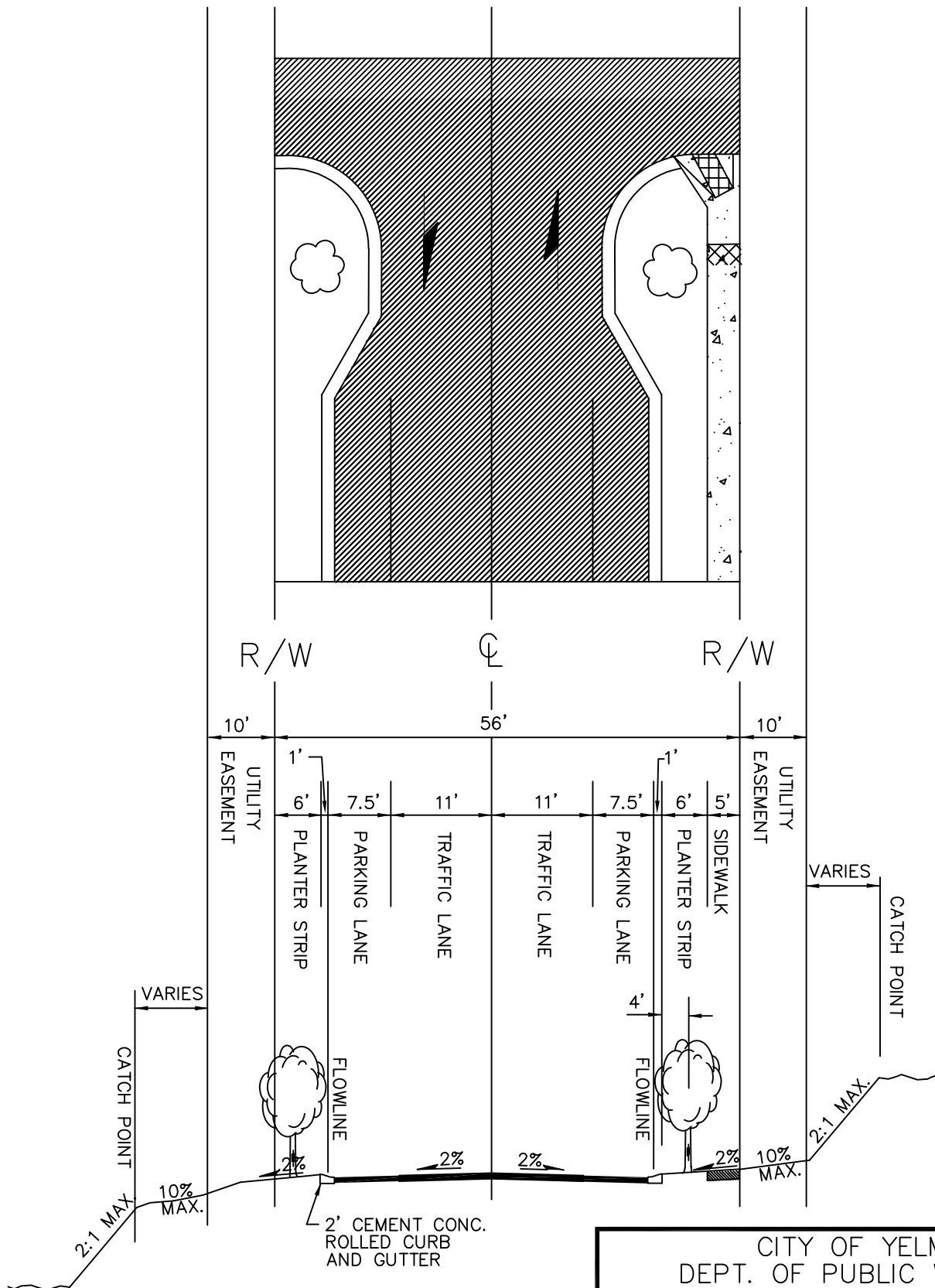
DWN.

CKD.

DATE

9/21/2000

JEG



GENERAL NOTES:

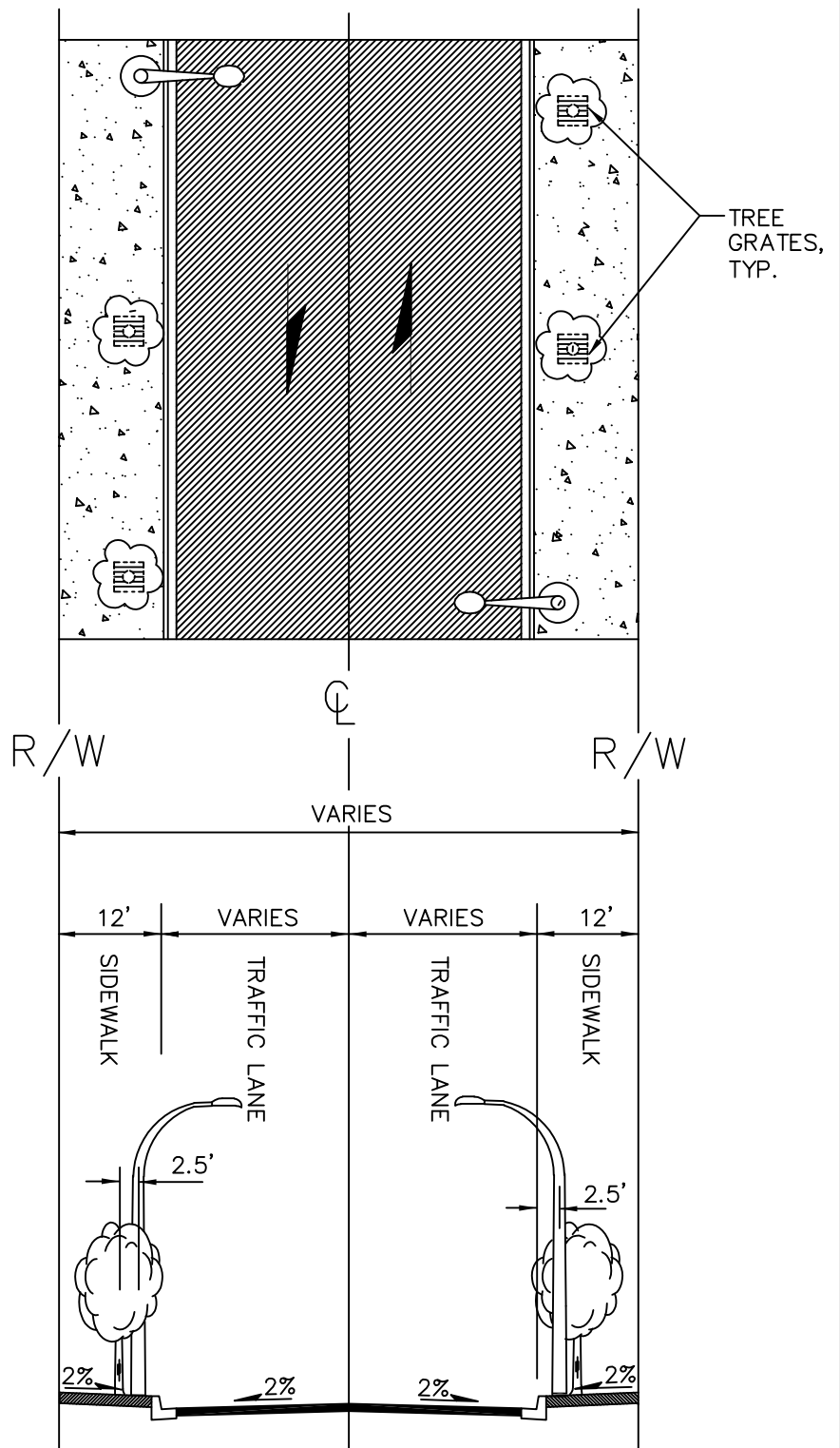
1. "ON STREET" PARKING PERMITTED.
2. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ETC.

JEG

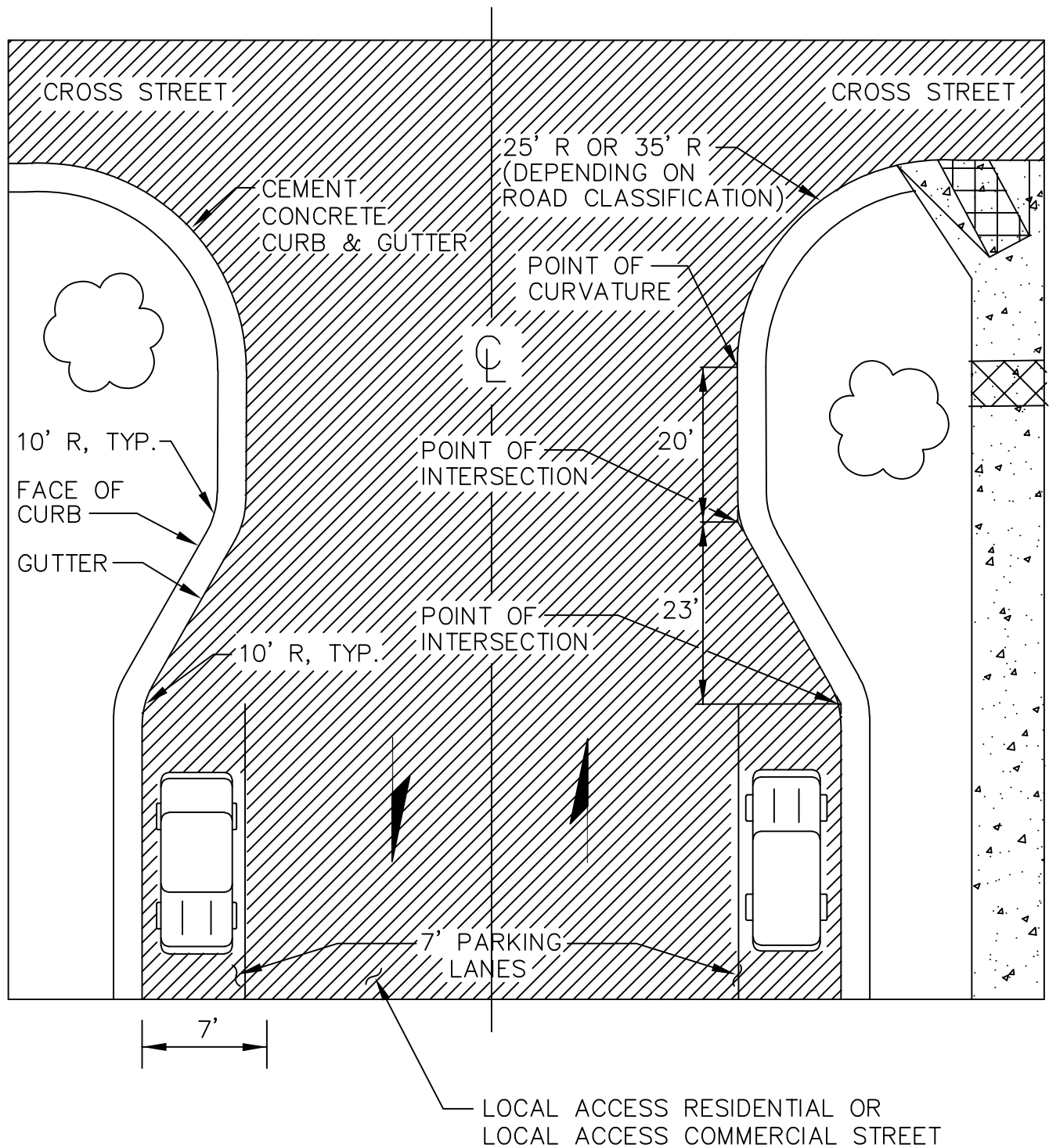
CITY OF YELM DEPT. OF PUBLIC WORKS			
LOCAL ACCESS RESIDENTIAL			
APPROVED _____			DWG. NO. 2-7
DES.	DWN.	CKD.	DATE

PEDESTRIAN- ORIENTED STREETS:

- **YELM AVENUE**
Between Solberg W. and 4th Street E.
- **FIRST STREET**
Between Mosman Avenue SE and Jefferson Avenue NE
- **SECOND STREET SE**
Between Washington Avenue SE and Yelm Avenue E
- **THIRD STREET SE**
Between Washington Avenue SE and Yelm Avenue E
- **ALL PUBLIC STREETS**
Within 1000 feet of the intersection of Yelm Avenue W. and Killion Road NW



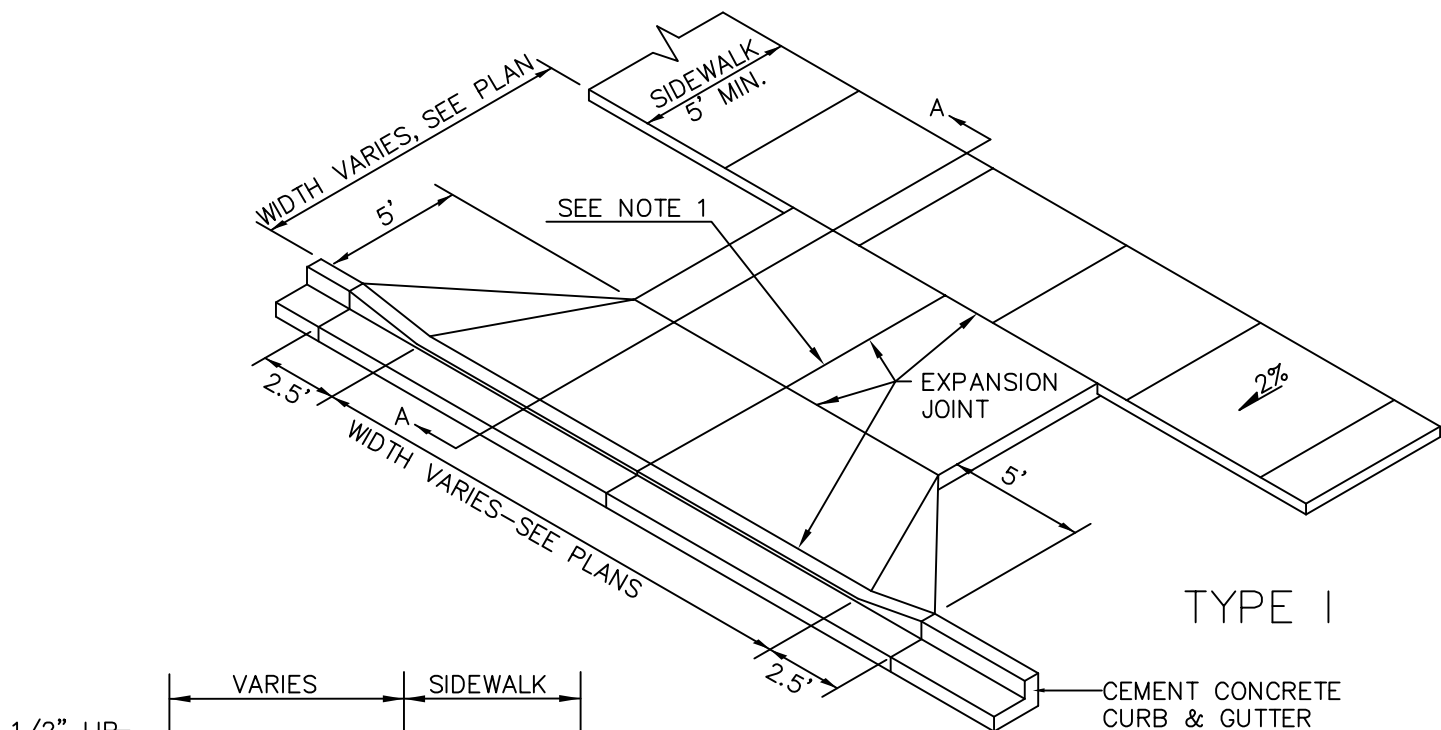
CITY OF YELM DEPT. OF PUBLIC WORKS			
TYPICAL PEDESTRIAN- ORIENTED STREET SECTION			
APPROVED			DWG. NO. 2-8A
DES.	DWN.	CKD.	DATE 9/21/2000



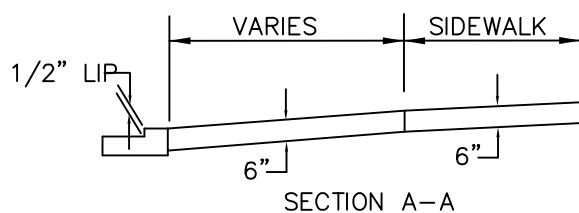
GENERAL NOTE:

1. REFER TO RELEVANT SECTIONS OF THE DEVELOPMENT GUIDELINES FOR ADDITIONAL INFORMATION ON STORM DRAINAGE, STREET LIGHTING, PAVEMENT STRUCTURE, ETC.

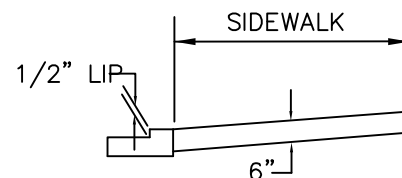
CITY OF YELM DEPT. OF PUBLIC WORKS			
ON-STREET PARKING DETAIL			
APPROVED _____			DWG. NO. 2-8B
DES. _____	DWN. _____	CKD. _____	DATE 9/21/2000



TYPE I

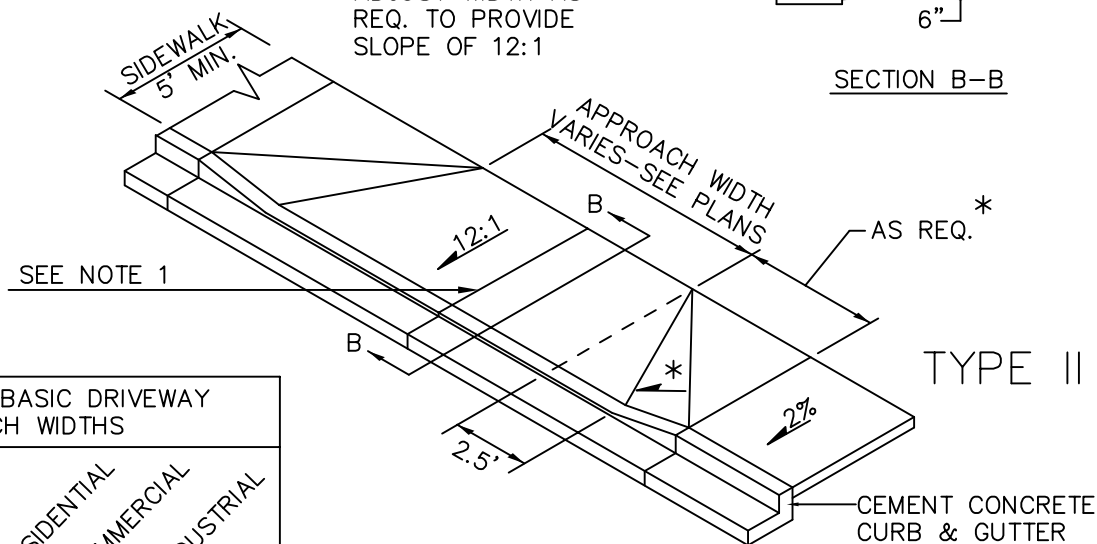


SECTION A-A



SECTION B-B

* ADJUST WIDTH AS REQ. TO PROVIDE SLOPE OF 12:1



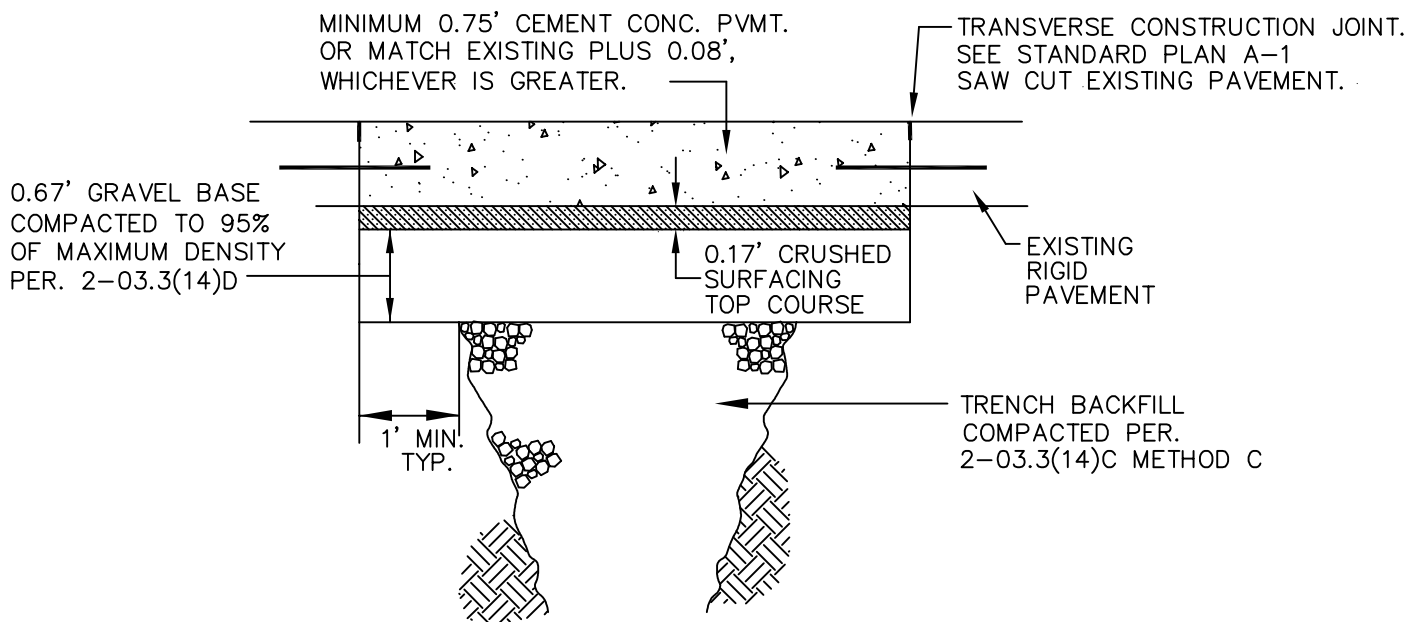
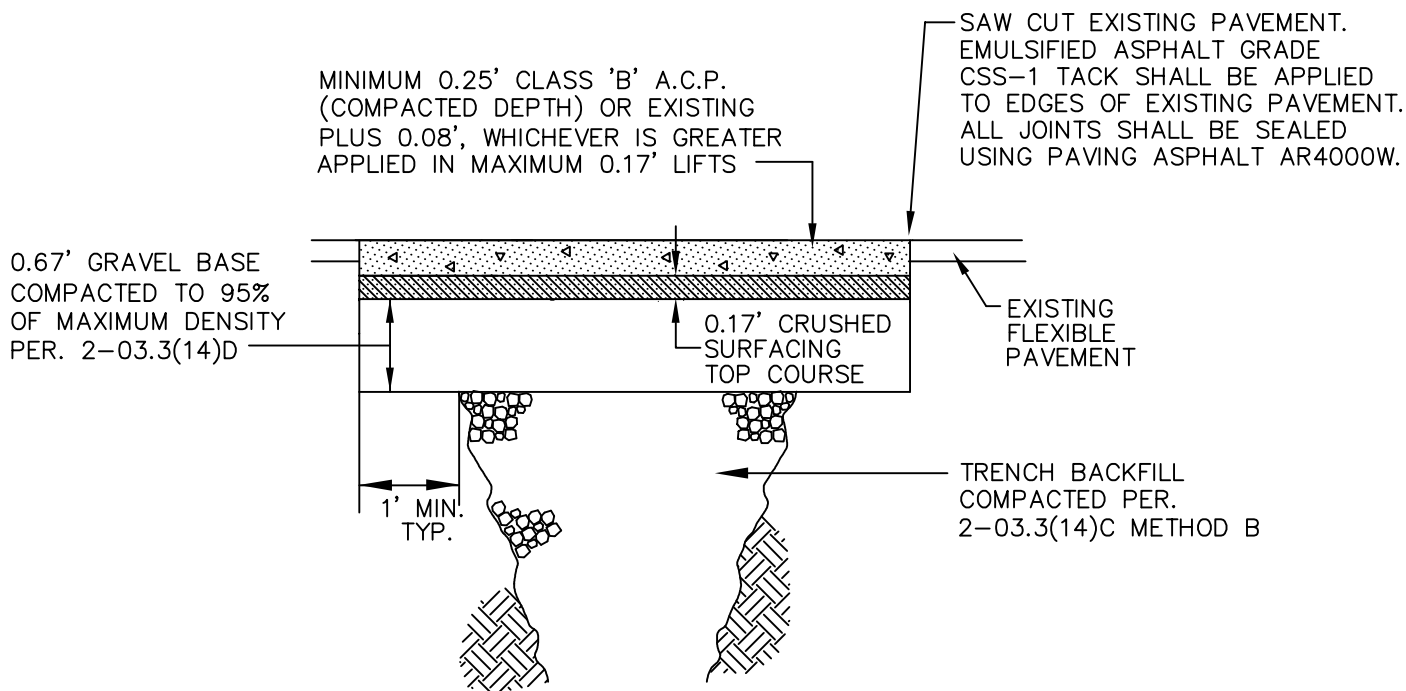
TYPE II

RECOMMENDED BASIC DRIVEWAY APPROACH WIDTHS			
NOMINAL WIDTH	RESIDENTIAL	COMMERCIAL	INDUSTRIAL
ONE-WAY	10'	15'	20'
TWO-WAY	10'	30'	40'

NOTES:

1. WHERE APPROACH EXCEEDS 16' WIDTH A FULL DEPTH EXPANSION JOINT SHALL BE PLACED LONGITUDINALLY, CENTERED IN THE APPROACH.
2. FORM AND SUBGRADE INSPECTION ARE REQUIRED BEFORE POURING CONCRETE.
3. REFER TO SECTION 4B.140, YELM DEVELOPMENT GUIDELINES.

CITY OF YELM DEPT. OF PUBLIC WORKS			
CEMENT CONCRETE APPROACH			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			2-9
DES.	DWN.	CKD.	DATE
S-C	S-C	S-C	2/2/95



NOTES:

1. ALL MATERIALS, WORKMANSHIP, AND INSTALLATION SHALL BE IN CONFORMANCE WITH THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AS AMENDED BY CITY OF YELM STANDARDS.

CITY OF YELM
DEPT. OF PUBLIC WORKS

TRENCH-PAVEMENT RESTORATION DETAIL

APPROVED

DWG. NO.

PUBLIC WORKS DIRECTOR

DATE

2-10

DES.

DWN.

CKD.

DATE

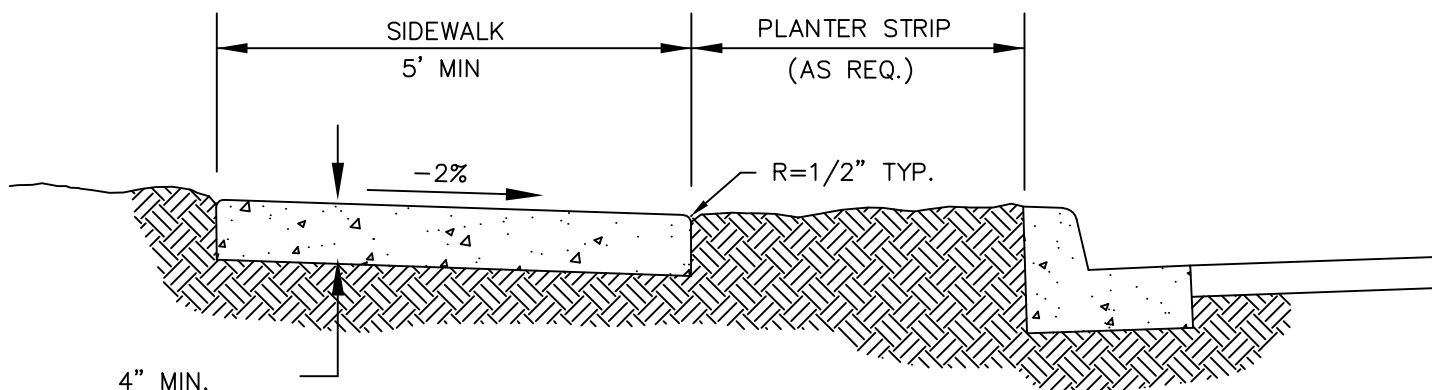
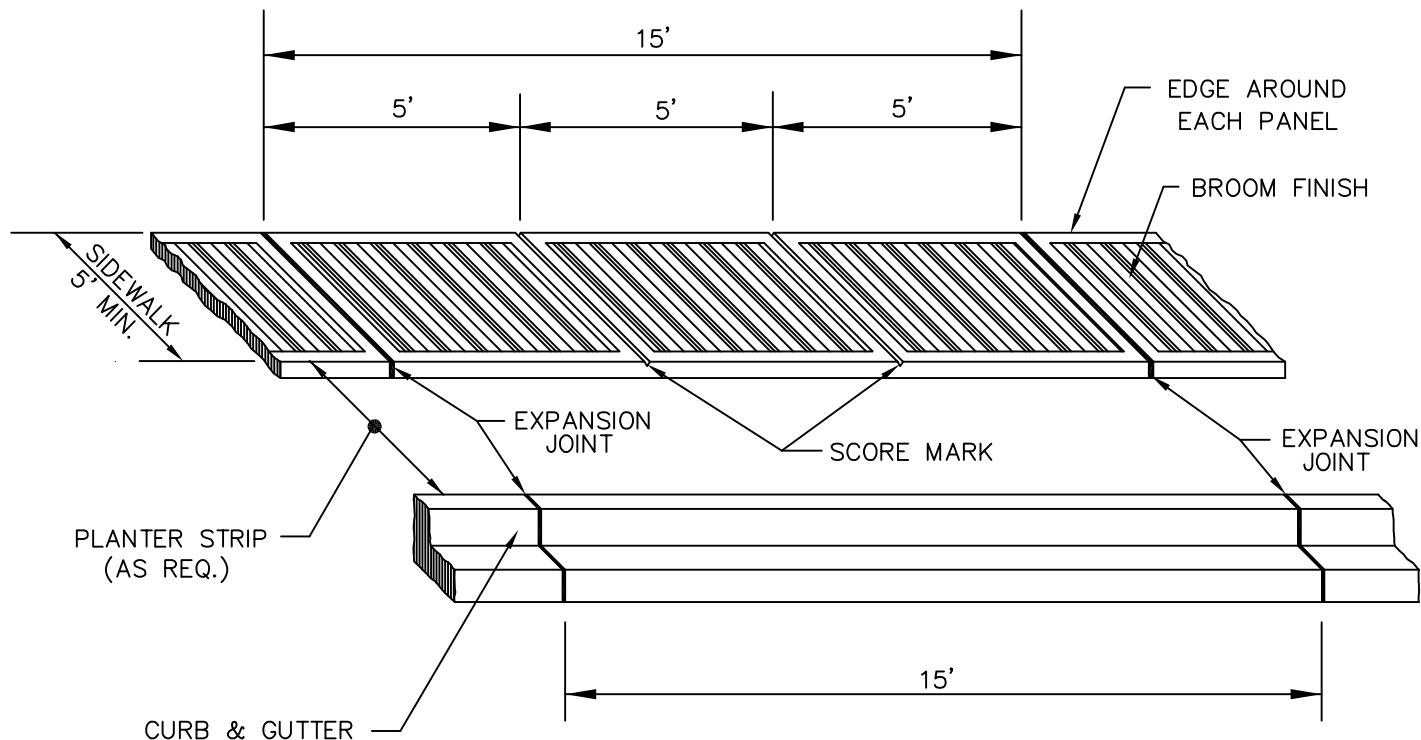
S-C

S-C

S-C

10/3/94

JEG



NOTES:

1. EXPANSION JOINT MATERIAL TO BE 3/8" THICK PREMOLDED JOINT FILLER FULL THICKNESS OF CONCRETE.
2. FORM AND SUBGRADE INSPECTION REQUIRED BEFORE POURING CONCRETE.
3. SCORE MARKS SHALL BE $\pm 1/8"$ WIDE BY $\pm 1/4"$ DEEP. FOR SIDEWALKS OVER 8' IN WIDTH, A LONGITUDINAL SCORE MARK SHALL BE MADE ALONG CENTER OF WALK.
4. EXPANSION JOINTS SHALL BE INSTALLED IN CURB AND GUTTER AND IN SIDEWALK AT PC AND PT AT ALL CURB RETURNS. EXPANSION JOINTS SHALL BE PLACED IN SIDEWALK AT SAME LOCATIONS AS THOSE IN CURB AND GUTTER WHEN SIDEWALK IS ADJACENT TO CURB AND GUTTER, UNLESS OTHERWISE DIRECTED BY ENGINEER.

CITY OF YELM
DEPT. OF PUBLIC WORKS

CEMENT CONCRETE SIDEWALK

APPROVED

DWG. NO.

PUBLIC WORKS DIRECTOR

DATE

2-11

DES.

DWN.

CKD.

DATE

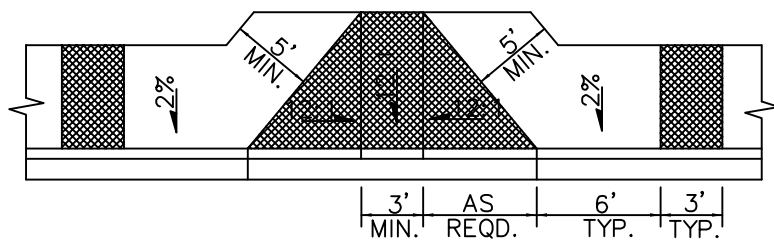
S-C

S-C

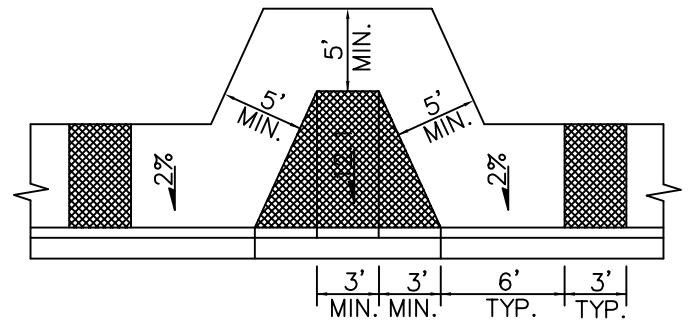
S-C

10/3/94

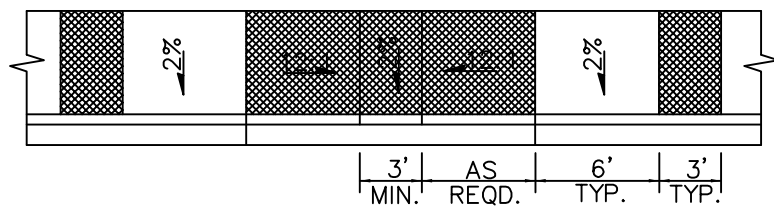
JEG



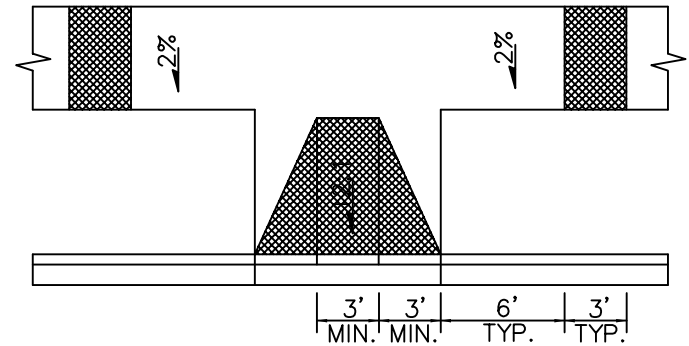
TYPE I



TYPE II



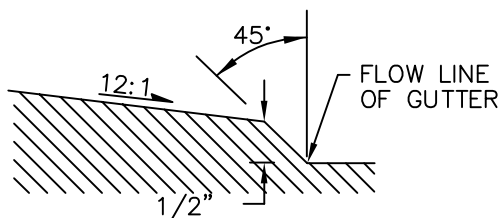
TYPE III



TYPE IV

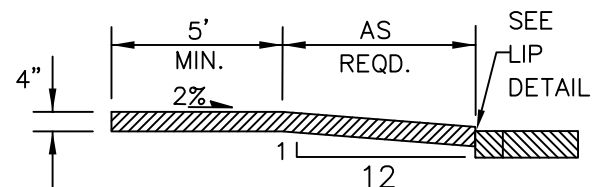
TYPICAL CURB RAMPS

BOTTOM OF RAMP MAY
HAVE MAX. 1/2" LIP
AT 45°.



LIP DETAIL

NOTE: SEE SIDEWALK SPACING,
EXPANSION JOINTS & SCORE
MARK DETAIL FOR ADDITIONAL
NOTES.



RAMP SECTION

NOTES:

1. RAMP TEXTURING IS TO BE DONE WITH AN EXPANDED METAL GRATE PLACED AND REMOVED FROM WET CON. TO LEAVE A DIAMOND PATTERN. THE LONG AXIS OF THE DIAMOND PATTERN SHALL BE PERPENDICULAR TO THE CURB. GROOVES SHALL BE 1/8" DEEP AND 1/4" WIDE.
2. CURB RAMPS SHALL BE POURED AS A SEPARATE UNIT FROM THE SIDEWALK AND FROM THE CURB AND GUTTER, ISOLATED BY EXPANSION JOINT MATERIAL ON ALL SIDES EXCEPT AT END OF RAMP NEXT TO ROADWAY.
3. INLETS SHALL BE LOCATED SO THAT RUNOFF DOES NOT FLOW PAST THE CURB RAMP. NO INLETS ARE TO BE SET SO THAT PEDESTRIANS WALK OVER OR AROUND THEM.

JEG

CITY OF YELM
DEPT. OF PUBLIC WORKS

TYPICAL CURB RAMPS

APPROVED

DWG. NO.

PUBLIC WORKS DIRECTOR

DATE

2-12

DES.

DWN.

CKD.

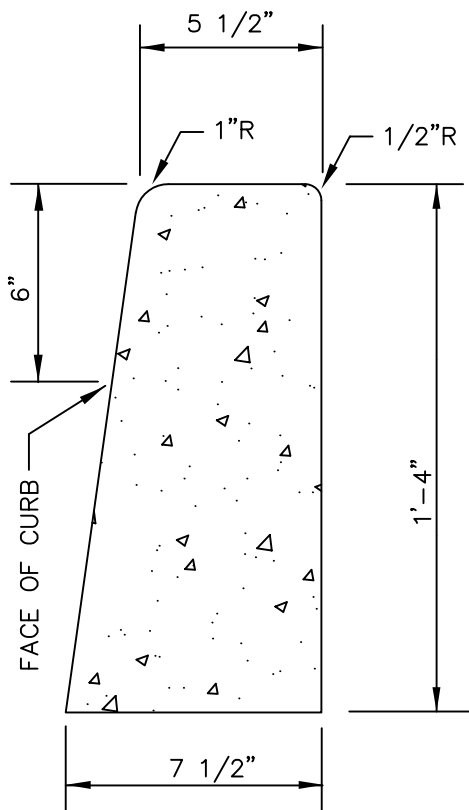
DATE

S-C

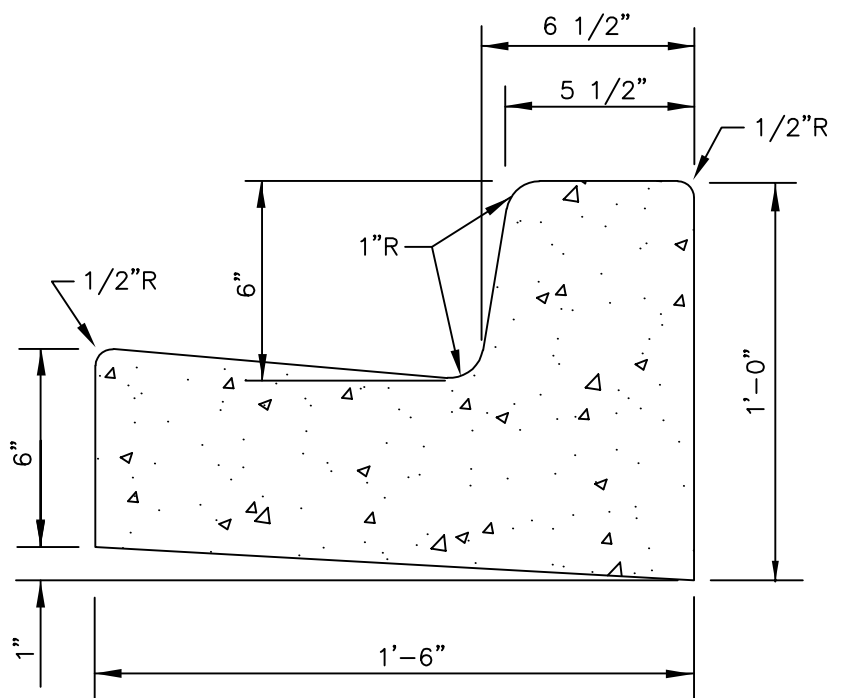
S-C

S-C

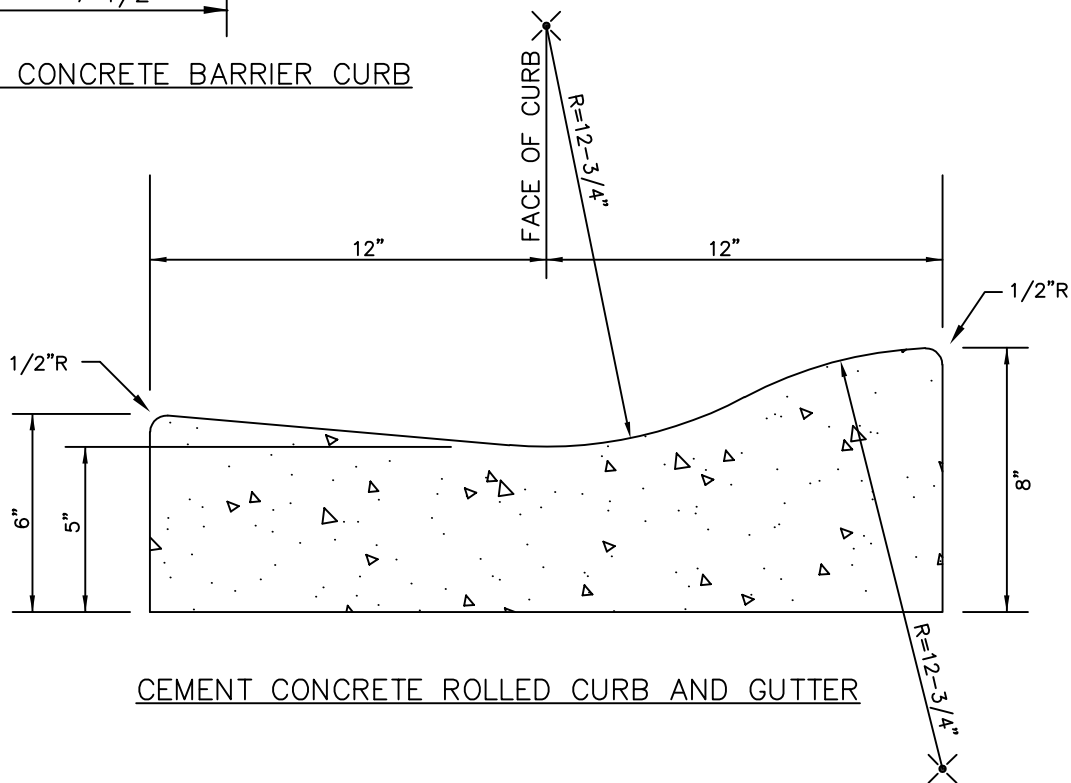
10/3/94



CEMENT CONCRETE BARRIER CURB



CEMENT CONCRETE BARRIER CURB AND GUTTER



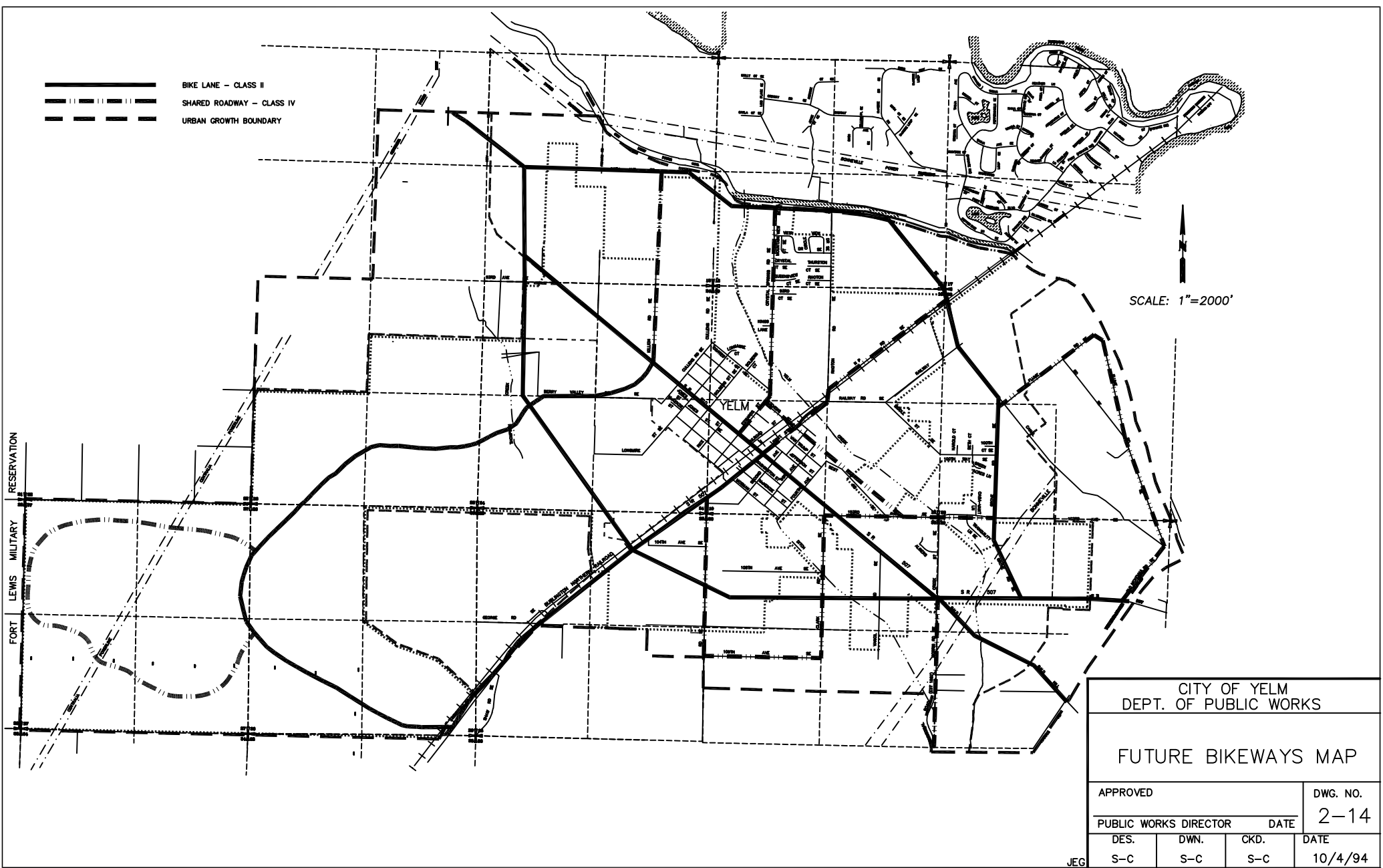
CEMENT CONCRETE ROLLED CURB AND GUTTER

NOTES:

1. EXPANSION JOINT MATERIAL TO BE 3/8" THICK PREMOLDED JOINT FILLER FULL THICKNESS OF CONCRETE.
2. FORM AND SUBGRADE INSPECTION REQUIRED BEFORE POURING CONCRETE.
3. EXPANSION JOINTS TO BE PLACED ON 15' CENTERS.

JEG

CITY OF YELM DEPT. OF PUBLIC WORKS			
CEMENT CONCRETE CURBS			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			2-13
DES.	DWN.	CKD.	DATE
S-C	S-C	S-C	3/15/94



BIKE LANE - CLASS II
SHARED ROADWAY - CLASS IV
URBAN GROWTH BOUNDARY

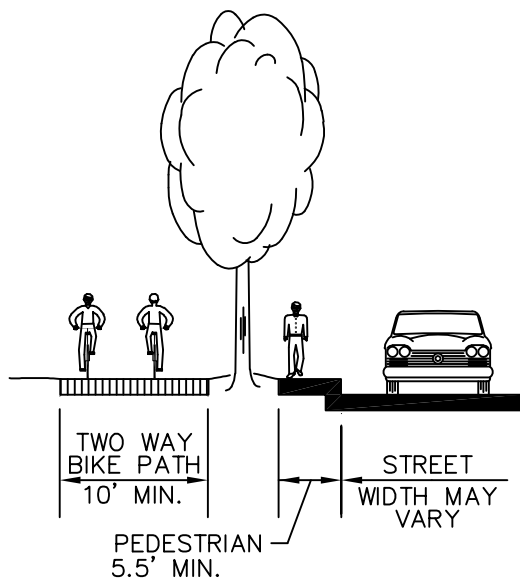
SCALE: 1"=2000'

CITY OF YELM
DEPT. OF PUBLIC WORKS

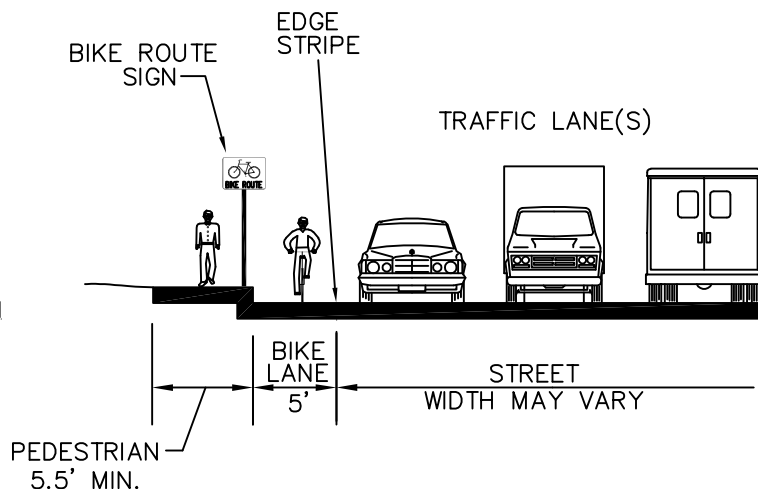
FUTURE BIKEWAYS MAP

APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			2-14
DES.	DWN.	CKD.	DATE
S-C	S-C	S-C	10/4/94

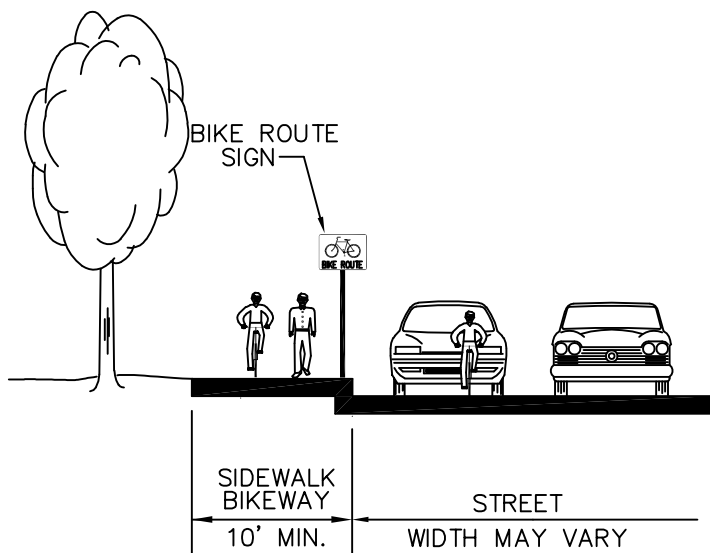
JEG



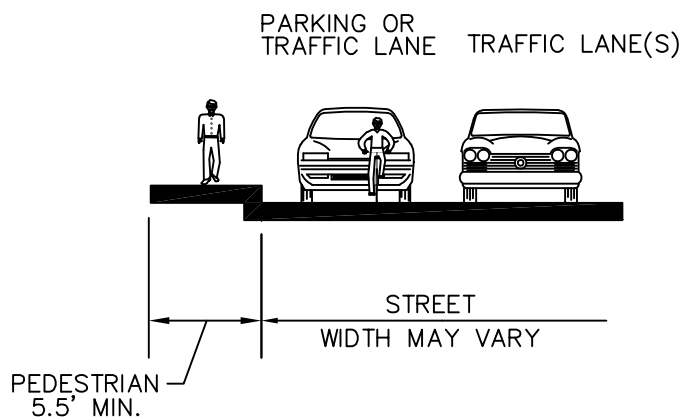
CLASS I BIKE PATH



CLASS II BIKE LANE



CLASS III BIKE ROUTE



CLASS IV SHARED ROADWAY

CITY OF YELM
DEPT. OF PUBLIC WORKS

BIKEWAY CLASSES

APPROVED

DWG. NO.

PUBLIC WORKS DIRECTOR

DATE

2-15

DES.

DWN.

CKD.

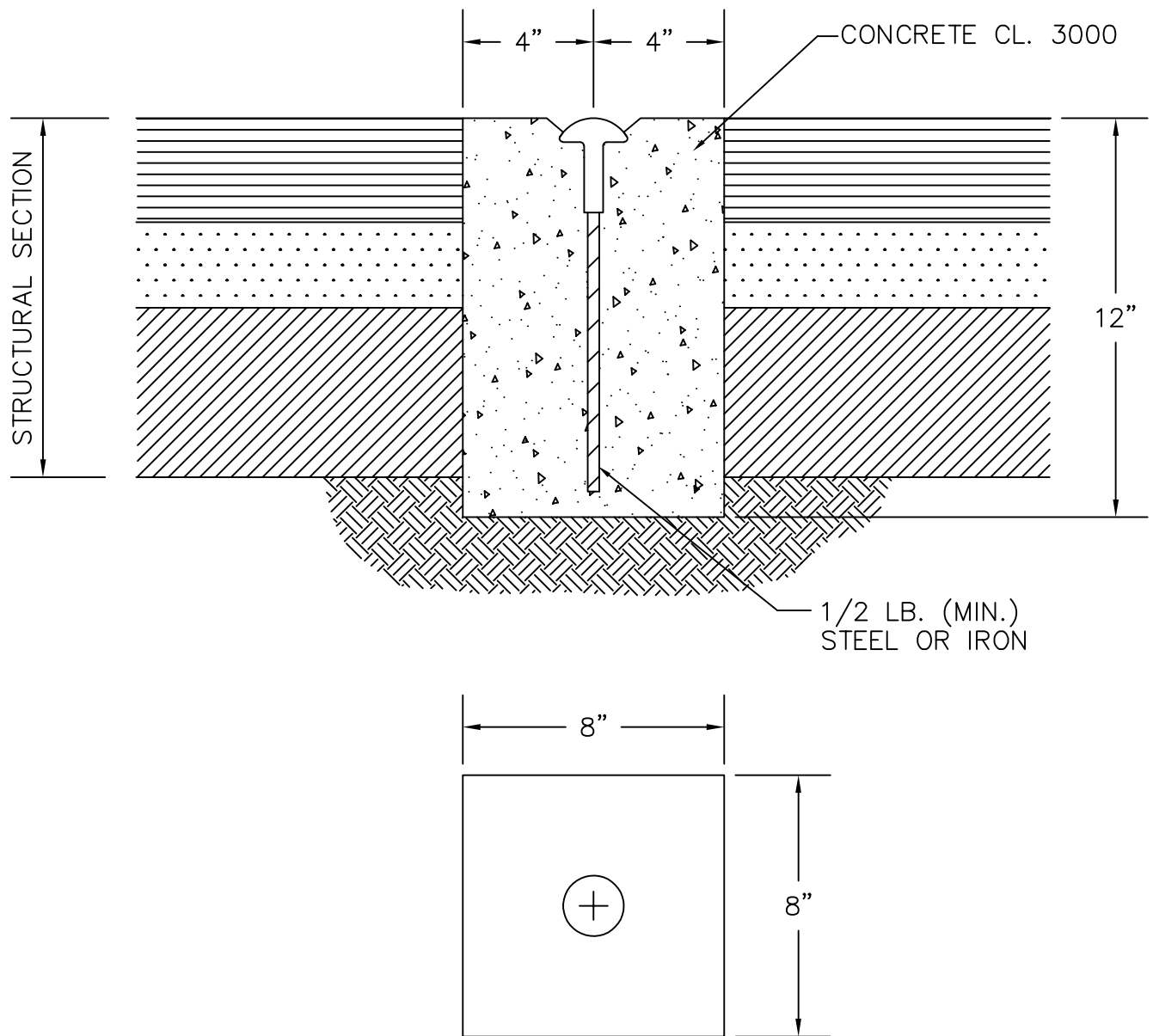
DATE

S-C

S-C

S-C

10/3/94

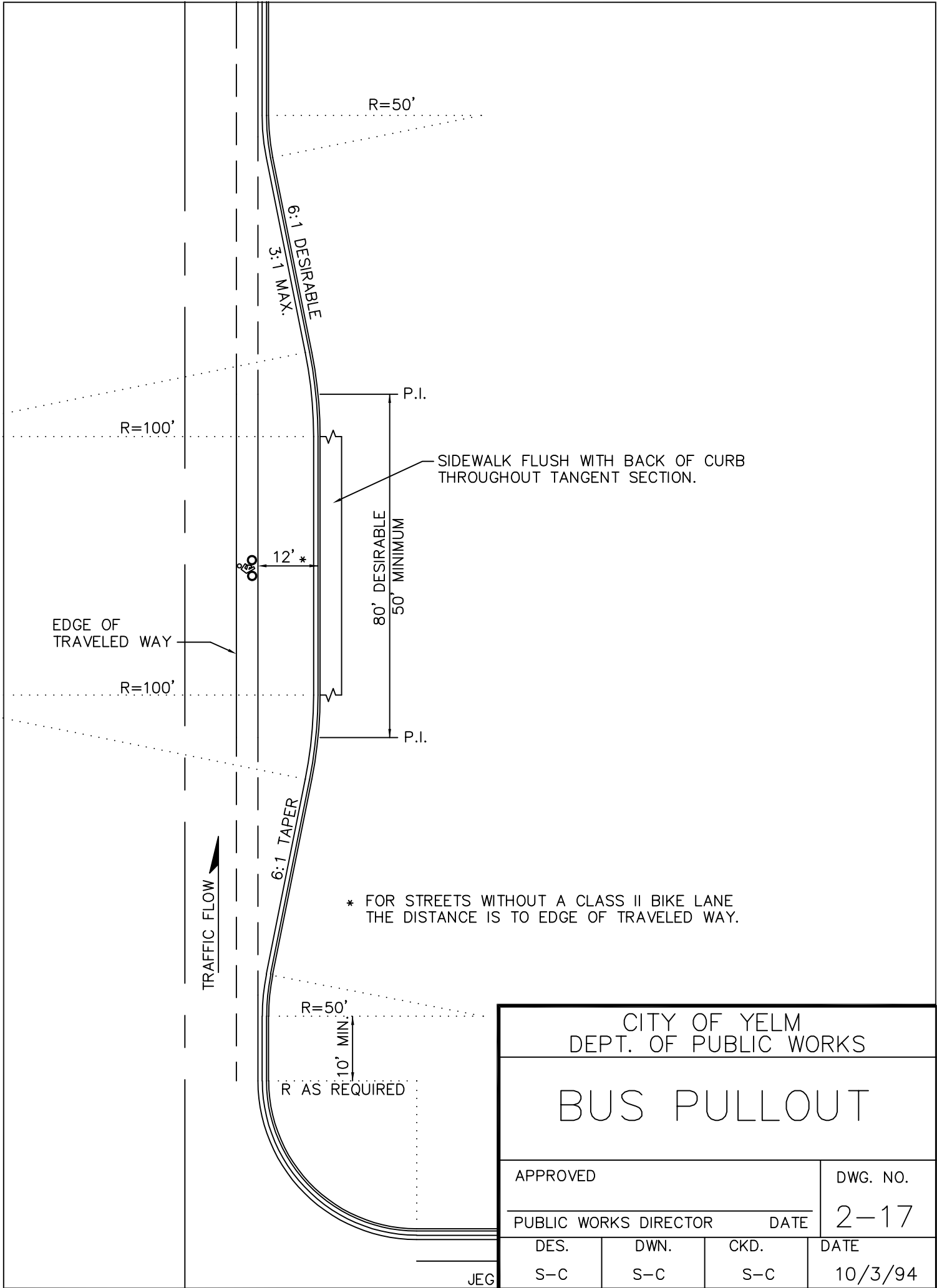


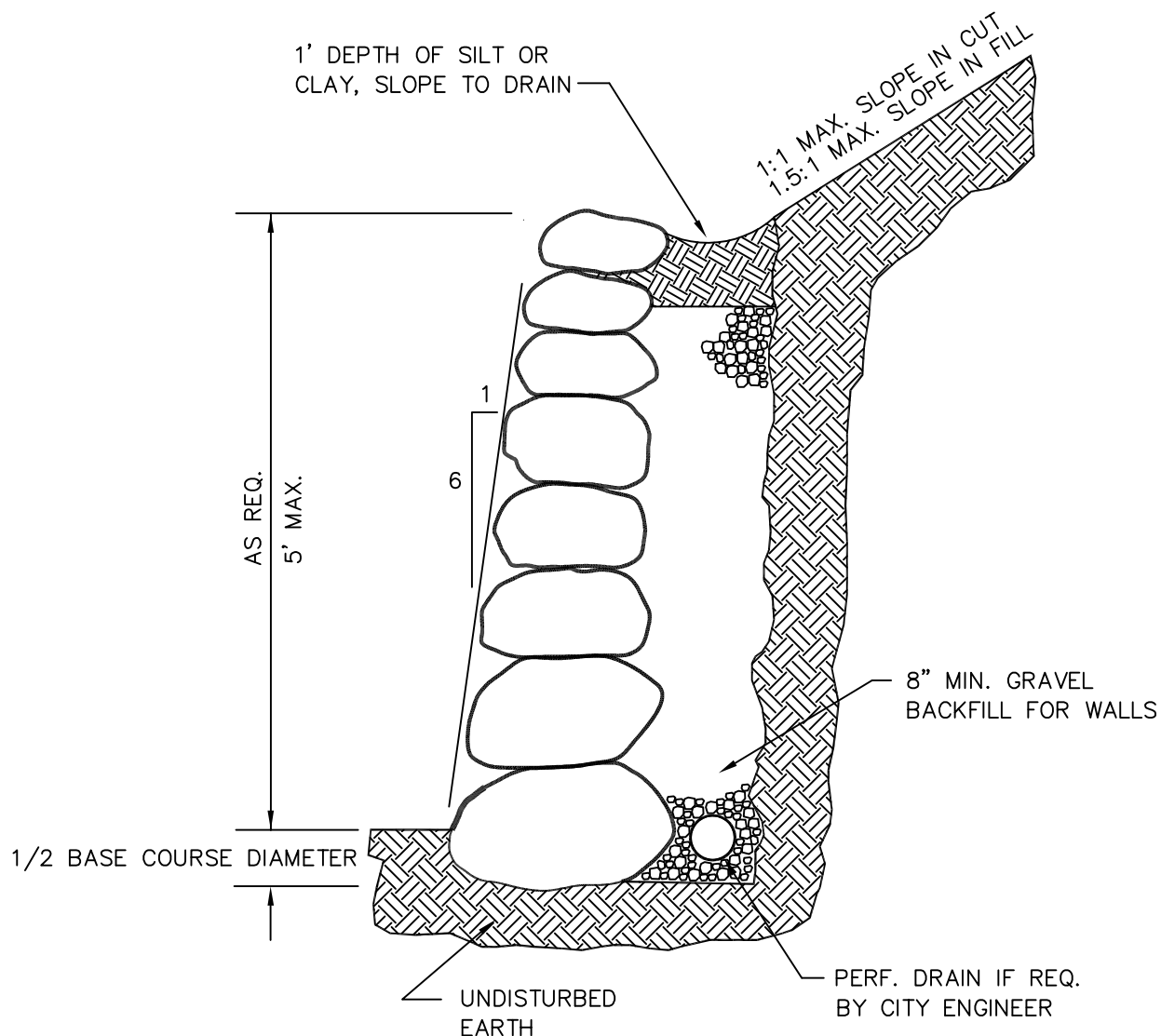
GENERAL NOTES:

1. THIS MONUMENT TO BE USED IN BITUMINOUS OR ASPHALT CONCRETE PAVEMENT WHERE CASED MONUMENT IS NOT REQUIRED
2. CONCRETE BASE DIMENSIONS SHOWN ARE MINIMUM. CONCRETE BASE NEED NOT BE FORMED.
3. CAP SHALL BE 2" MIN. DIAM. BRASS PLUG MARKER.
4. CONCRETE TO BE PLACED ON A FIRM AND UNYIELDING FOUNDATION.

CITY OF YELM DEPT. OF PUBLIC WORKS			
CAST IN PLACE MONUMENT			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			DATE
DES. S-C	DWN. S-C	CKD. S-C	DATE 10/3/94

JEG





GENERAL NOTES:

- ROCK WALLS SHALL BE CONSTRUCTED OF 3-MAN TO 2-MAN ROCKS FROM BOTTOM TO TOP. ROCK SIZES ARE AS FOLLOWS.
2-MAN ROCK (300 TO 600 LBS.) 13 INCHES IN LEAST DIMENSION.
3-MAN ROCK (600 TO 1200 LBS.) 16 INCHES IN LEAST DIMENSION.
- THE ROCK WALL SHALL BE INSTALLED WITH A SMOOTH FACE.
- THE LONG DIMENSION OF THE ROCKS SHALL BE PERPENDICULAR TO THE FACE OF THE WALL TO PROVIDE MAXIMUM STABILITY.
- EACH ROCK SHALL BE PLACED SO AS TO LOCK INTO TWO ROCKS IN THE LOWER TIER.
- CALL FOR INSPECTION PRIOR TO SETTING ANY ROCKS.
- DESIGNS VARYING FROM THAT SHOWN SHALL CARRY THE SEAL OF A CIVIL ENGINEER.

CITY OF YELM
DEPT. OF PUBLIC WORKS

ROCK WALL

APPROVED

DWG. NO.

PUBLIC WORKS DIRECTOR

DATE

2-18

DES.

S-C

DWN.

S-C

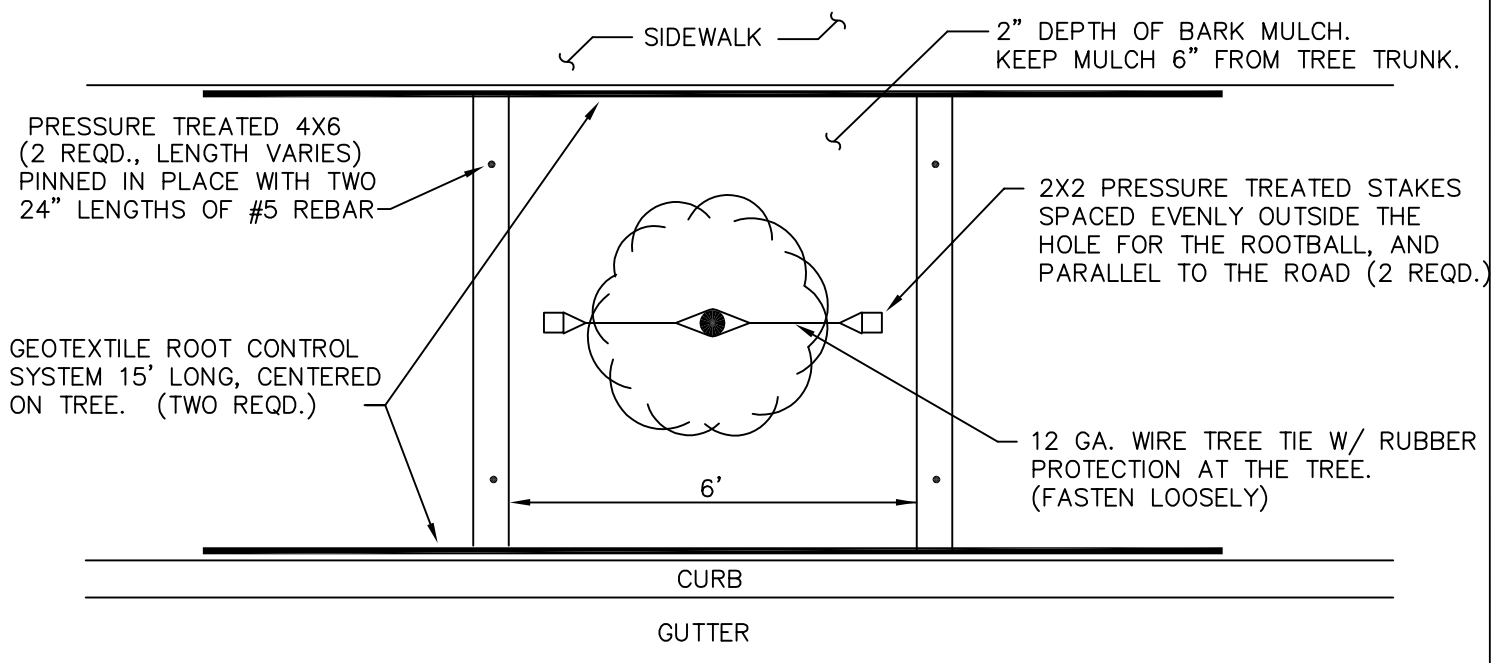
CKD.

S-C

DATE

10/3/94

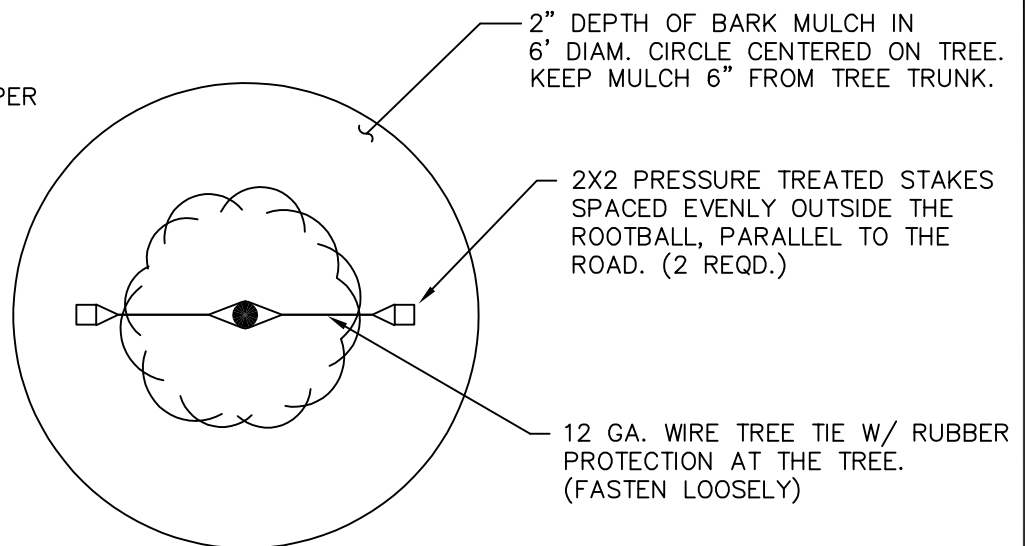
JEG



FOR USE WHEN TREE IS WITHIN 6' OF CURB AND/OR SIDEWALK

STREET TREE SPECIFICATIONS:

1. TREES SHALL BE 2" TO 3" CALIPER MEASURED 6" ABOVE THE BASE.
2. TREES SHALL HAVE A MINIMUM 6 FOOT FREE-OF-BRANCH CLEARANCE, MEASURED FROM THE GROUND LINE TO THE FIRST BRANCH.
3. TREES SHALL BE SPACED 35 FEET ON CENTER STARTING 15 FEET FROM THE PROPERTY LINE.



FOR USE WHEN TREE IS NOT WITHIN 6' OF CURB AND/OR SIDEWALK

NOTES:

1. THE GEOTEXTILE ROOT CONTROL SYSTEM SHALL BE 12 INCH BIOBARRIER STRIPS, OR APPROVED EQUAL.
2. WIRE TREE TIE SHALL BE 42" ABOVE THE GROUND
3. FINISH GRADE FOR BARK MULCH SHALL BE 1 TO 2 INCHES BELOW SURROUNDING GRADE

CITY OF YELM
DEPT. OF PUBLIC WORKS

STREET TREE

APPROVED

DWG. NO.

PUBLIC WORKS DIRECTOR

DATE

2-19

DES.

DWN.

CKD.

DATE

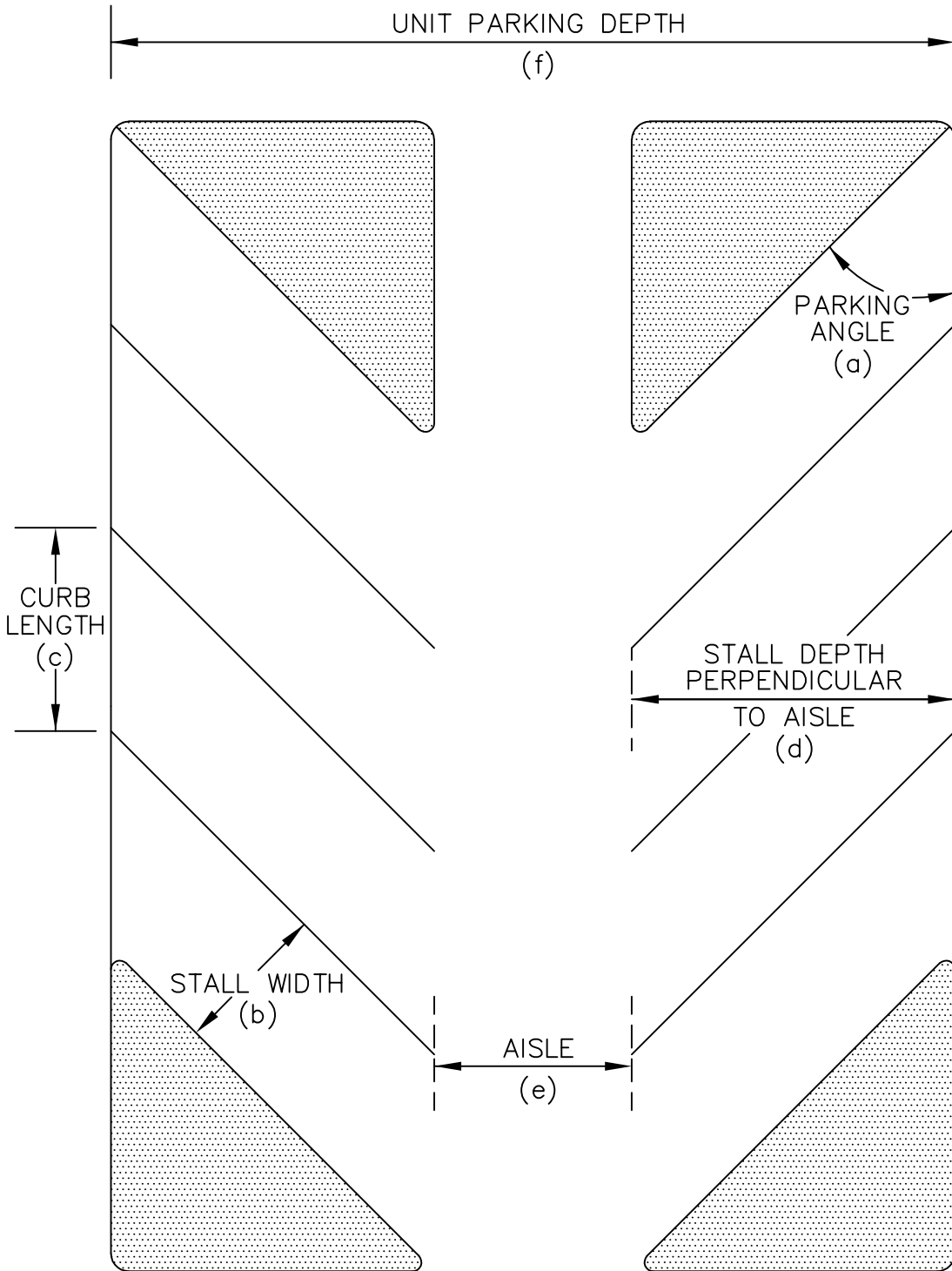
S-C

S-C

S-C

10/3/94.

JEG



CITY OF YELM
DEPT. OF PUBLIC WORKS

NOMENCLATURE OF
OFF-STREET
PARKING AREA

APPROVED

DWG. NO.

CITY ENGINEER

DATE

2-21

DES.

DWN.

CKD.

DATE

S-C

S-C

S-C

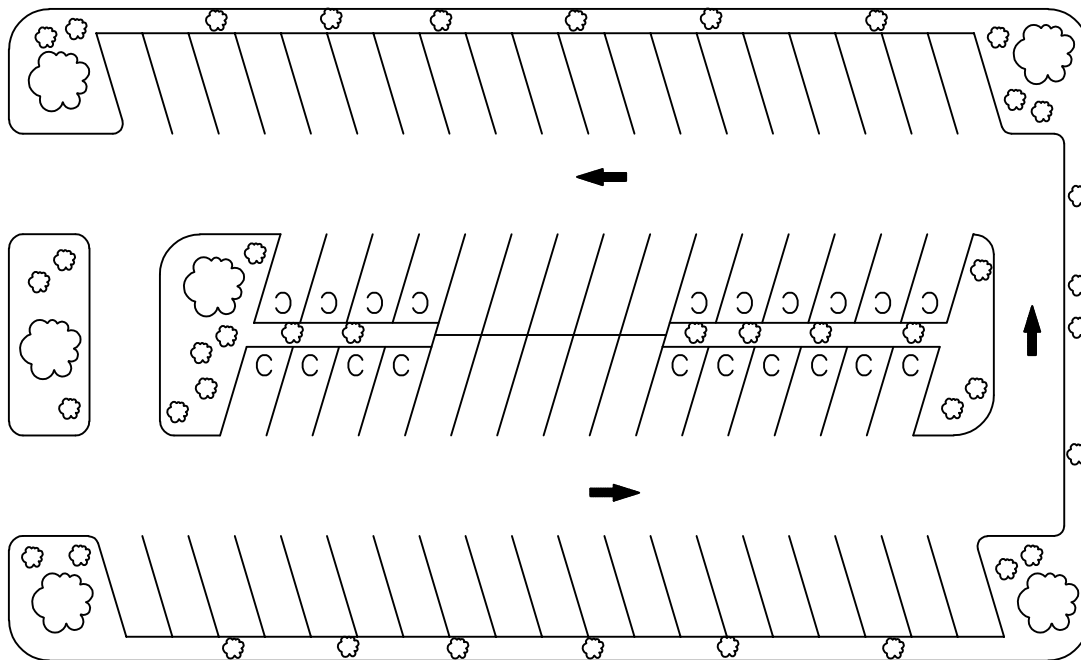
12/2/95

A	B	C	D	E		F	
PARKING ANGLE	STALL WIDTH	CURB LENGTH	STALL DEPTH	AISLE WIDTH 1-WAY	2-WAY	UNIT DEPTH 1-WAY	2-WAY
0	8.0*	20.0*	8.0*	12.0	20.0	**	**
	Min. 8.5	22.5	8.5	12.0	20.0	29.0	37.0
	Desired 9.0	22.5	9.0	12.0	20.0	30.0	38.0
30	8.0*	16.0*	15.0*	10.0	20.0	**	**
	Min. 8.5	17.0	16.5	10.0	20.0	43.0	53.0
	Desired 9.0	18.0	17.0	10.0	20.0	44.0	54.0
45	8.0*	11.5*	17.0*	12.0	20.0	**	**
	Min. 8.5	12.0	19.0	12.0	20.0	50.0	58.0
	Desired 9.0	12.5	19.5	12.0	20.0	51.0	59.0
60	8.0*	9.5*	18.0*	18.0	20.0	**	**
	Min. 8.5	10.0	20.0	18.0	20.0	58.0	60.0
	Desired 9.0	10.5	21.0	18.0	20.0	60.0	62.0
90	8.0*	8.0*	16.0*	23.0	23.0	**	**
	Min. 8.5	8.5	20.0	23.0	23.0	63.0	63.0
	Desired 9.0	9.0	20.0	23.0	23.0	63.0	63.0

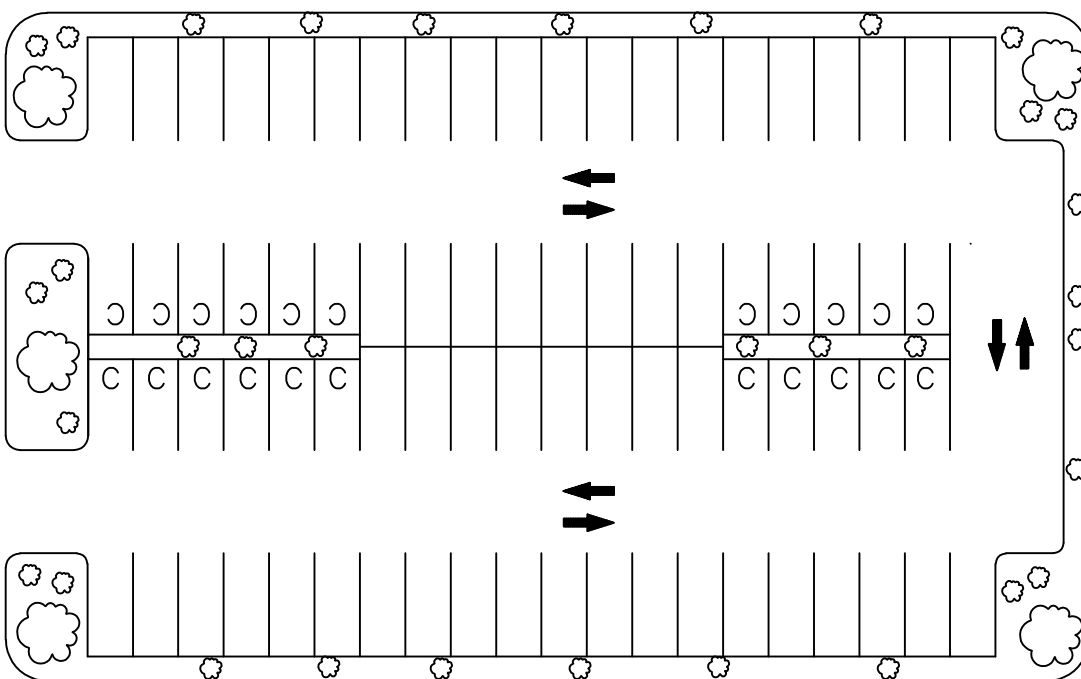
* FOR COMPACT STALL ONLY

** VARIABLE WITH COMPACT AND STANDARD COMBINATIONS

CITY OF YELM DEPT. OF PUBLIC WORKS			
MOST COMMON MINIMUM PARKING AREA DIMENSIONS			
APPROVED			DWG. NO.
CITY ENGINEER			DATE
DES. S-C	DWN. S-C	CKD. S-C	DATE 12/2/95

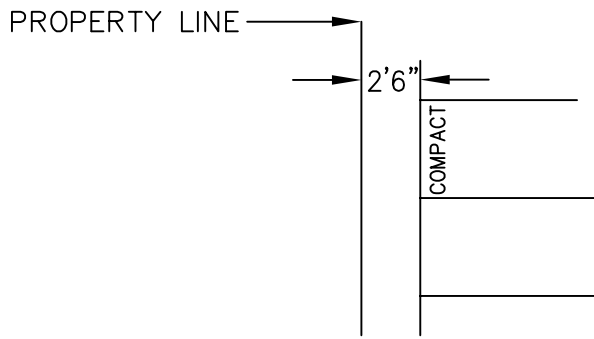


45°
ONE-WAY

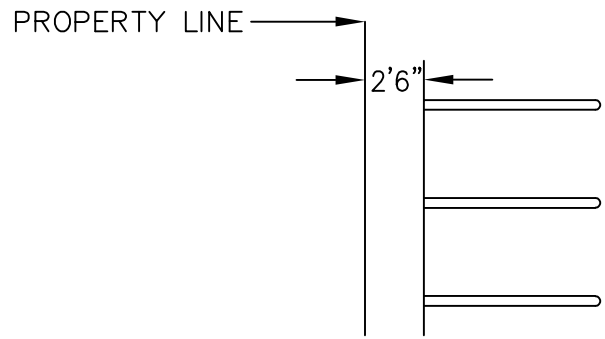


90°
TWO-WAY

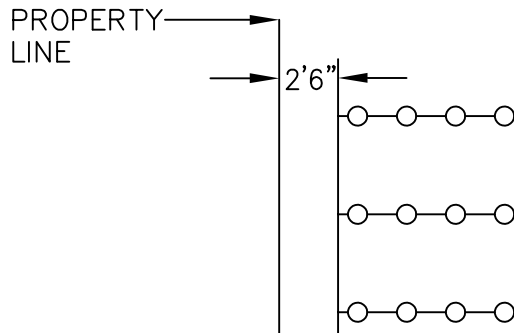
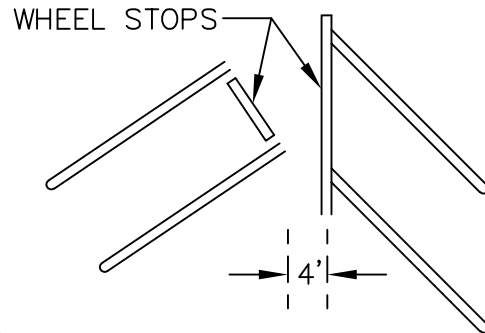
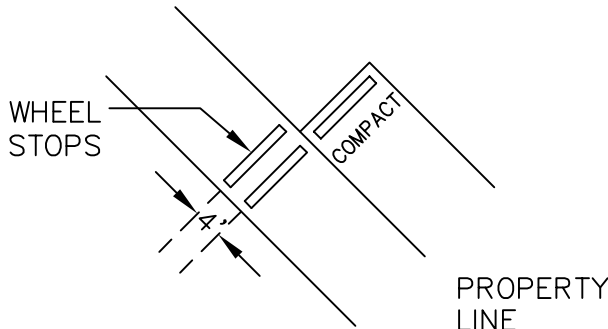
CITY OF YELM DEPT. OF PUBLIC WORKS			
EXAMPLES OF OFF-STREET PARKING			
APPROVED			DWG. NO.
CITY ENGINEER			DATE
DES.	DWN.	CKD.	DATE
S-C	S-C	S-C	12/2/95



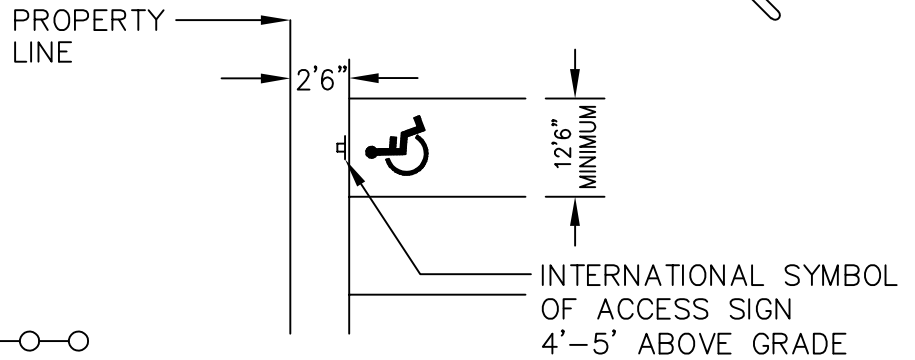
COMPACT MARKING



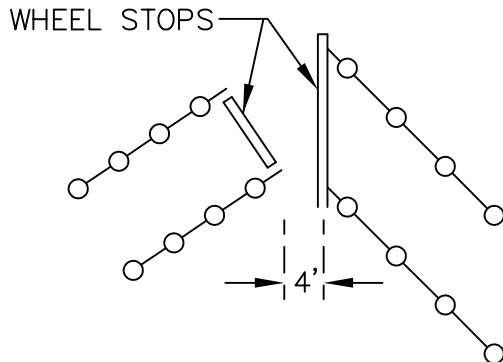
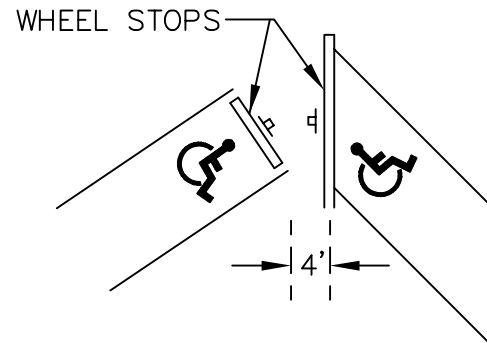
PAINTED HORSESHOE MARKING



METAL OR PLASTIC
TRAFFIC MARKING



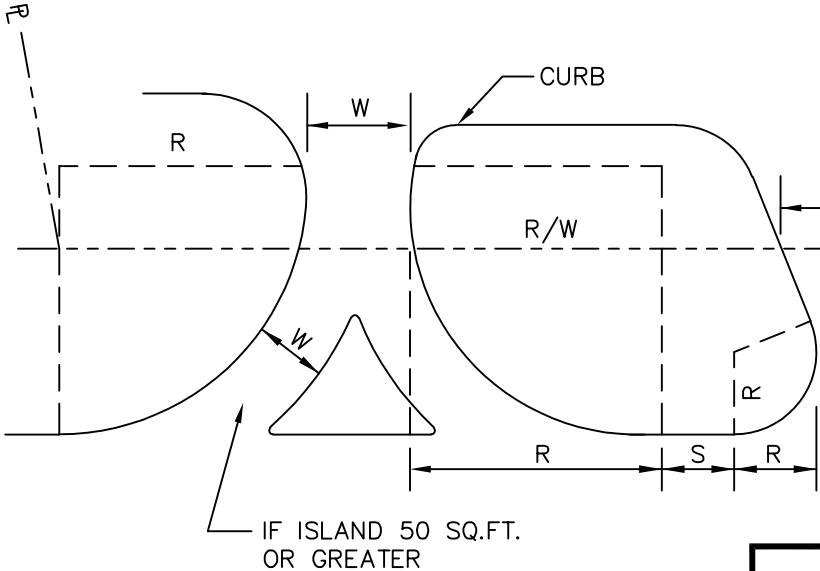
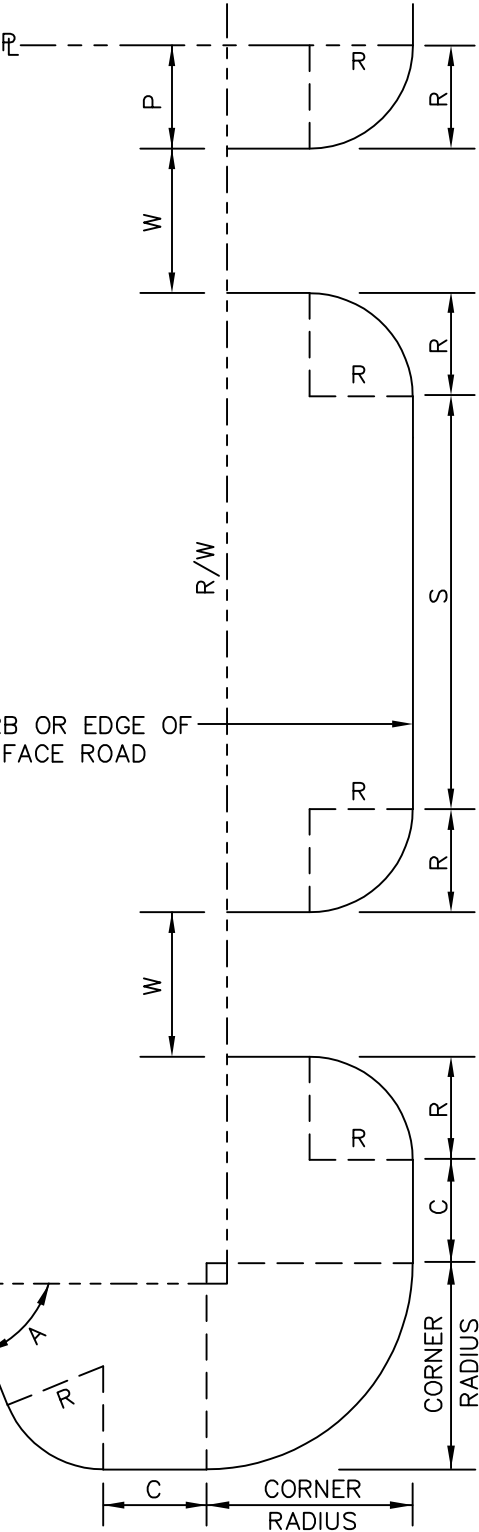
HANDICAP MARKING



CITY OF YELM DEPT. OF PUBLIC WORKS			
STALL MARKINGS AND WHEEL STOP LOCATIONS			
APPROVED			DWG. NO.
CITY ENGINEER			2-24
DES.	DWN.	CKD.	DATE
S-C	S-C	S-C	12/2/95

RECOMMENDED BASIC DRIVEWAY DIMENSION GUIDELINES				
	DIMENSION REFERENCE	RESIDENTIAL	COMMERCIAL	INDUSTRIAL
MINIMUM LENGTH OF DRIVEWAY APPROACH 20' (RESIDENTIAL ONLY)				
NOMINAL WIDTH	W			
ONE-WAY		10	15	20
TWO-WAY		10	30	40
RIGHT TURN RADIUS	R			
MINIMUM		5	15	20
MINIMUM SPACING				
FROM PROPERTY LINE	P	0	0	-R
FROM STREET CORNER	C	5	10	10
BETWEEN DRIVEWAYS	S	3	3	10
MINIMUM ANGLE	A	40°	45°	30°

NOTE: MINIMUMS BASED ON LOCAL ACCESS AND LOW VOLUMES



CITY OF YELM DEPT. OF PUBLIC WORKS			
DRIVEWAY DIMENSIONS MEASUREMENTS			
APPROVED			DWG. NO.
PUBLIC WORKS DIRECTOR			DATE
DES.	DWN.	CKD.	DATE
S-C	S-C	S-C	2-25 2/3/95

**YELM ENGINEERING SPECIFICATIONS AND STANDARD
DETAILS**

CHAPTER 3 STORM DRAINAGE

Table of Contents

CHAPTER 3.00 STORM DRAINAGE 2

3.00.010 GENERAL2

3.00.020 DESIGN STANDARDS2

3.00.030 CONVEYANCE2

3.00.040 STAKING3

3.00.040 TRENCH EXCAVATION.....3

3.00.050 BACKFILLING3

3.00.060 STREET PATCHING AND RESTORATION3

CHAPTER 3.00 STORM DRAINAGE

3.00.010 General

The standards established by this chapter are intended to represent the minimum standards for the design and construction of storm drainage facilities.

The design of storm drainage and or retention/detention systems shall be designed to meet or exceed the most current Stormwater Management Manual for Western Washington, as published by the Washington State Department of Ecology.

3.00.020 Design Standards

The following design considerations shall apply:

- A. The use of commercial parking lots for detention of storm water will be reviewed by the Director of Public Works and approved or denied based on the design. The detention area shall be situated away from areas of pedestrian movement unless means for rapid closing of the areas is incorporated in the design, the maximum depth of water in parking lot storage shall be limited to 12 inches.
- B. Maximum catch basin spacing shall be 300 feet on arterials and collectors and 500 feet on all other street classifications. No surface water shall cross any roadway.

3.00.030 Conveyance

- A. Pipe: Storm drain pipe within a public Right-of-Way or easement shall be sized to carry the maximum anticipated runoff from the possible contributing area.

The minimum main size shall be 8 inches diameter. Lateral lines may be 6 inches diameter. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to serve adjacent areas or for future service.

All pipe for storm mains shall comply with one of the following types:

- 1. Polyvinyl Chloride: PVC pipe per WSDOT/APWA Standard Specifications.
- 2. Plain Concrete: Plain concrete pipe per WSDOT/APWA Standard Specifications.
- 3. Reinforced Concrete: Reinforced concrete pipe per WSDOT/APWA Standard Specifications.

4. Ductile Iron: Ductile iron pipe per chapter 4.00.030.
 5. Polyethylene: PE smooth wall pipe per Advanced Drainage Systems (ADS) N-12 constructed per WSDOT/APWA Standard Specifications.
- B. Channels: The City encourages the use of open vegetated channels to convey stormwater runoff when possible. Any open channels proposed to be located within public Right-of-Way shall require special approval from the Director of Public Works.

3.00.040 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of storm sewer systems shall be as directed by the City Engineer or as follows:

- A. Stake centerline alignment every 50 feet with cut or fill to invert of pipe.
- B. Stake location of all catch basins, manholes and other fixtures for grade and alignment with cut or fill to rim and invert of all pipes.
- C. Grade stake or slope stake (as appropriate) at intervals, sufficient to control location, size and depth of retention/detention facilities.

3.00.040 Trench Excavation

See Chapter 4.00.170 for requirements regarding trench excavation.

3.00.050 Backfilling

See Chapter 4.00.190 for requirements regarding backfilling.

3.00.060 Street Patching and Restoration

See Sections 2.10.130 and 2.10.140 YDS for requirements regarding street patching and trench restoration.

YELM ENGINEERING SPECIFICATIONS AND STANDARD DETAILS

CHAPTER 4 WATER

Table of Contents

CHAPTER 4.00	WATER	2
4.00.010	GENERAL	2
4.00.020	DESIGN STANDARDS	2
GENERAL NOTES (WATER MAIN INSTALLATION)		2
PROCESS TO OBTAIN WATER SERVICE		5
4.00.030	MAIN LINE	6
4.00.040	CONNECTION TO EXISTING WATER MAIN	7
4.00.050	SERVICE INTERRUPTION	7
4.00.060	HYDRANTS	7
4.00.070	VALVES	9
4.00.080	CASING	10
4.00.090	AIR AND VACUUM RELEASE VALVE	10
4.00.100	BLOWOFF ASSEMBLY	10
4.00.110	BACKFLOW PREVENTION	10
4.00.120	SERVICE CONNECTION	11
4.00.130	MARKING SERVICE LINES ON CURBS	11
4.00.140	WATER MAIN/SANITARY SEWER CROSSINGS	12
4.00.150	IRRIGATION	13
4.00.160	STAKING	14
4.00.170	TRENCH EXCAVATION	14
4.00.180	THRUST BLOCKING	15
4.00.190	BACKFILLING	15
4.00.200	STREET PATCHING AND RESTORATION	15
4.00.210	HYDROSTATIC TESTS	16
4.00.220	STERILIZATION AND FLUSHING	16
4.00.230	FENCING AT WATER METERS	16
4.00.240	LANDSCAPING, WATER METERS AND FIRE HYDRANTS	16
LIST OF DRAWINGS - WATER		18

CHAPTER 4.00 WATER

4.00.010 General

Any extension of the Yelm Water System must be approved by the Director of Public Works and, all extensions must conform to DOH and the Coordinated Water System Plan, City of Yelm Water System Plan, and South East Thurston Fire Authority requirements.

In designing and planning for any development, it is the developer's responsibility to see that adequate water for both domestic use and fire protection is attainable. The developer must show, in the proposed plans, how water will be supplied and whether adequate water pressure will be attained in case of fire. An analysis of the system may be required if it appears that the system might be inadequate.

Prior to the release of any water meters, all Public Works improvements must be completed and approved including granting of Right-of-Way or easements, and all applicable fees must be paid.

Issuance of building permits for new construction of single family subdivisions shall not occur until final Public Works approval is given. For commercial projects, building permits may be issued upon completion and acceptance of the required fire protection facilities. A performance bond, in accordance with Section 1.00.050 YDS, will be required for the remaining Public Works improvements. Certificate of occupancy will not be issued until final Public Works approval is given for all improvements.

4.00.020 Design Standards

The design of any water extension/connection shall conform to City Standards and any applicable standards as set forth herein and in Section 1.00.010 YDS.

The layout of extensions shall provide for the future continuation and/or "looping" of the existing system as determined by the City. In addition, main extensions shall be extended as required in Section 1.00.095 YDS.

The General Notes on the following page shall be included on any plans dealing with water system design.

GENERAL NOTES (WATER MAIN INSTALLATION)

- A. All workmanship and material shall be in accordance with City of Yelm standards and the most current copy of the State of Washington Standard Specifications for Road, Bridge and Municipal Construction.
- B. All work in City right-of-way requires a permit from the City of Yelm. Prior to any work commencing, the general contractor shall arrange for a preconstruction meeting to be attended by all major contractors,

representatives of involved utilities, and the City of Yelm. The Contractor is responsible to have a set of approved plans at the meeting.

C. Water mains shall meet the following specifications:

1. Polyvinyl Chloride (PVC) Pipe (under 4 inches): Pipe material shall be PVC 1120, PVC 1220, or PVC 2120, and have minimum wall thickness equal to or less than the Standard Dimension Ratio (SDR) of 21, and meet the requirements of WSDOT Standard Specifications Section 9-30.1(5)B.
2. Polyvinyl Chloride (PVC) Pipe (4 through 12 inches): Shall meet the requirements of AWWA C900, Class 150 wall thickness equal to or greater than the SDR of 18, and meet the requirements of WSDOT Standard Specifications Section 9-30.1(5)A.
3. Polyvinyl Chloride (PVC) Pipe (14 through 20 inches): Shall meet the requirements of AWWA C905 wall thickness equal to or greater than the SDR of 18.
4. Ductile Iron Pipe (DIP): DIP shall conform to AWWA C151 Class 50 or greater, and shall be 1/16-inch cement lined and sealed in accordance with ANSI/AWWA C104/A21.4-90, and meet the requirements of WSDOT Standard Specifications Section 9-30.2.(1). Six-inch fire hydrant spools shall be Class 52.

D. Gate valves shall be resilient wedge, NRS (Non Rising Stem) with O-rings seals. Valve ends shall be mechanical joint or ANSI flanges. Valves shall conform to AWWA 509-80. Valves shall be Mueller, M & H, Kennedy, Clow R/W or Waterous Series 500. Existing valves to be operated by City employees only.

E. Hydrants shall be M & H Reliant Style 929, Mueller Centurion, or Clow Medallion or AVK. Hydrants shall be bagged until system is approved.

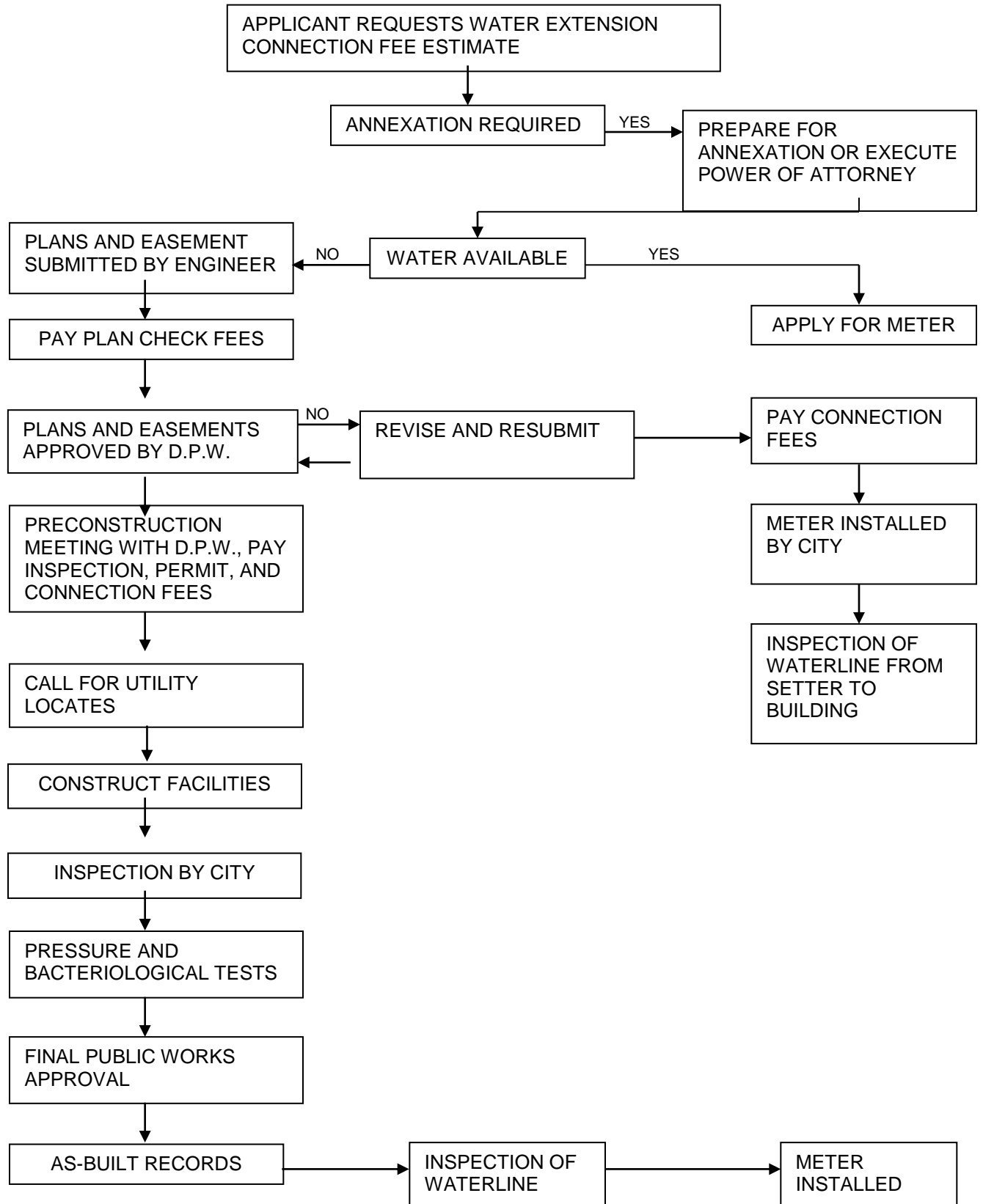
F. All lines shall be chlorinated and tested in conformance with the above referenced specification (Note 1).

G. All pipe and services shall be installed with continuous tracer tape installed 12" to 18" under the final ground surface. The marker shall be plastic non-biodegradable, metal core or backing marked water 2-inch-wide minimum, which can be detected by a standard metal detector. Tape shall be Terra Tape "D" or approved equal. In addition to tracer tape, install 14 gauge heavy duty direct bury coated copper wire (PAIGE "UF" single conductor or equal), wrapped around the pipe, brought up and tied off at valve body. All wire connections shall use wire nuts and a DBR Splice Kit, manufactured by 3-M or approved

equal. All locator wire for service pipe shall be connected to the locator wire on the water main.

- H. Provide traffic control plan(s) as required in accordance with MUTCD.
- I. All water mains shall be staked for grades and alignment by an engineering or surveying firm capable of performing such work.
- J. All service line locations shall be marked on the face of the curb with an embossed "W" 1/4 inch into concrete.
- K. Call Underground Locate at 1-800-424-5555 a minimum of 48 hours prior to any excavations.
- L. The City will be given 72 hours' notice prior to scheduling a shutdown. Where connections require "field verification", connection points will be exposed by contractor and fittings verified 48 hours prior to distributing shut-down notices.
- M. At any connection to an existing line where a new valve is not installed, the existing valve must be pressure tested to City standards prior to connection. If an existing valve fails to pass the test, the contractor shall make the necessary provisions to test the new line prior to connection to the existing system or install a new valve.
- N. After completion of all items shown on these plans and before acceptance of the project, the contractor shall obtain a "punch list" prepared by the City's Inspector detailing remaining items of work to be completed. All items of work shown on these plans shall be completed to the satisfaction of the City prior to acceptance of the water system and provision of water service.
- O. A copy of these approved plans and applicable city developer specifications and details shall be onsite during construction.
- P. Any revisions made to these plans must be reviewed by the developer's engineer and the City of Yelm prior to any implementation in the field. The City shall not be responsible for any errors and/or omissions on these plans.

PROCESS TO OBTAIN WATER SERVICE



4.00.030 Main Line

- A. Water mains shall be sized to provide adequate domestic plus fire flow at the required residual pressure. Fire flow requirements will be determined by South East Thurston Fire Authority, however, the quantity of water required will in no case be less than 750 GPM at 20 psi residual pressure.

The minimum water main size shall be 6 inches diameter as long as fire flow requirements can be met. Larger size mains are required in specific areas outlined in the Coordinated Water System Plan. Nothing shall preclude the City from requiring the installation of a larger sized main in areas not addressed in the Coordinated Water System Plan if the City determines a larger size is needed to meet fire protection requirements or for future service.

- B. All pipe for water mains shall have flexible gasketed joints and shall comply with one of the following types:

Water mains shall meet the following specifications:

1. Polyvinyl Chloride (PVC) Pipe (under 4 inches): Pipe material shall be PVC 1120, PVC 1220, or PVC 2120, and have minimum wall thickness equal to or less than the Standard Dimension Ratio (SDR) of 21, and meet the requirements of WSDOT Standard Specifications Section 9-30.1(5)B.
 2. Polyvinyl Chloride (PVC) Pipe (4 through 12 inches): Shall meet the requirements of AWWA C900, Class 150 wall thickness equal to or less than the SDR of 18, and meet the requirements of WSDOT Standard Specifications Section 9-30.1(5)A.
 3. Polyvinyl Chloride (PVC) Pipe (14 through 20 inches): Shall meet the requirements of AWWA C905 wall thickness equal to or greater than the SDR of 18.
 4. Ductile Iron Pipe (DIP): DIP shall conform to AWWA C151 Class 50 or greater, and shall be 1/6-inch cement lined and sealed in accordance with ANSI/AWWA C104/A21.4-90, and meet the requirements of WSDOT Standard Specifications Section 9-30.2.(1). Six-inch fire hydrant spools shall be Class 52.
- C. All fittings for ductile iron pipe or PVC pipe shall be ductile iron compact fittings conforming to AWWA C 153 or Class 250 gray iron conforming to AWWA C 110 and C 111. All shall be cement mortar lined conforming to AWWA C 104. Plain end fittings shall be ductile iron if mechanical joint retainer glands are installed on the plain

ends. All fittings shall be connected by flanges or mechanical joints.

- D. All pipe and services shall be installed with continuous tracer tape installed 12" to 18" under the final ground surface. The marker shall be plastic non-biodegradable, metal core or backing marked water 2-inch-wide minimum, which can be detected by a standard metal detector. Tape shall be Terra Tape "D" or approved equal. In addition to tracer tape, install 14 gauge heavy duty direct bury coated copper wire (PAIGE "UF" single conductor or equal), wrapped around the pipe, brought up and tied off at valve body. All wire connections shall use wire nuts and epoxy DBY water connection kit.
- E. The minimum cover for all water mains from top of pipe to finish grade shall be 42 inches unless otherwise approved.
- F. No trees shall be planted closer than 5 feet to the water main.

4.00.040 Connection To Existing Water Main

The developer's engineer shall be responsible for determining the scope of work for connection to existing water mains. See drawing number 4-10.

It shall be the Contractor's responsibility to field verify the location and depth of the existing main and the fittings required to make the connections to the existing mains. All fittings shall be approved by the Water Department prior to installation.

4.00.050 Service Interruption

The contractor shall give the City a minimum of 72 hours notice of any planned connection to an existing pipeline. This includes all cut-ins and live taps. Notice is required so any disruptions to existing services can be scheduled. The City will notify customers involved or affected of the water service interruption. The contractor shall make every effort to schedule water main construction with a minimum interruption of water service. In certain situations, the City may dictate scheduling of water main shutdowns so as not to impose unnecessary shutdowns during specific periods to existing customers.

4.00.060 Hydrants

- A. The lead from the service main to the fire hydrant shall be ductile iron cement mortar lined Class 52 no less than 6 inches in diameter. MJ joint shall be restrained with wedge action retainer glands, MegaLug 1006 or approved equal.

- B. Fire Hydrants, shall have two, 2-1/2 inch outlets and one 4-1/2 inch pumper port outlet. All outlet ports shall be National Standard thread. The valve opening shall be no less than 5-1/4 inch diameter with a 5-inch "Storz" coupling and blind flange cap installed on the steamer port. The hydrant shall have a positive and automatic barrel drain and shall be of the "traffic safety" or break-away style; i.e., when accidentally broken off, water will not flow.

All hydrants shall be center-stem compression design, valve shall open against pressure.

Hydrants shall be M & H Reliant Style 929 or Mueller Centurion, or Clow Medallion or American AVK Series 2780. All hydrants shall be bagged until system is approved.

- C. The Department of Public Works and South East Thurston Fire Authority work together to insure that adequate hydrant spacing and installation are achieved.

Unless otherwise required by the governing authority, the following guidelines shall apply for hydrant number and location:

1. At least one hydrant shall be installed at all intersections.
 2. Hydrant spacing of 330 feet shall be required in all areas except single family and duplex residential areas.
 3. Hydrant spacing of 660 feet shall be required for single family and duplex residential areas.
 4. Hydrants located in cul-de-sac or dead end areas either by design, topographic or manmade feature which prohibit straight line distance measurement, shall be located to serve no more than 120,000 square feet, and be served by an 8-inch-minimum main.
 5. When any portion of a proposed building is in excess of 150 feet from a water supply on a public street, there shall be provided, when required by the fire chief, on-site hydrants and mains capable of supplying the required fire flow. Such hydrants shall be located as may be required by the South East Thurston Fire Authority and easements for such hydrants shall be granted to the City.
- D. Fire hydrants shall be set as shown in drawing number 4-7.
- E. For requirement regarding use, size and location of a fire department connection (FDC) and/or post indicator valve contact

South East Thurston Fire Authority. Location of FDC shall be shown on water plans.

- F. Where needed, the Department of Public Works or South East Thurston Fire Authority will require hydrants to be protected by two or more posts, each eight inches in diameter by five feet in height made of either reinforced concrete or steel. Post shall be painted to match hydrant color.
- G. Fire hydrants must be installed, tested, and accepted prior to the
- H. Fire Hydrants must have 3 foot of clearance around them.
- I. Hydrant locks are required to be installed as part of the City's water conservation and accountability program. Hydrant locks and adapters are purchased from the City.

4.00.070 Valves

Where possible, valves shall be located at tee's or crosses, and be flanged by mechanical joints.

All valves and fittings shall be ductile iron with ANSI flanges or mechanical joint ends. All existing valves shall be operated by City employees only.

Valves shall be installed in the distribution system at sufficient intervals to facilitate system repair and maintenance, but in no case shall there be less than one valve every 1000 feet. Generally, there shall be two valves on each tee and three valves on each cross. Specific requirements for valve spacing will be made at the plan review stage.

- A. Gate Valves, 6 inch to 12 inch. The design, materials and workmanship of all gate valves shall conform to AWWA C509-80 latest revision. Gates valves shall be resilient wedge non-rising stem (NRS) with two internal O-ring stem seals. Gate valves shall be Mueller, M & H, Kennedy, Clow R/W or Waterous Series 500.

Gate valves shall be used on all 2 to 12-inch lines.

- B. Butterfly Valves. Butterfly valves shall conform to AWWA C504, Class 150B, with cast iron short body and O-ring stem seals. Butterfly valves shall be Mueller, Linseal III, M & H, Pratt Ground hog, or Allis Chalmers.

Butterfly valves shall be used on all lines 14 inches and larger.

- C. Valve Box. All valves shall have a standard Inland Foundry, 910 or equal water valve box set to grade with a 6 inch ASTM SDR 21 PVC riser from valve to within 4 to 6 inches of valve box top. If valves are not set in paved area, a 3 foot by 3 foot by 4 inch concrete pad

shall be set around each valve box at finished grade. In areas where valve box falls in road shoulder, the ditch and shoulder shall be graded before placing asphalt or concrete pad. See drawing number 4-11.

- D. Valve marker Post. Valve marker posts shall be 4 inch x 4 inch reinforced concrete or schedule 40 steel posts 5 feet long stamped with "W" and distance to valve. Post shall be painted with 1 base coat and 2 coats white oil base enamel. See drawing number 4-12.

4.00.080 Casing

Steel casing shall be designed to a minimum of H2O loading. Pipe spacers shall be Cascade style CC5 with 8 inch runners as available from Cascade Waterworks. Casing pipe and spacers shall be sized for pipe being installed. Install minimum of three spacers per section of pipe.

4.00.090 Air and Vacuum Release Valve

Combination air and vacuum release valves (ARV) shall be 2" combination air release valve, or approved equal. Installation shall be as shown on drawing number 4-8.

The installation shall be set at the high point of the line when required. Where possible, pipes are to be graded to prevent the need for an air release valve. Air release valves may not be required when services are in the vicinity.

4.00.100 Blowoff Assembly

If a fire hydrant is not located at the end of a dead end main, a blowoff assembly shall be required. On water mains which will be extended in the future, the valve which operates the blowoff assembly shall be the same size as the main and provided with a concrete thrust block. The pressure rating for blowoff assemblies shall be 200 psi. Installation shall be as shown on drawing number 4-9.

4.00.110 Backflow Prevention

All water system connections to serve buildings or properties with domestic potable water, fire sprinkler systems, or irrigation systems shall comply with the minimum backflow requirements as established by the Department of Health (DOH) and the City of Yelm.

The installation of all backflow devices is required to protect the existing water system and users from possible contamination.

Public Works shall get the certificate for testing of any backflow prevention device before releasing the certificate of occupancy on any building. Test may be performed by any person certified by the

Washington State Board of Health. A list of approved testers may be obtained from Washington Environmental Training Resource Center (WETRC) located in Auburn, Washington.

South East Thurston Fire Authority will test the fire line and obtain the certificate for underground piping. In any situation, South East Thurston Fire Authority No. 2 will not test their portion of underground until Public Works has tested and approved their main up to the fire line.

4.00.120 Service Connection

- A. All service connections relating to new development shall be installed by the developer at the time of mainline construction. After the lines have been constructed, tested and approved the owner may apply for a water meter. The City will install a water meter after the application has been made and all applicable fees have been paid. Water meters will be set only after system is inspected and final approval is given.
- B. When water is desired to a parcel fronting an existing main but not served by an existing setter, an application must be made to the City. Upon approval of the application and payment of all applicable fees, the City will tap the main, and install the meter, box, and setter.
- C. Service lines shall be one inch high density polyethylene pipe, minimum pressure class 200 psi DR7, Phillips Drisco 5100 Ultra-Line, or Westflex. No glued joints will be accepted. Service lines shall be installed 90 degrees off the main. Tracer tape and wire wrapped around the pipe shall be installed on all service lines.
- D. Service saddle shall be all ductile iron body with stainless steel straps and shall be Romac style 202S, Rockwell 313 or approved equal. All clamps shall have rubber gasket and iron pipe threaded outlets.
- E. Corporation stop shall be all bronze, lead free, and shall be Ford type FB1101 or approved equal with iron pipe threads conforming to AWWA C 800. Stainless steel inserts shall be used with pack joints and polyethylene pipe.
- F. Master meters will not be allowed for service to more than one per building. An approved backflow prevention system must be installed in conjunction with any master meter. Deviations to this may be granted by the Director of Public Works.

4.00.130 Marking Service Lines on Curbs

The location of all service lines shall be marked on the face or top of the cement concrete curb with a "W" 1/4 inch into concrete.

4.00.140 Water Main/Sanitary Sewer Crossings

The Contractor shall maintain a minimum of 18 inches of vertical separation between sanitary sewers and water mains. The minimum cover for water main of 42 inches may be reduced to 24 inches upon approval by the City to provide for as much vertical separation as possible.

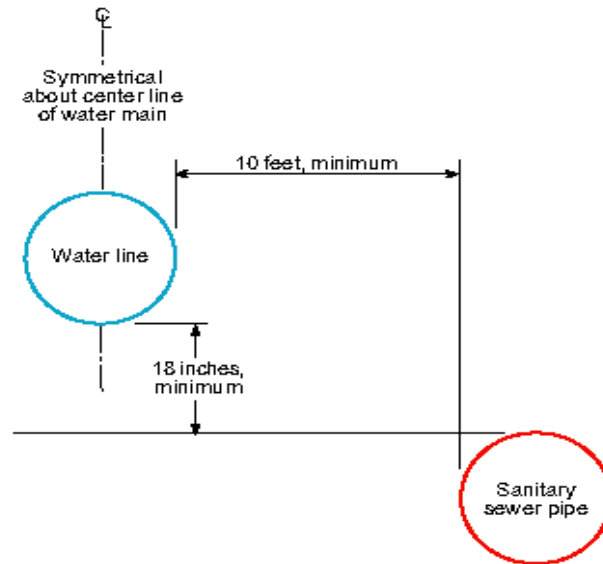
The longest standard length of water pipe shall be installed so that the joints will fall equidistant from any sewer crossing. In some cases where minimum separation cannot be maintained, it may be necessary to encase the water pipe and/or sewer service in pipe or concrete. No concrete shall be installed unless specifically directed by the City.

Taken from: "Criteria for Sewage Works Design"

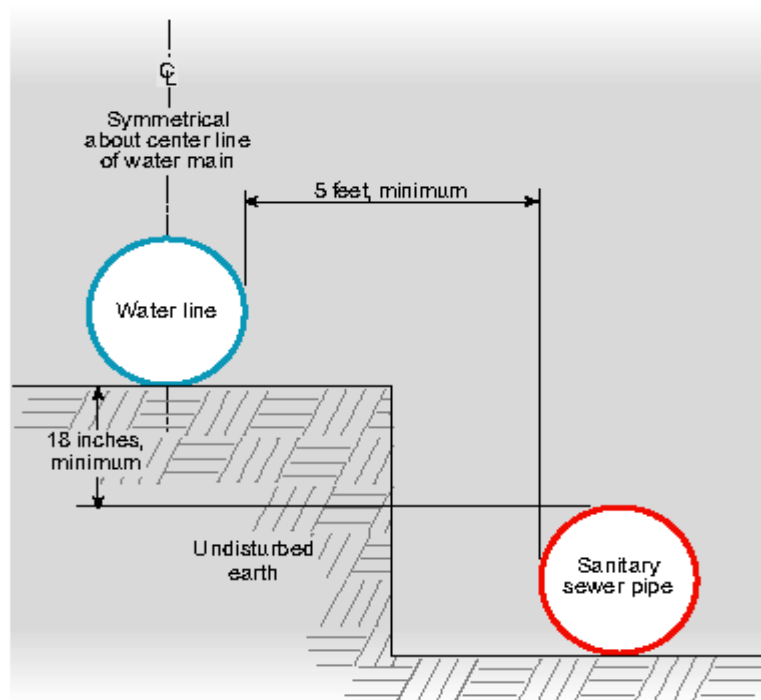
By: "State of Washington Department of Ecology,
December 1998.

Situations not addressed below shall follow the criteria as outlined in the most current edition of the above mentioned document.

WATER MAIN STANDARD PIPE MATERIAL			
	AWWA (ASTM) Standard		
Type of Pipe	PIPE	JOINT	FITTINGS
Ductile Iron – Class 50	C151 & C104	C111	C110 & C153
Polyvinyl-Chloride – Class 150	C900	D3139 & 477	C110 & FC153
Concrete Cylinder	C303		



Required Separation Between Water Lines and Sanitary Sewers, Parallel Construction



Required Separation Between Water Lines and Sanitary Sewers, Unusual Conditions Parallel Construction

4.00.150 Irrigation

All irrigation systems shall be installed with an approved backflow prevention assembly approved by the Department of Health.

Irrigation sprinklers shall be situated so as to not wet any public street or sidewalk.

4.00.160 Staking

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

The minimum staking of waterlines shall be as directed by the City Engineer or as follows:

- A. Stake centerline alignment every 50 feet with cut or fill to invert of pipe maintaining 42 inches of cover over pipe. Cuts are normally not required when road grade has been built to subgrade elevation.
- B. Stake alignment of all fire hydrants, tees, water meters, setters and other fixtures and mark cut or fill to hydrant flange finished grade.

4.00.170 Trench Excavation

- A. Clearing and grubbing where required shall be performed within the easement or public Right-of-Way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the owner or contractor in accordance with the terms of all applicable permits. Temporary erosion control measures shall be installed and approved by the City Inspector prior to any excavations.
- B. Trenches shall be excavated to the line and depth designated by the Engineer to provide a minimum of 42 inches of cover over the pipe. Except for unusual circumstances where approved by the City, the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench. The owner shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.

- C. The contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below water main grade. Where materials are removed from below water main grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted Section 4.00.190 YDS.
- D. Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without approval of the City, and shall be in conformance with Washington Industrial Safety and Health Administration (WISHA) and Office of Safety and Health Administration (OSHA) Safety Standard.
- E. The bottom of the trench shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to make up the joint.

4.00.180 Thrust Blocking

Location of thrust blocking shall be shown on plans. Thrust block concrete shall be commercial Class 3000 psi poured against undisturbed earth. A plastic barrier shall be placed between all thrust blocks and fittings.

See drawing number 4-13 and 4-14 for thrust block locations and calculations.

4.00.190 Backfilling

Backfilling and surface restoration shall closely follow installation of pipe so that not more than 100 feet is left exposed during construction hours without approval of the City. All trenches shall be backfilled during non-working hours unless otherwise approved by the City. Selected backfill material shall be sorted or screened so that the maximum aggregate is 4 inches and placed and compacted around and under the water mains by hand tools to a height of 6 inches above the top of the water main. The remaining backfill shall be compacted to 95 percent of the maximum density in traveled areas, 90 percent outside traveled area. Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction. See Standard Drawing No. 4-15 for backfill and bedding materials.

4.00.200 Street Patching and Restoration

See Chapter 2 for requirements regarding street patching and trench restoration.

4.00.210 Hydrostatic Tests

Prior to the acceptance of the work, the installation shall be subjected to a hydrostatic pressure test of 200 psi for 15 minutes, and any leaks or imperfections developing under said pressure shall be remedied by the contractor. No main shall be hydrostatically tested until the lines are flushed of chlorine. The main shall be tested between valves. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. Test pressure shall be maintained while the entire installation is inspected.

The contractor shall provide all necessary equipment and shall perform all work connected with the tests. Tests shall be made after all connections have been made and the roadway section is constructed to subgrade. This is to include any and all connections as shown on the plan. The contractor shall perform the test to assure that the equipment to be used for the test is adequate and in good operating condition and the air in the line has been released before requesting the City to witness the test.

See Section 4.00.110 for testing responsibilities for backflow prevention devices.

4.00.220 Sterilization and Flushing

Sterilization of water mains shall be accomplished by the contractor in accordance with the requirements of the Washington State Department of Health and in a manner satisfactory to the City. At no time shall chlorinated water from a new main be flushed into a body of fresh water. This is to include lakes, rivers, streams, drainage ways, and any and all other waters where fish or other natural water life can be expected.

When a chlorine concentration has been established throughout the line, the valves shall be closed and the line left undisturbed for 24 hours. The line shall then be thoroughly flushed and water samples taken by the contractor at least 24 hours after flushing and disinfecting for approval by the local health agency. Should the initial treatment result in an unsatisfactory bacteriological test, the original chlorination procedure shall be repeated by the contractor until satisfactory results are obtained. The sample can only be taken on Mondays, Tuesdays, and Wednesdays until noon. Testing and sampling shall take place after all underground utilities are installed and compaction of the roadway section is complete.

4.00.230 Fencing at Water Meters

Water meters shall not be fenced in yard. Fencing shall be placed around meters to allow access from the City right-of-way or easements.

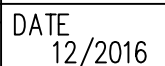
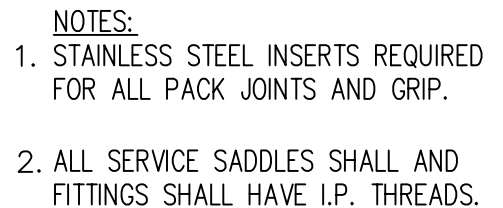
4.00.240 Landscaping, Water Meters and Fire Hydrants

No trees or shrubs shall be planted within 5 feet of any water meter or fire hydrant. Improvement or landscaping of any sort shall not be constructed which will impede easy access or maintenance to water meters and fire hydrants.

LIST OF DRAWINGS - WATER

<u>Title</u>	<u>Drawing</u>
5/8" Single Meter Service	4 - 1
5/8" Dual Meter Service	4 - 2
1 ½" to 2" Meter Service	4 - 3
Double Detector Check Valve	4 - 4
2" Blowoff Assembly	4 - 4.1
Water Vault Details	4 - 4.2
Double Detector Check Valve Notes.	4 - 4.3
Fire Department Connection.	4 - 4.4
3" – 4" – 6" Water Meter.	4 - 5
Typical Meter Placement.	4 - 6
Fire Hydrant.....	4 - 7
2" Air and Vacuum Release Valve.	4 - 8
2" Blowoff Assembly.	4 - 9
Connection to Existing Main	4 - 10
Standard Valve Box	4 - 11
Valve Marker Post & Hydrant Bollard Detail	4 - 12
Standard Blocking Detail	4 - 13
Thrust Loads.....	4 - 14
Typical Water Main Trench & Bedding.....	4 - 15
Double Check Valve Assembly 2" and Smaller	4 - 16
Reduced Pressure Backflow Assembly for 2" or Smaller	4 - 17
Reduced Pressure Backflow Assembly for 3" and Greater.....	4 - 18

LID - *FLUSH COVER WITH PLASTIC OR CAST IRON READ DOOR
BOX- *OLD CASTLE BOX 1118BCF
*OR PRE APPROVED EQUAL

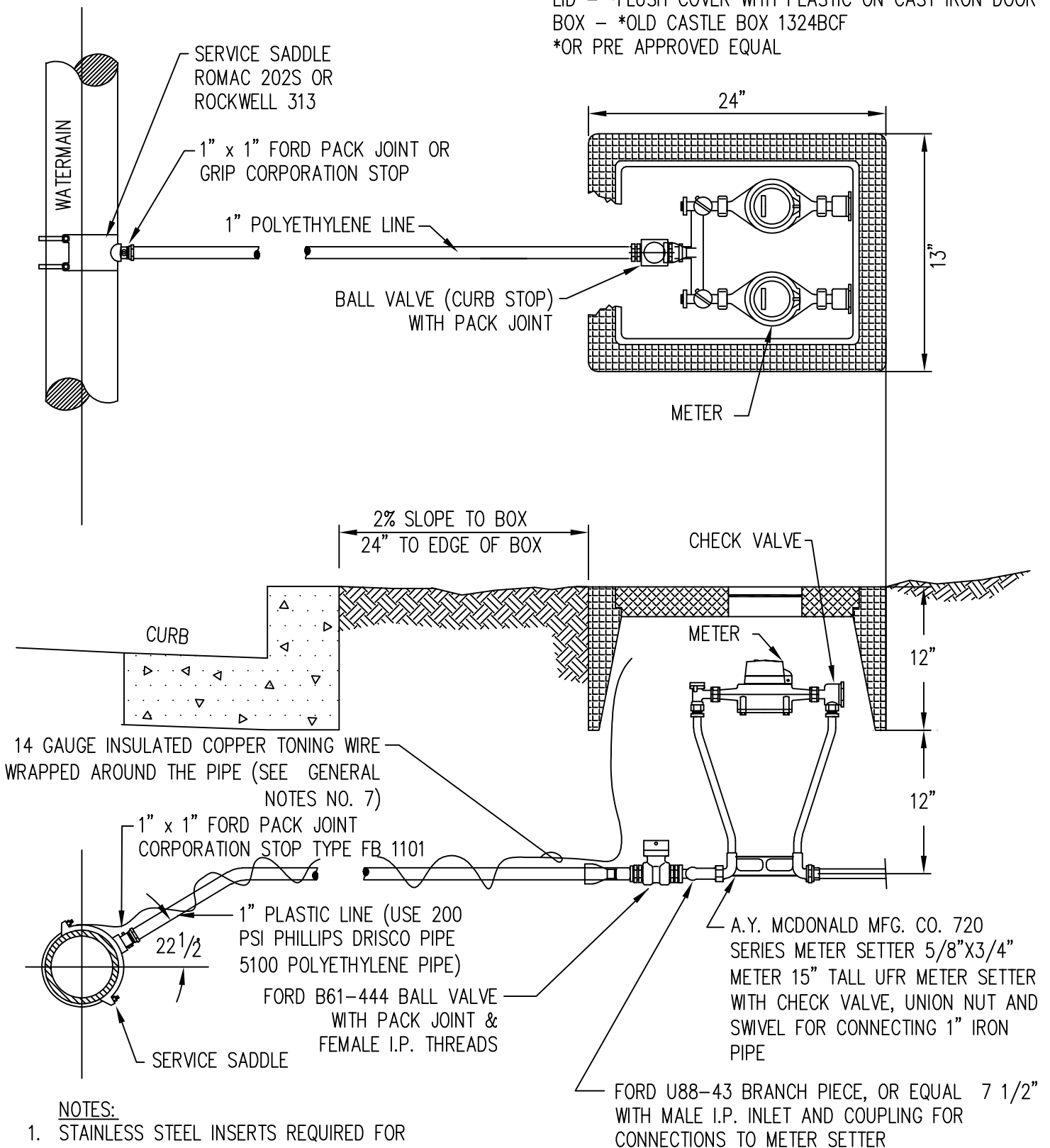


APPROVED METER BOX

LID - *FLUSH COVER WITH PLASTIC ON CAST IRON DOOR

BOX - *OLD CASTLE BOX 1324BCF

*OR PRE APPROVED EQUAL



NOTES:

1. STAINLESS STEEL INSERTS REQUIRED FOR ALL PACK JOINTS AND GRIP.
2. ALL SERVICE SADDLES SHALL HAVE RUBBER GASKET AND I.P. THREADS.



CITY OF YELM

5/8" DUAL METER SERVICE

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. JEG

DWG. NO.

4-2

DATE
12/2016

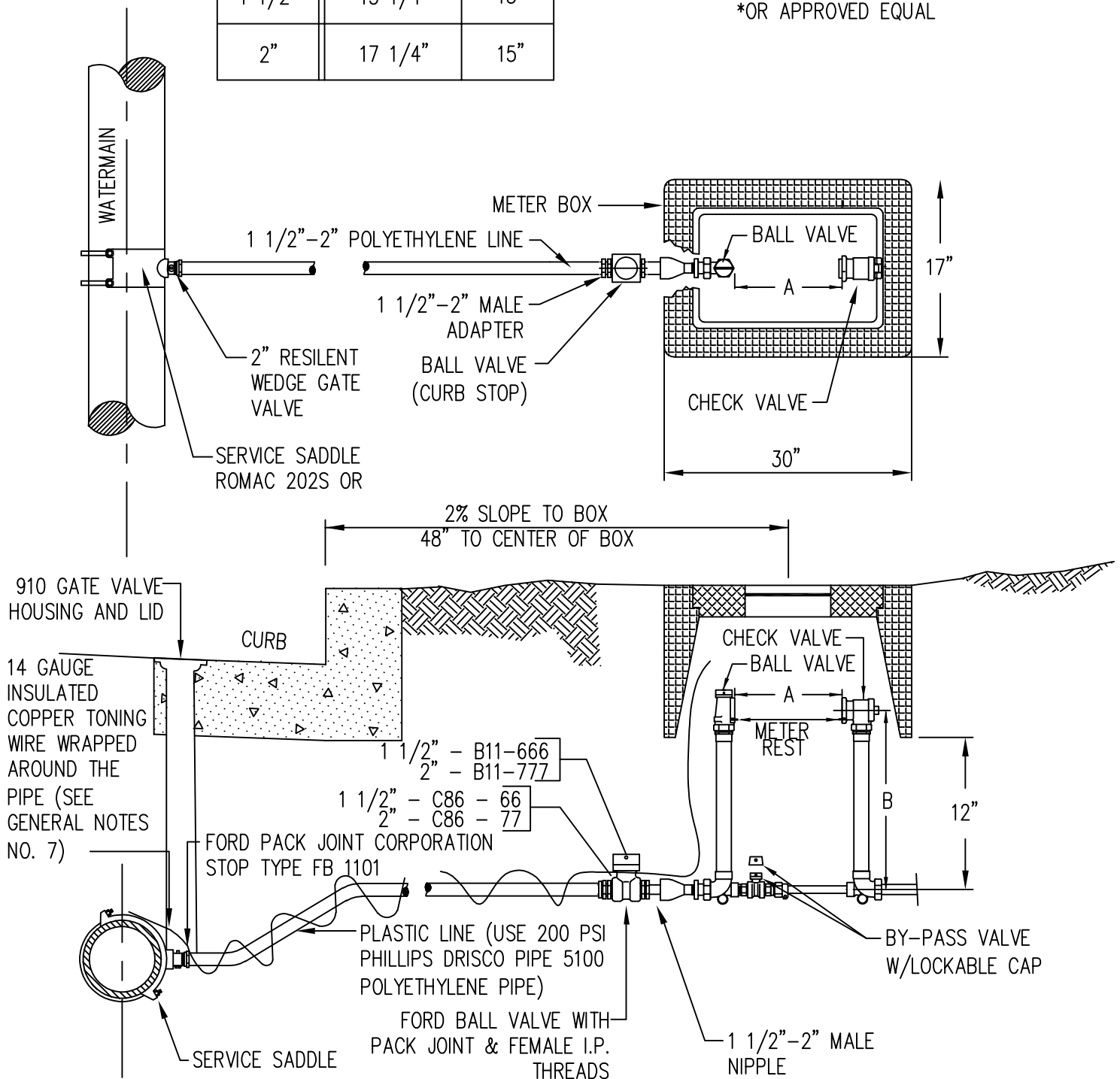
SIZE	A	B
1 1/2"	13 1/4"	15"
2"	17 1/4"	15"

APPROVED METER BOX

LID - *1730 DI READER LID

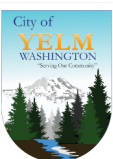
BOX - *BCF 1730 X 12 BASE

*OR APPROVED EQUAL



NOTES:

1. STAINLESS STEEL INSERTS REQUIRED FOR ALL PACK JOINTS.
2. ALL SERVICE SADDLES SHALL HAVE RUBBER 2. GASKET AND I.P. THREADS.
3. CITY STANDARD FOR COPPER SETTERS ARE: 1 1/2" - FORD VBH 76-15B13 OR EQUAL 2" - FORD VBH 77-15B17 OR EQUAL
4. ALL 1 1/2" AND 2" SADDLES WILL BE 2" TAPS WITH BRASS 2" NIPPLE AND 2" RESILIENT WEDGE GATE VALVE AND 910 HOUSING AND SDR-21 PVC PIPE HOUSING



CITY OF YELM

1 1/2" TO 2" METER SERVICE

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

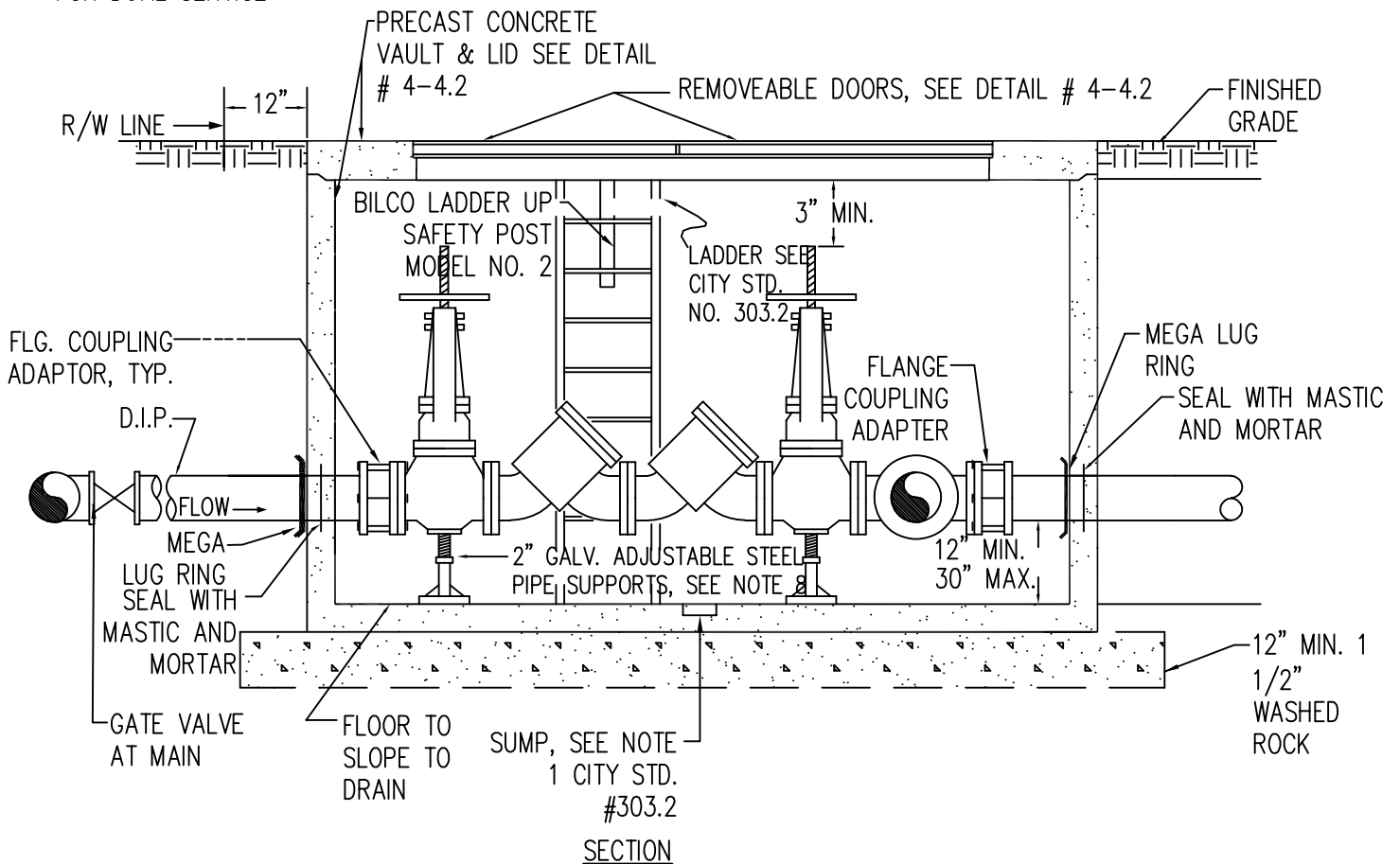
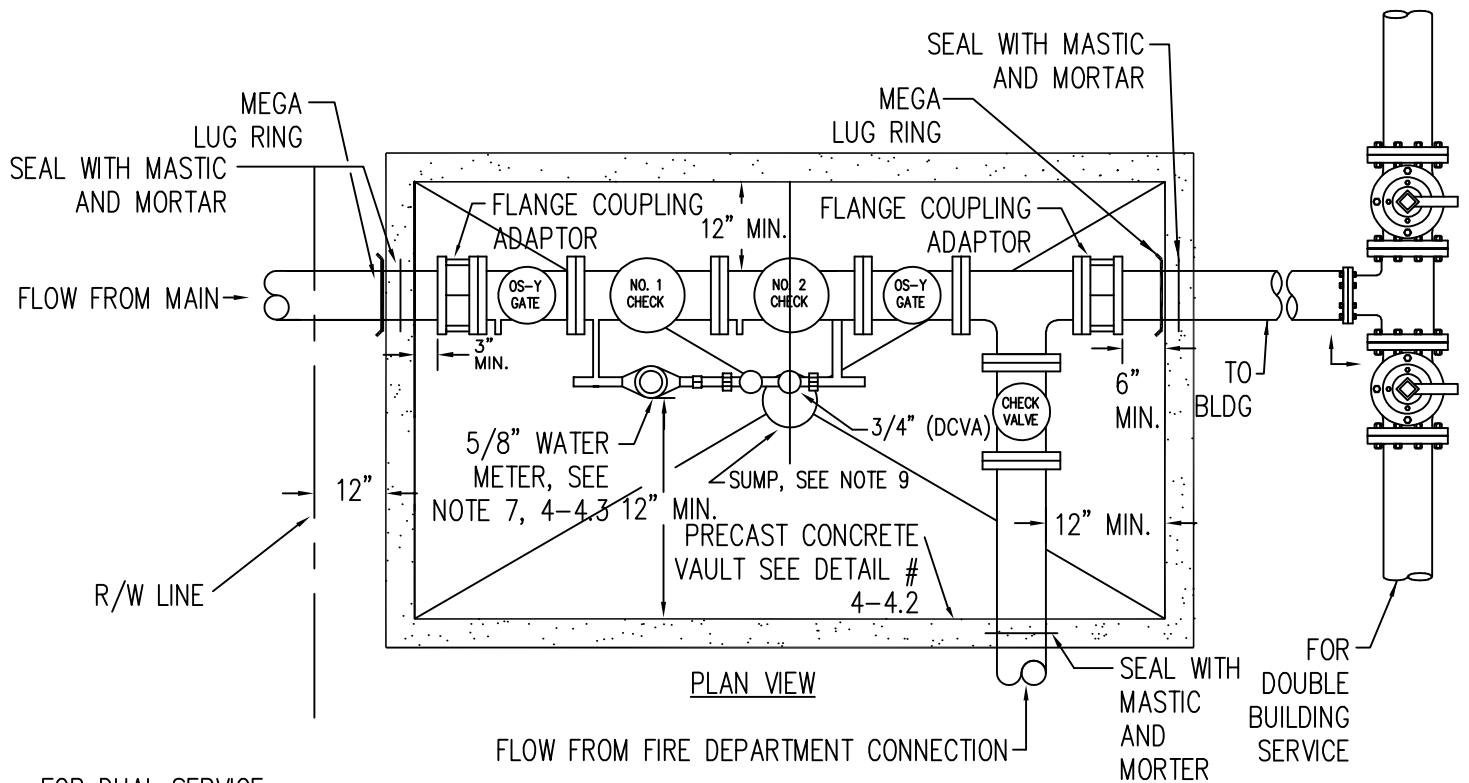
DWN. MKD

CKD. JEG

DWG. NO.

4-3

DATE
12/2016



CITY OF YELM
DOUBLE DETECTOR CHECK VALVE

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

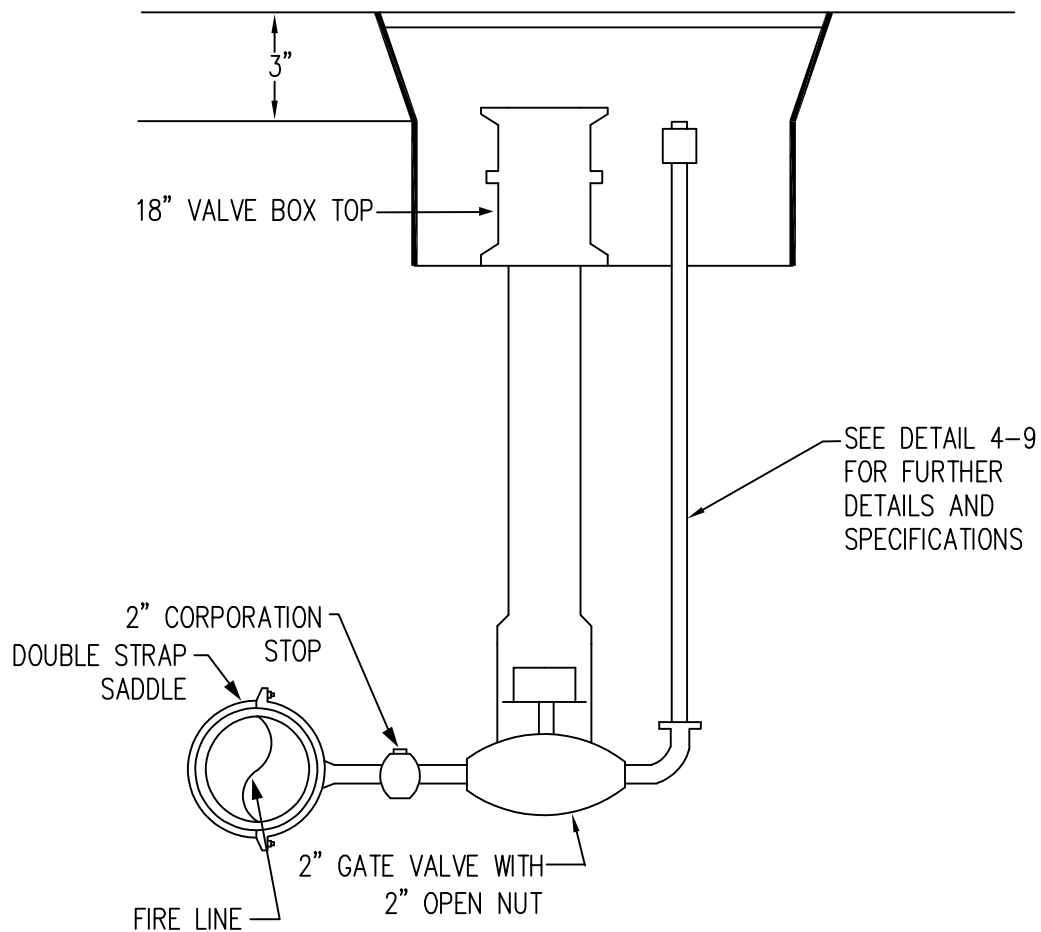
DWN. MKD

CKD. JEG

DWG. NO.

4-4

DATE
12/2016



CITY OF YELM

2 INCH BLOW-OFF ASSEMBLY

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

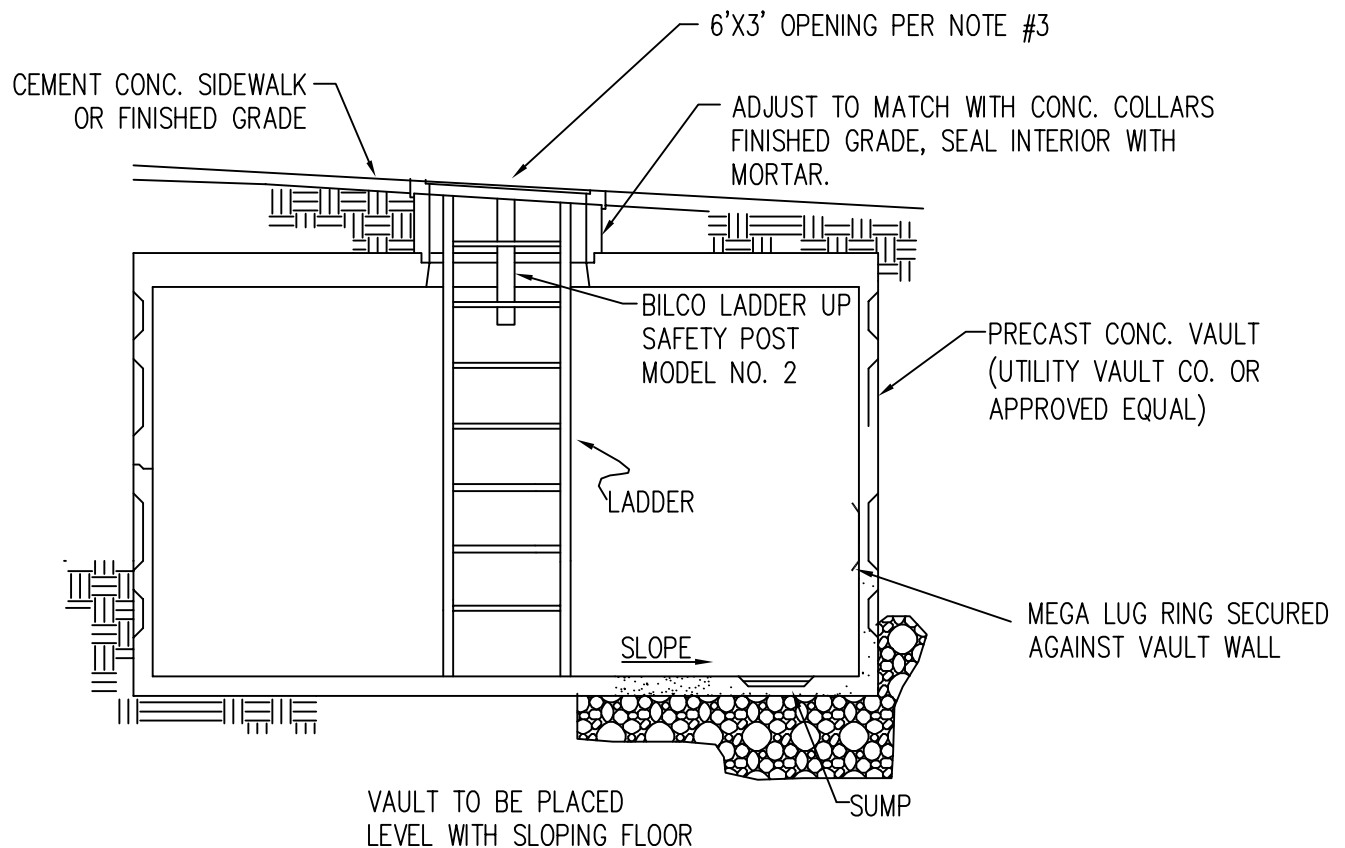
DWN. MKD

CKD. JEG

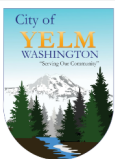
DWG. NO.

4-4.1

DATE
12/2016



1. IN AREAS OF HIGH GROUNDWATER A 1/4 HP SUMP PUMP SHALL BE INSTALLED IN THE SUMP PIT OF THE VAULT. IT SHALL BE WIRED PER WASHINGTON STATE ELECTRICAL CODE AND INSPECTED BY AT STATE ELECTRICAL INSPECTOR. THE DISCHARGE PIPE SHALL BE CONNECTED TO THE NEAREST APPROVED ON-SITE STORM DRAINAGE STRUCTURE OR DRAIN TO DAYLIGHT. WHERE NO GROUNDWATER IS PRESENT USE A 2"Ø DRAIN HOLE WITH 1/4 CUBIC YARD OF WASHED DRAIN ROCK.
2. THE VAULT SHALL BE A PRECAST CONCRETE VAULT SIZED TO MEET THE CLEARANCE REQUIREMENTS SHOWN ON DETAIL #4-5.
3. REMOVABLE DOORS SHALL BE A MINIMUM OF 6'-0" X 3'-0" DIAMOND PLATE HINGED LOCKING DOORS, WITH HINGES LOCATED AT EACH END OF OPENING. DOORS SHALL HAVE AN H-20 LOAD RATING IN AREAS THAT ARE SUBJECT TO VEHICLE TRAFFIC. DOORS SHALL BE SPRING LOADED WITH OPEN POSITION LOCK.
4. A GALVANIZED LADDER SHALL BE SET INSIDE THE VAULT FOR ACCESS INTO THE VAULT. IT SHALL BE SECURED TO THE VAULT WITH 1/2" DIA. BOLTS EPOXIED TO THE VAULT LID AND FLOOR.
5. A BILCO LADDER UP SAFETY POST MODEL NO. 2 SHALL BE ATTACHED TO THE LADDER STEPS.



CITY OF YELM

WATER VAULT DETAILS

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. JEG

DWG. NO.

4-4.2

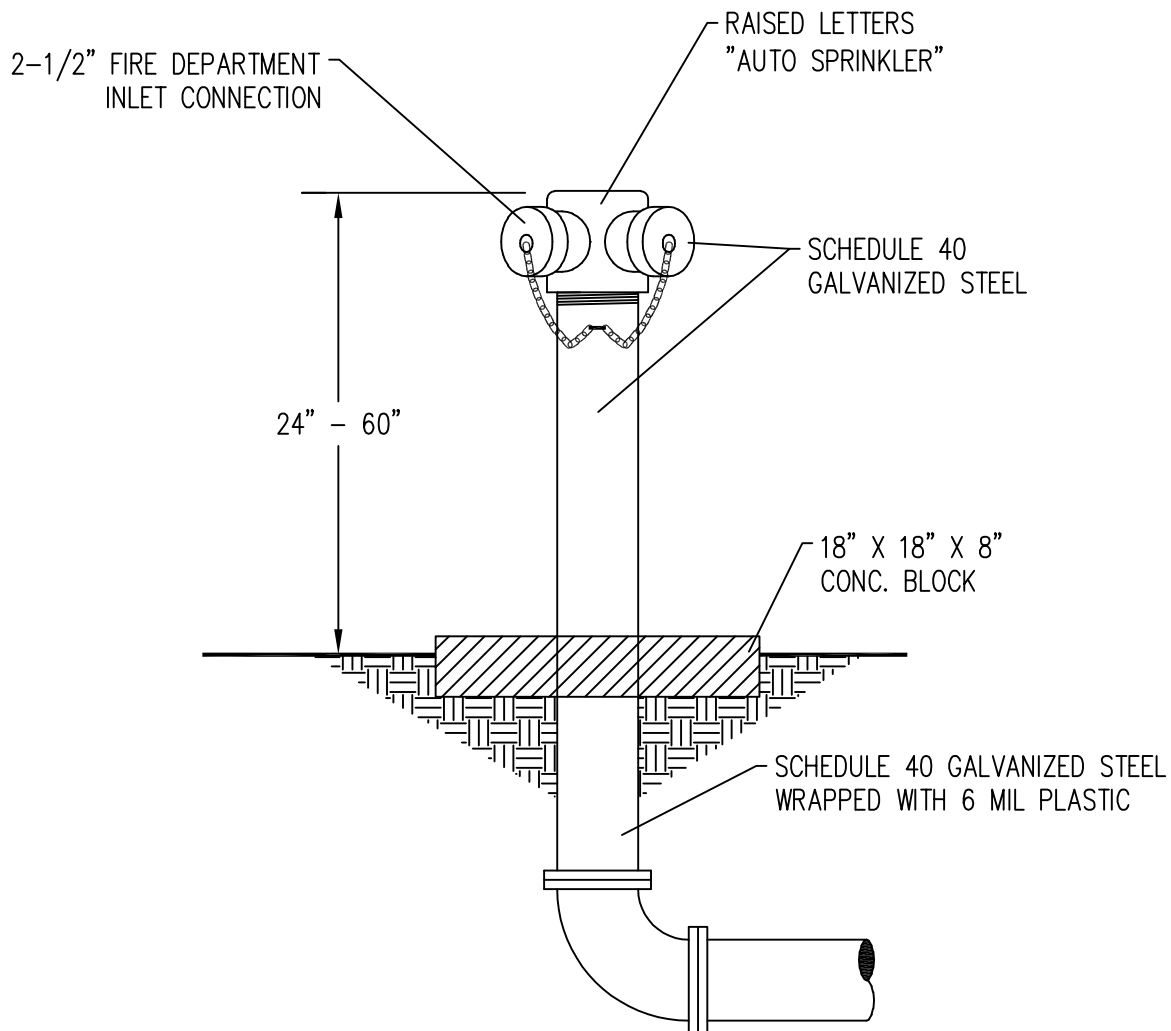
DATE
12/2016

NOTES FOR: DOUBLE DETECTOR CHECK VALVE ASSEMBLY (DDCVA) INSTALLATION

1. INSTALLATION OF THE APPROVED BACKFLOW ASSEMBLY SHALL BE IN ACCORDANCE WITH THE "BACKFLOW PREVENTION AND CROSS-CONNECTION CONTROL: RECOMMENDED PRACTICES" MANUAL, OF THE CROSS-CONNECTION CONTROL COMMITTEE, PACIFIC N.W. SECTION OF THE A.W.W.A., FEBRUARY 2015 OR CURRENT ADDITION.
2. BACKFLOW ASSEMBLY MUST BE SELECTED FROM WASHINGTON STATE DEPARTMENT OF HEALTH LIST OF BACKFLOW PREVENTION ASSEMBLIES APPROVED FOR INSTALLATION IN WASHINGTON STATE, LATEST EDITION.
3. UPON INSTALLATION OF THE APPROVED BACKFLOW ASSEMBLY, (AND YEARLY THEREAFTER), THE ASSEMBLY SHALL BE TESTED BY A WASHINGTON STATE CERTIFIED BACKFLOW ASSEMBLY TESTER, WHO SHALL PROMPTLY FORWARD THE TEST RESULTS TO: THE CITY OF YELM, WATER DEPARTMENT, PRIOR TO OCCUPANCY.
4. DOUBLE DETECTOR CHECK VALVE ASSEMBLY OS & Y GATE VALVES SHALL HAVE SUPERVISED TAMPER SWITCHES.
5. ALL ELECTRICAL SHALL BE INSPECTED BY BY A WASHINGTON STATE ELECTRICAL INSPECTOR.
6. DDCVA MUST BE PURCHASED AS A UNIT. NO MODIFICATIONS TO ASSEMBLY ARE ALLOWED.
7. WATER METER SHALL BE CITY OF YELM APPROVED, READING IN CUBIC FEET.
8. PIPE SUPPORTS SHALL BE RUST-PROTECTED WITH ALUMINUM PAINT.
9. THE FIRE DEPARTMENT CONNECTION SHALL BE LOCATED WITHIN 15 FEET OF A FIRE HYDRANT BUT NOT LESS THAN 10 FEET.
10. WHEN DDCVA IS LOCATED WITHIN A BUILDING, THE BALL DRIP SHALL DRAIN TO THE NEAREST APPROVED CATCH BASIN.



CITY OF YELM		APPROVED BY		DWG. NO.
DOUBLE DETECTOR CHECK VALVE NOTES		PUBLIC WORKS DIRECTOR DATE		4-4.3
		DES. MKD	DWN. MKD	DATE 12/2016
		CKD. JEG		



CITY OF YELM

FIRE DEPARTMENT CONNECTION

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. JEG

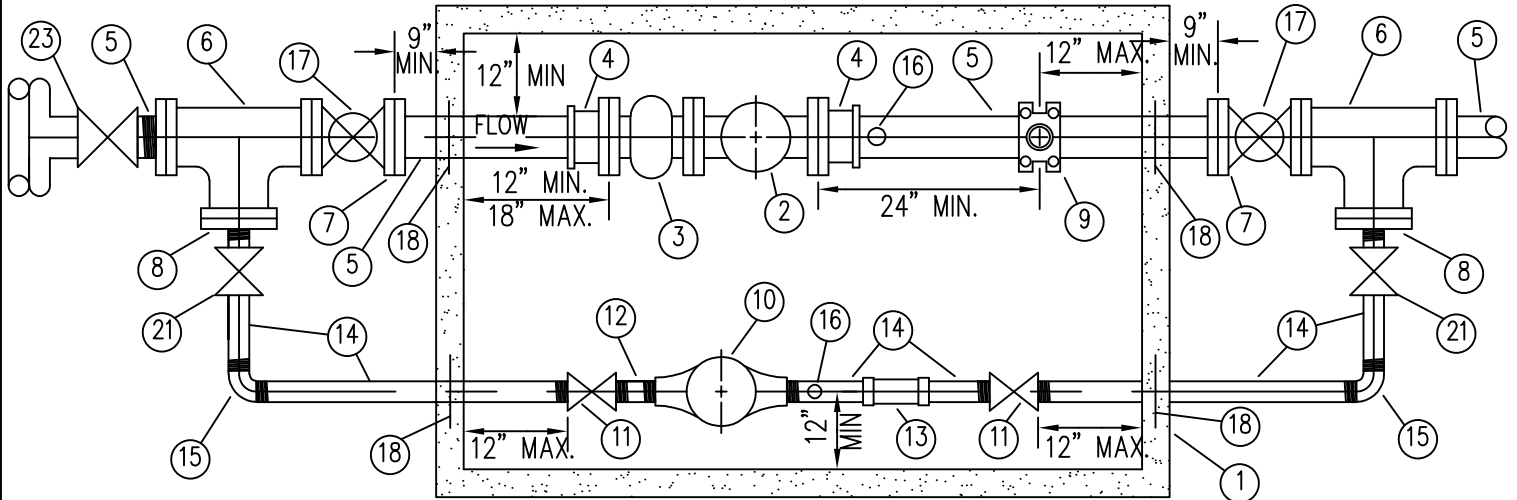
DWG. NO.

4-4.4

DATE
12/2016

-GENERAL NOTES-

1. ALL PIPE, VALVES, FITTINGS AND OTHER MATERIAL USED SHALL CONFORM TO AWWA STANDARDS (LATEST EDITION).
2. ALL CONSTRUCTION SHALL CONFORM TO WSDOT/APWA STANDARDS SPECIFICATIONS, 2000 EDITION, AND CITY OF YELM STANDARDS.



- ① VAULT, UTILITY VAULT OR APPROVED EQUAL, SIZED TO MAINTAIN CLEARANCES AS SHOWN.
- ② **COMPOUND PRO READ METER – READS IN CUBIC FEET.
- ③ *FLANGED STRAINER.
- ④ *FLANGED COUPLING ADAPTOR.
- ⑤ *DUCTILE IRON PIPE—CLASS 50 INSTALL VALVE AT MAIN LINE TEE.
- ⑥ *X*X* TEE (MJxFLGxFLG).
- ⑦ *GATE VALVE (FLGxMJ) W/2\" THRD. PLUG – SAME SIZE PIPE
- ⑧ *BLIND FLANGED W/2\" THREADED OUTLET.
- ⑨ *x2\" DOUBLE STRAP D.I. SADDLE W/2\" THRD. PLUG.
- ⑩ **2\" PRO READ – READS IN CUBIC FEET.
- ⑪ 2\" GATE VALVE, KENNEDY FIG. 982 W/HANDWHEEL.
- ⑫ 2\"x6\" THRD. GALV. NIPPLE.
- ⑬ 2\" COMPRESSION COUPLING, ROCKWELL #522.
- ⑭ 2\" THRD. GALV. PIPE—CUT TO LENGTH REQUIRED.
- ⑮ 2\" THRD. GALV. ELL.
- ⑯ 2\" ADJUSTABLE PIPE SUPPORT—GALVANIZED.
- ⑰ VALVE BOX W/WATER MARKED ON LID.
- ⑱ MASTIC AND MORTAR SEAL.
- ⑲ REMOVABLE DOORS SHALL BE A MINIMUM OF 6'-0\" X 3'-0\" DIAMOND PLATE HINGED LOCKING DOORS, WITH HINGES LOCATED AT EACH END OF OPENING. DOORS SHALL HAVE AN H-20 LOAD RATING IN AREAS THAT ARE SUBJECT TO VEHICLE TRAFFIC. DOORS SHALL BE SPRING LOADED WITH OPEN POSITION LOCK.
- ⑳ VAULT SHALL DRAIN TO DAYLIGHT OR STORM DRAIN. * = 3\",4\",OR 6\" DEPENDING ON SERVICE LINE SIZE NOTE: APPROVED EQUAL SUBSTITUTIONS MAY BE MADE FOR MOST MATERIALS, EXCEPT THE METER AND THE PIPE.
- ㉑ 2\" SQUARE NUT RISILIENT WEDGE GATE VALVE AND HOUSING PER STANDARD DETAIL.
- ㉒ BY-PASS FOR MEDICAL ONLY
- ㉓ *X\" GATE VALVE

** CITY TO SUPPLY METER AT THE OWNER'S EXPENSE. METER TO BE READ ONLY BY YELM METER READING EQUIPMENT.



CITY OF YELM

3\"-4\"-6\" WATER METER

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

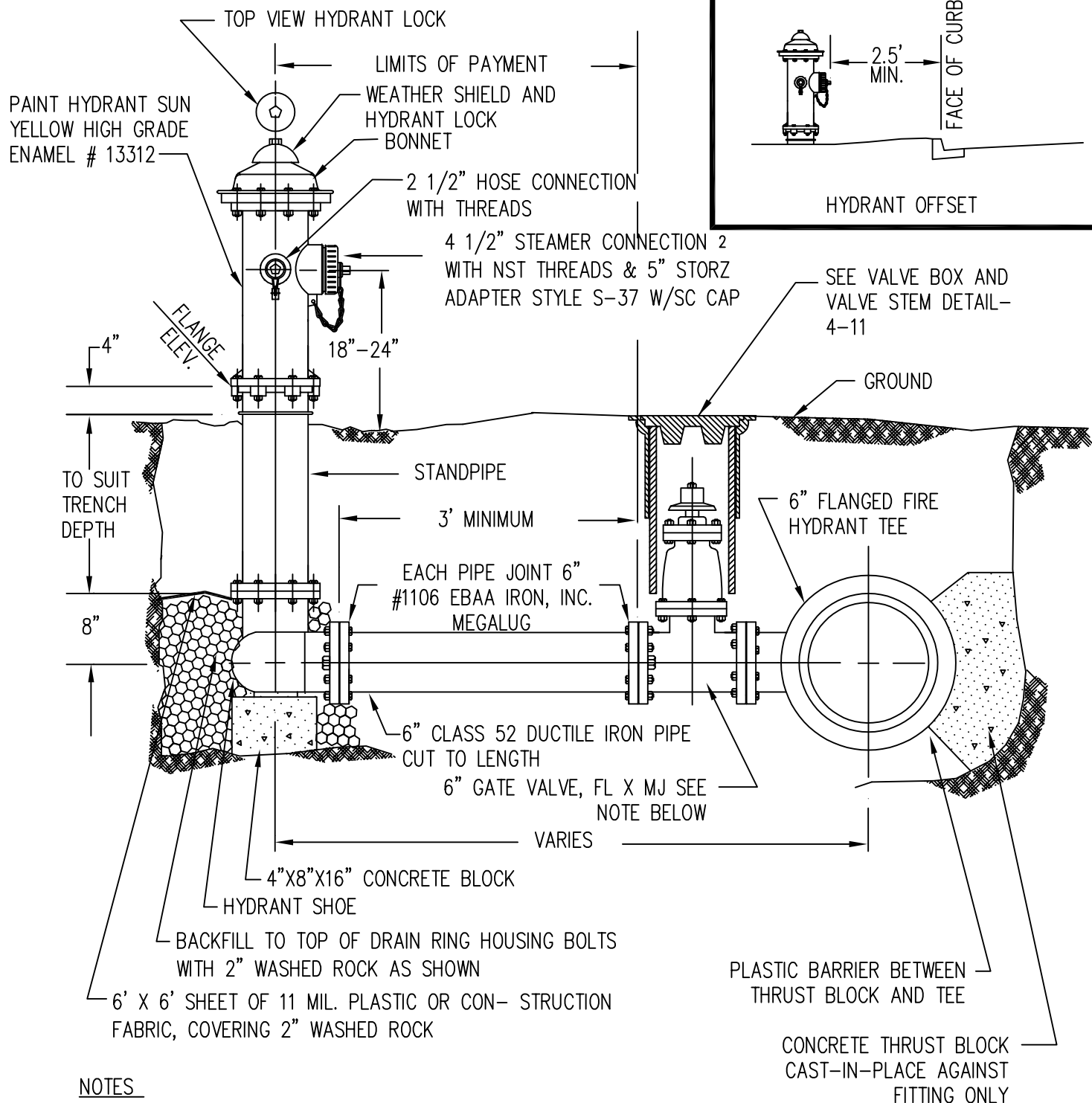
DWN. MKD

CKD. JEG

DWG. NO.

4-5

DATE
12/2016



NOTES

1. HYDRANTS SHALL BE LOCATED IN ACCORDANCE WITH SECTION 6.060. IN ADDITION, A MINIMUM THREE FOOT RADIUS UNOBSTRUCTED WORKING AREA SHALL BE PROVIDED AROUND ALL HYDRANTS.
2. HYDRANTS SHALL BE DRESSER M & H RELIANT STYLE 129, CLOW MEDALLION OR AMERICAN AVK SERIES 2780 OR MUELLER CENTURION
3. GATE VALVES SHALL BE RESILIENT WEDGE NRS WITH O-RING SEALS. VALVE ENDS SHALL BE MECHANICAL JOINT BY ANSI FLANGES. VALVES SHALL CONFORM TO AWWA 509-80. VALVES SHALL BE MUELLER M&H, KENNEDY, CLOW R/W OR WATEROUS SERIES 500.
4. FIRE HYDRANT LOCK PAYMENT IS REQUIRED CITY WILL ORDER AND INSTALL.



CITY OF YELM

FIRE HYDRANT

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. JEG

DWG. NO.

4-7

DATE
12/2016

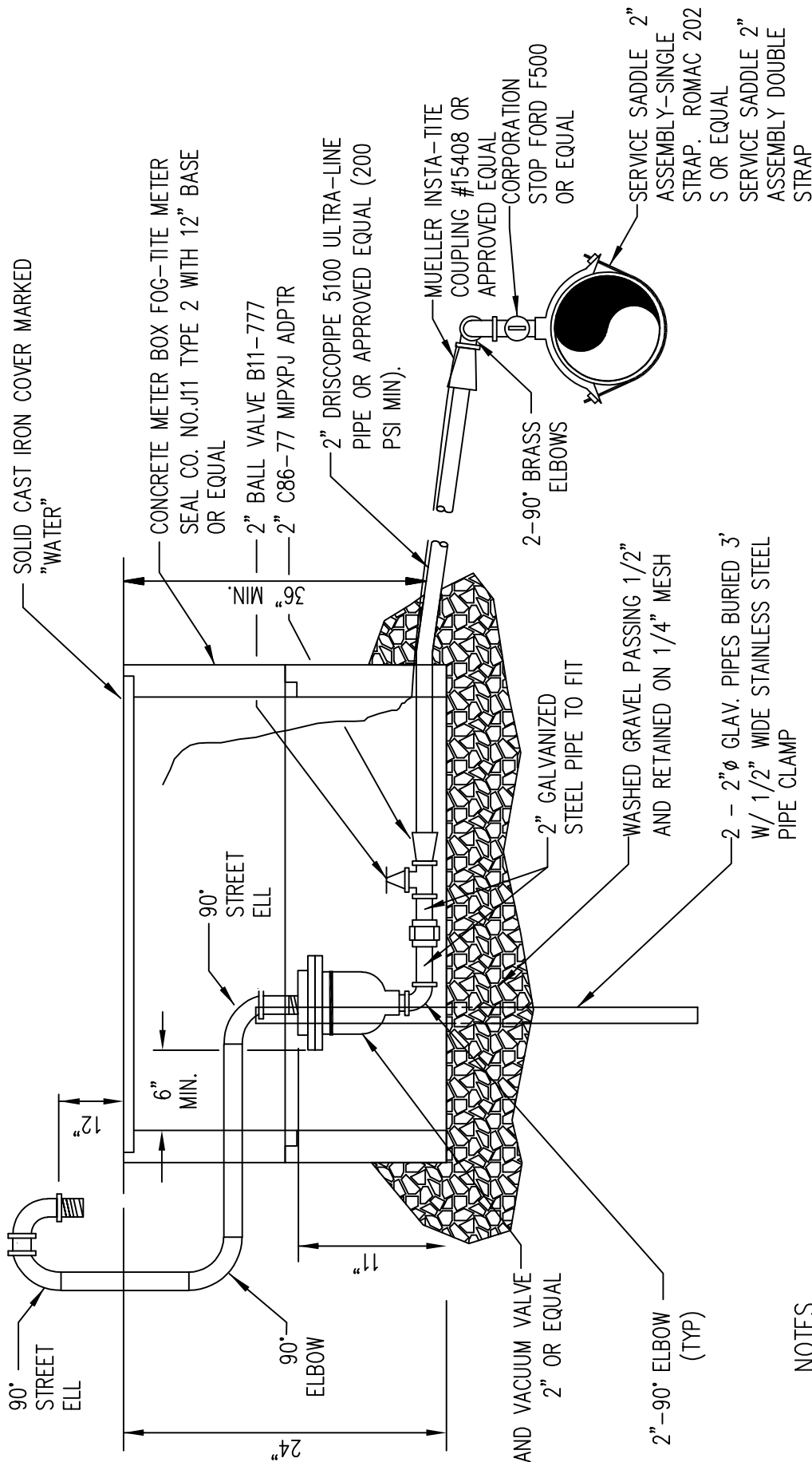


CITY OF YELM

2" AIR AND VACUUM RELEASE VALVE

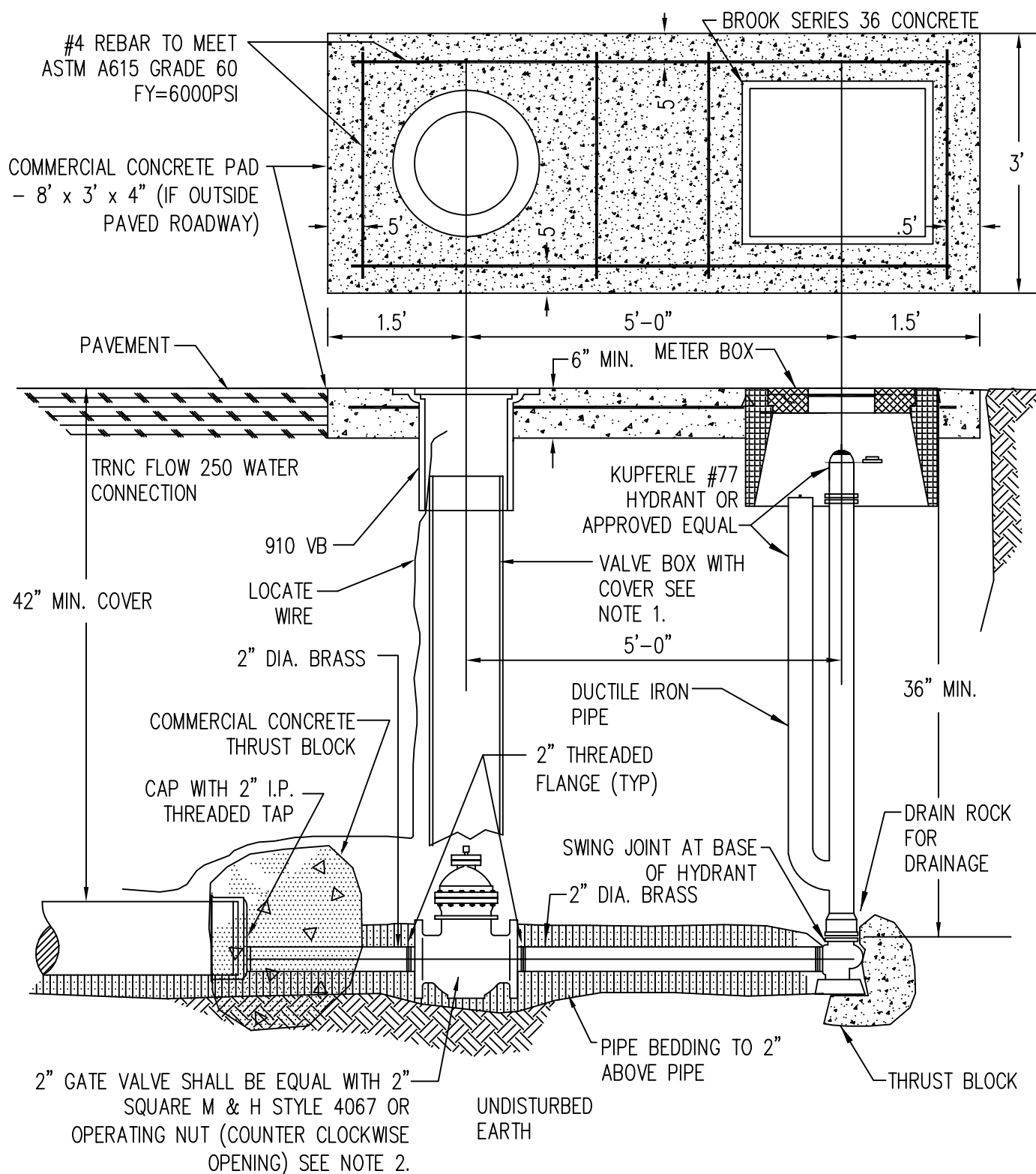
APPROVED BY		
PUBLIC WORKS DIRECTOR		
DES. MKD	DWN. MKD	CKD. JEG

DWG. NO.
4-8
DATE
12/2016



NOTES

1. AIR & VACUUM VALVE ASSEMBLY MUST BE INSTALLED AT HIGHEST POINT OF LINE.
2. REMOVE ALL FOR KNOCKOUTS TO ALLOW FOR DRAINAGE.
3. FACE OF METER BOX TO BE LOCATED 1' IN BACK OF CURB.
4. WHERE AIR RELEASE VALVE FALLS OUTSIDE OF PLANNED IMPROVEMENTS. REPAIR SIDEWALK TO MATCH EXISTING.
5. THE WATER SERVICE LINE SHALL HAVE 36" OF COVER BELOW FINISH GRADE.
6. METALLIC (DETECTABLE MARKING) TAPE SHALL BE COLOR CODE BLUE AND SHALL BE IMPRINTED CONTINUOUSLY OVER ITS ENTIRE LENGTH IN PERMANENT BLACK INK, WITH THE MESSAGE "WATER LINE BURIED BELOW" AND THE WORD "CAUTION" PROMINENTLY SHOWN. TAPE SHALL BE A 2" MIN WIDTH AND WILL HAVE LOCATE WIRE.



NOTES:

1. VALVE BOX AND COVER SHALL BE PER YELM VALVE BOX
DETAIL 6-11.
2. WATERMAINS WHICH WILL BE EXTENDED IN THE FUTURE, THE
VALVE WHICH OPERATES THE BLOWOFF ASSEMBLY SHALL BE
THE SAME SIZE AND INSTALLED ON THE MAINLINE AND
PROVIDED WITH A CONCRETE THRUST BLOCK.



CITY OF YELM

2" BLOW-OFF ASSEMBLY

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

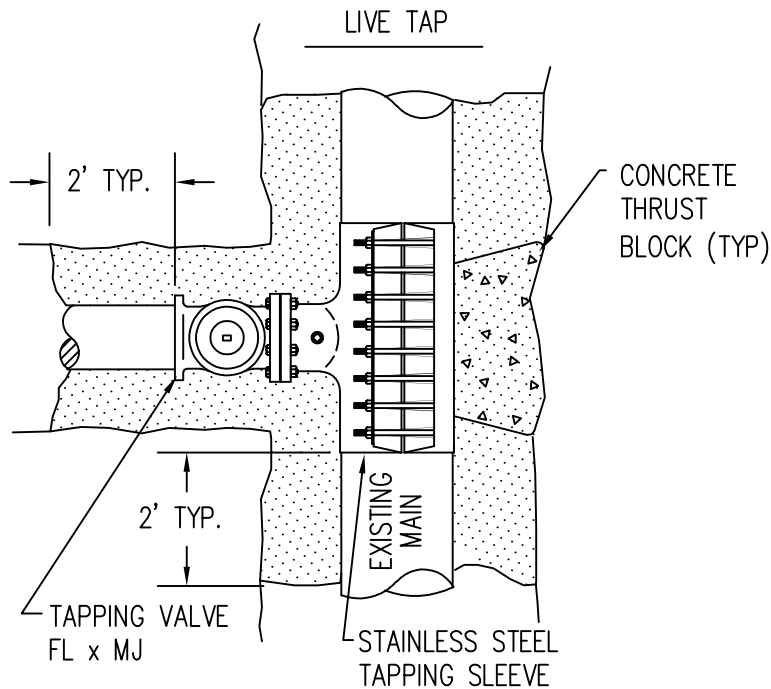
DWN. MKD

CKD. JEG

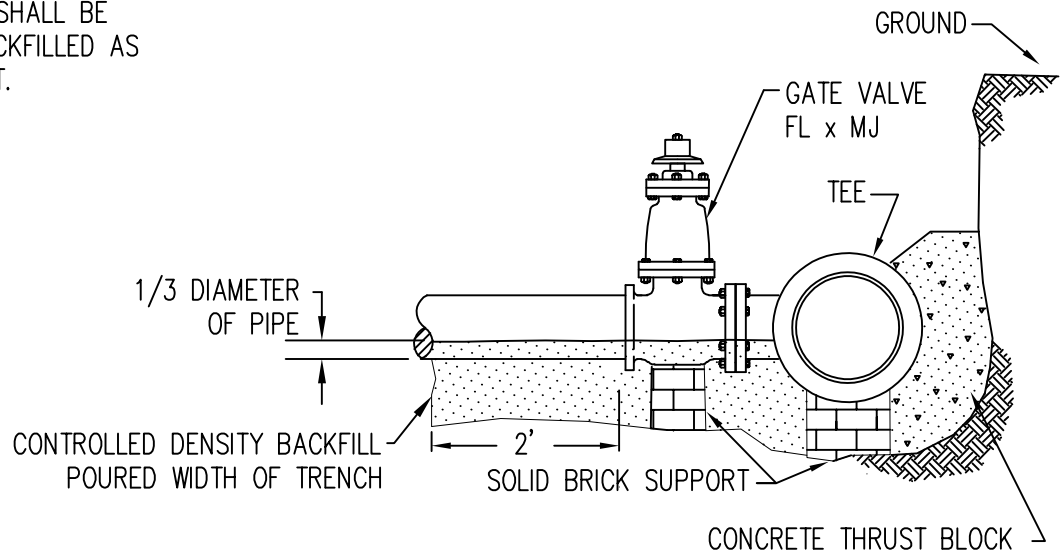
DWG. NO.

4-9

DATE
12/2016



VALVE AND SLEEVE SHALL BE
SUPPORTED AND BACKFILLED AS
SHOWN BELOW-RIGHT.



NOTES:

1. 11 MIL PLASTIC OR CONSTRUCTION FABRIC SHALL BE WRAPPED AROUND PIPE AND FITTINGS BEFORE THRUST BLOCK AND BACKFILL ARE POURED.
2. MJ CUT IN TEES SHALL NOT BE PERMITTED.
3. SUPPORT VALVE AND SLEEVE CONTINUOUSLY THROUGH INSTALLATION.



CITY OF YELM

CONNECTION TO EXISTING MAIN

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

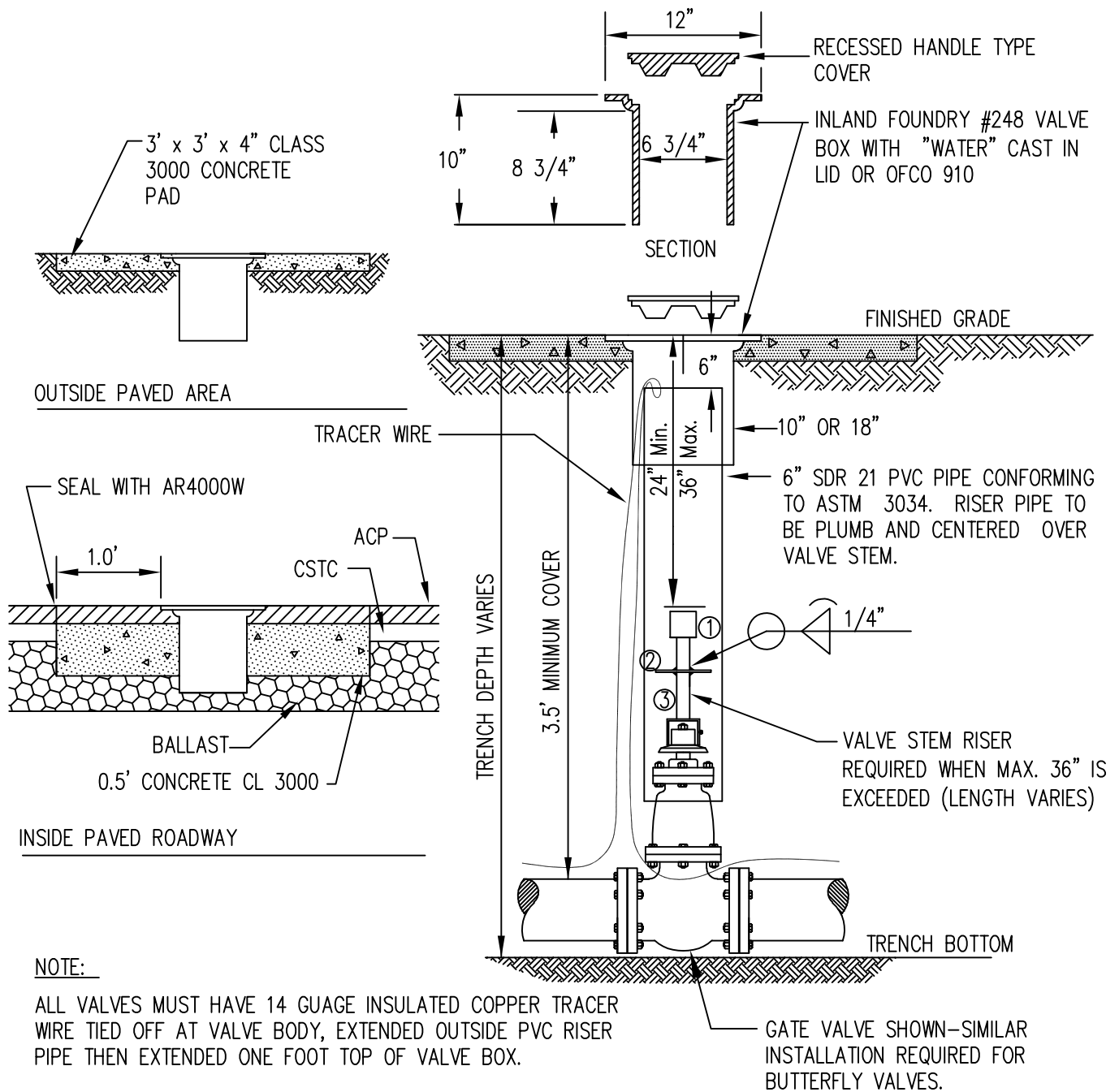
DWN. MKD

CKD. JEG

DWG. NO.

4-10

DATE
12/2016



CITY OF YELM

STANDARD VALVE BOX

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

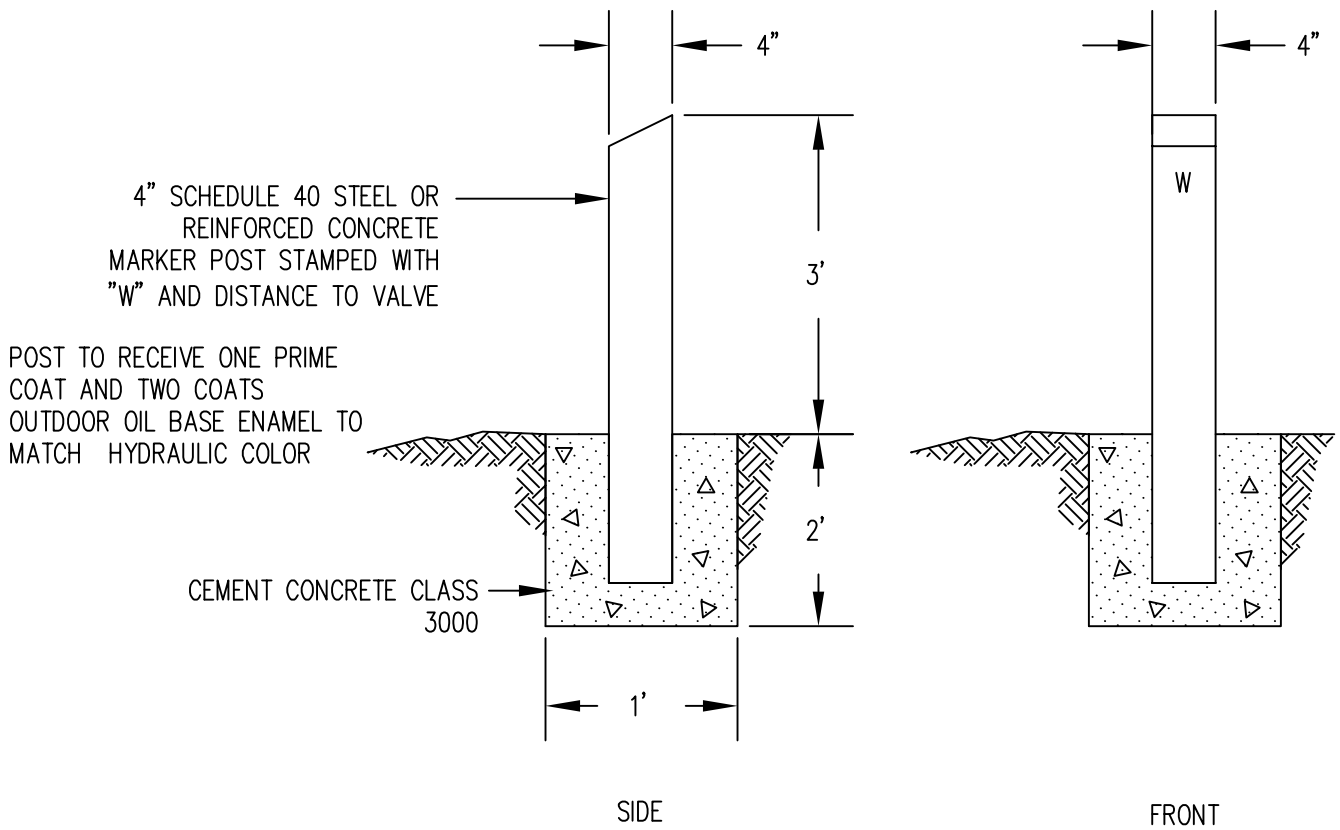
DWN. MKD

CKD. JEG

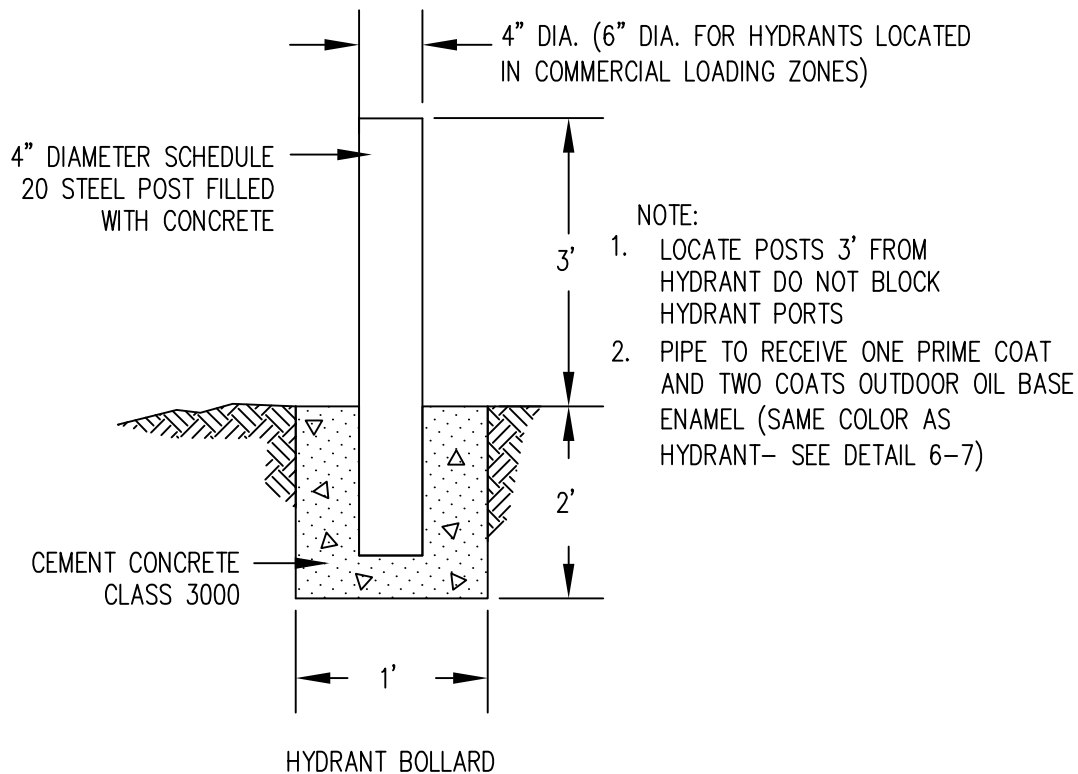
DWG. NO.

4-11

DATE
12/2016



VALVE MARKER POST



CITY OF YELM

**VALVE MARKER POST &
HYDRANT BOLLARD DETAIL**

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

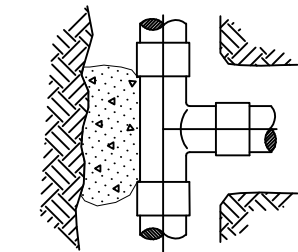
DES. MKD

DWN. MKD

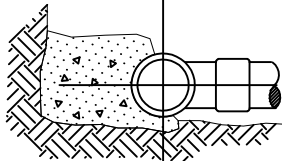
CKD. JEG

DWG. NO.
4-12

DATE
12/2016

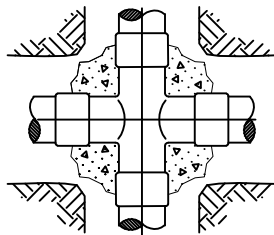


TOP VIEW

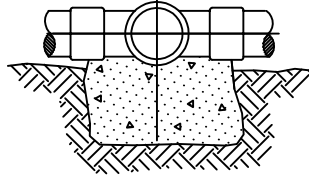


SIDE VIEW

TEE

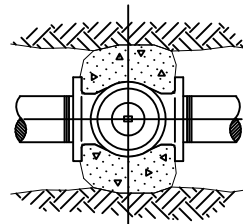


TOP VIEW

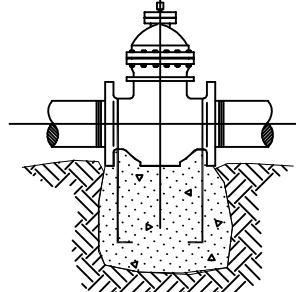


SIDE VIEW

CROSS

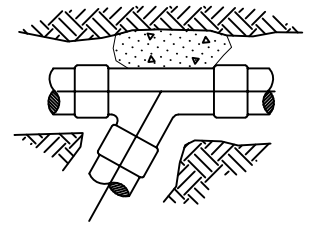


TOP VIEW

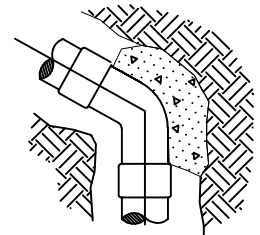


SIDE VIEW

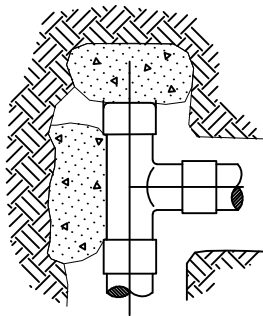
GATE VALVE



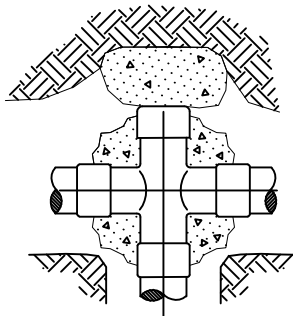
WYE



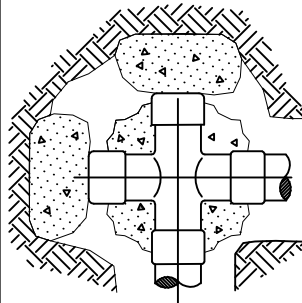
HORIZ. BEND



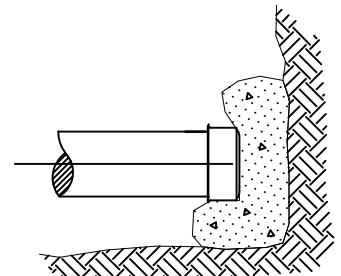
TEE WITH
PLUG



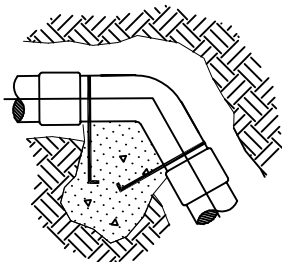
CROSS WITH
PLUG



CROSS WITH
PLUGS



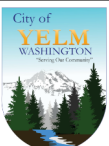
PLUG OR CAP



45° - 90°
VERTICAL BEND

NOTES:

1. CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
2. PLASTIC BARRIER SHALL BE PLACED BETWEEN ALL THRUST BLOCKS & FITTINGS.
3. ANCHOR REBAR SHALL BE 5/8" MINIMUM DIAMETER.



CITY OF YELM

STANDARD BLOCKING DETAIL

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. JEG

DWG. NO.

4-13

DATE
12/2016

THRUST LOADS

THRUST AT FITTINGS IN POUNDS AT 200 POUNDS PER SQUARE INCH OF WATER PRESSURE

PIPE DIAMETER	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	DEAD END OR TEE
4"	3,600	2,000	1,000	500	2,600
6"	8,000	4,400	2,300	1,200	5,700
8"	14,300	7,700	4,000	2,000	10,100
10"	22,300	12,100	6,200	3,100	15,800
12"	32,000	17,400	8,900	4,500	22,700
14"	43,600	23,600	12,100	6,100	30,800
16"	57,000	30,800	15,700	7,900	40,300

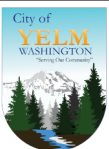
NOTES:

1. BLOCKING SHALL BE CEMENT CONCRETE CLASS 3000 POURED IN PLACE AGAINST UNDISTURBED EARTH. FITTING SHALL BE ISOLATED FROM CONCRETE THRUST BLOCK WITH PLASTIC OR SIMILAR MATERIAL.
2. TO DETERMINE THE BEARING AREA OF THE THRUST BLOCK IN SQUARE FEET (S.F.).
EXAMPLE : 12" - 90° BEND IN SAND AND GRAVEL $32,000 \text{ LBS} \div 3000 \text{ LB/S.F.} = 10.7 \text{ S.F. OF AREA}$
3. AREAS MUST BE ADJUSTED FOR OTHER PIPE SIZE, PRESSURES AND SOIL CONDITIONS.
4. BLOCKING SHALL BE ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.

SAFE SOIL BEARING LOADS

FOR HORIZONTAL THRUSTS WHEN THE DEPTH OF COVER OVER THE PIPE EXCEEDS 2 FEET

SOIL	POUNDS PER SQUARE FOOT
MUCK, PEAT	0
SOFT CLAY	1,000
SAND	2,000
SAND & GRAVEL	3,000
SAND & GRAVEL CEMENTED WITH CLAY	4,000
HARD SHALE	10,000



CITY OF YELM

THRUST LOADS

APPROVED BY

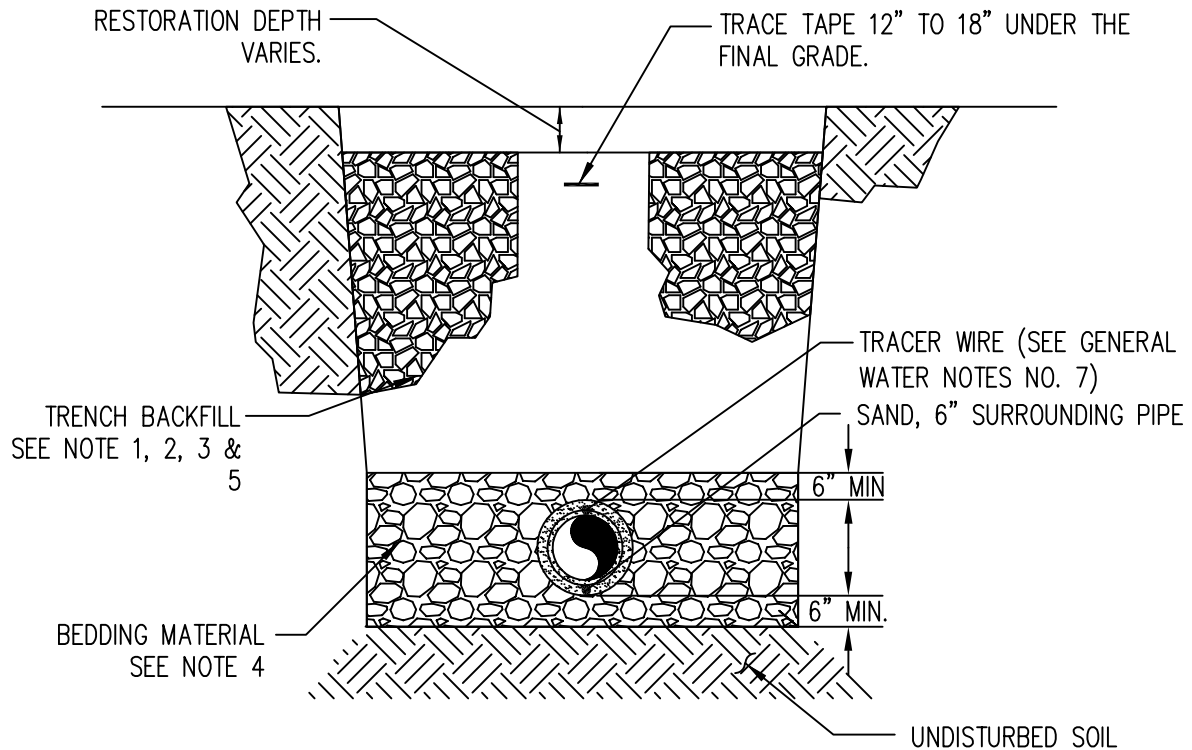
PUBLIC WORKS DIRECTOR DATE

DES. MKD	DWN. MKD	CKD. JEG
----------	----------	----------

DWG. NO.

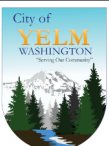
4-14

DATE
12/2016



NOTES:

1. A MINIMUM COVER OF 3.5' SHALL BE MAINTAINED, EXCEPT AS REQUIRED AT CONNECTION POINTS.
2. NATIVE BACKFILL SHALL CONSIST OF CRUSHED, PROCESSED, OR NATURALLY OCCURRING GRANULAR MATERIAL. IT SHALL BE ESSENTIALLY FREE FROM VARIOUS TYPES OF WOOD WASTE OR OTHER EXTRANEIOUS OR OBJECTIONABLE MATERIALS. IT SHALL HAVE SUCH CHARACTERISTICS OF SIZE AND SHAPE THAT IT WILL COMPACT READILY COMPACT.
3. NATIVE TRENCH BACKFILL MATERIAL SHALL BE SORTED OR SCREENED SO THAT THE MAXIMUM AGGREGATE SHALL IS 4-INCHES.
4. PIPE BEDDING MATERIAL SHALL BE SAND OR OTHER CITY APPROVED EQUAL. NO SUBSTUTIONS WILL BE ALLOWED WITHOUT WRITTEN AUTHORIZATION FROM THE CITY OF YELM.
5. WHERE NATIVE MATERIALS HAVE BEEN DEEMED UNACCEPTABLE BY THE CITY, TRENCH BACKFILL SHALL MEET THE WSDOT STANDARD SPECIFICATIONS FOR THE PIPE TYPE BEING SPECIFIED.



CITY OF YELM
**TYPICAL WATER MAIN TRENCH &
 BEDDING**

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

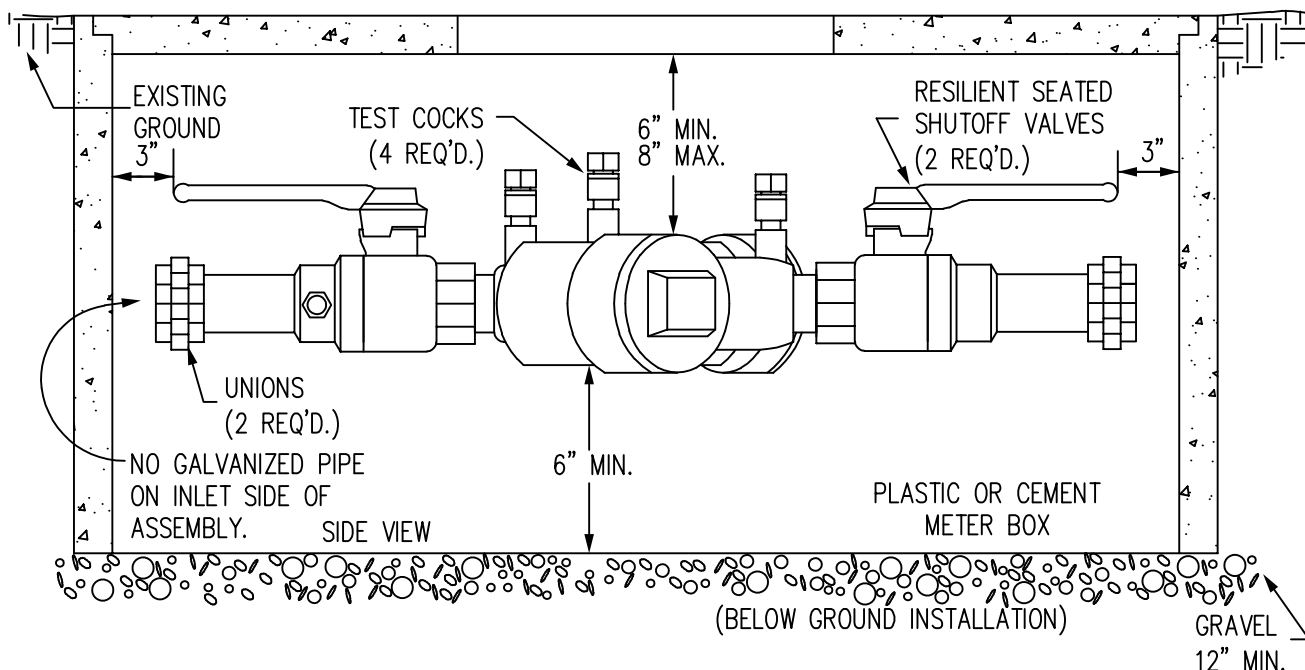
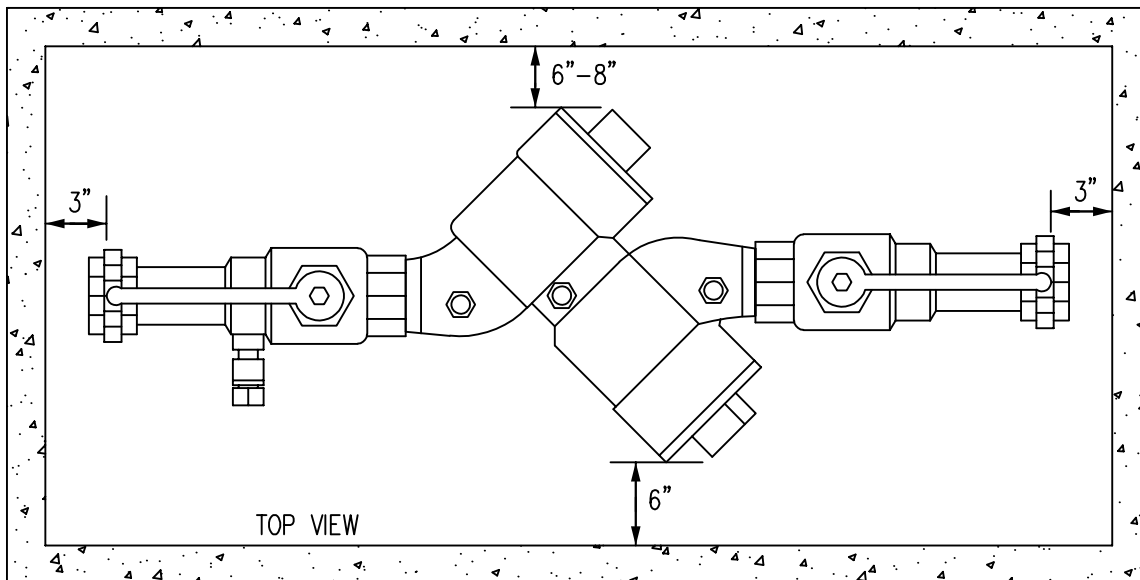
DES. MKD

DWN. MKD

CKD. JEG

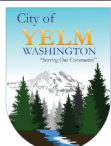
DWG. NO.
4-15

DATE
 12/2016



NOTE: ALL ITEMS SHALL COMPLY WITH THE FOLLOWING.

- APPROVED DOUBLE CHECK VALVE ASSEMBLY SHALL LAY HORIZONTAL WITH GROUND.
- DESIGNED FOR BACK SIPHONAGE AND BACK PRESSURE.
- THOROUGHLY FLUSH LINES PRIOR TO INSTALLATION OF BACK FLOW PREVENTER
- NO GALVANIZED PIPE BEFORE ASSEMBLY
- THE DCVA MAY BE INSTALLED ABOVE OR BELOW THE GROUND PROVIDED ALL CLEARANCES ARE MET.
- DO NOT INSTALL IN AN AREA SUBJECT TO FLOODING.
- VALVE SHALL BE PROTECTED FROM FREEZING CONDITIONS.
- THE BACK FLOW ASSEMBLY SHALL BE A CURRENT WASHINGTON STATE DEPT. HEALTH APPROVED MODEL.
- A PLUMBING PERMIT IS REQUIRED.



CITY OF YELM DOUBLE CHECK VALVE ASSEMBLY 2" AND SMALLER

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

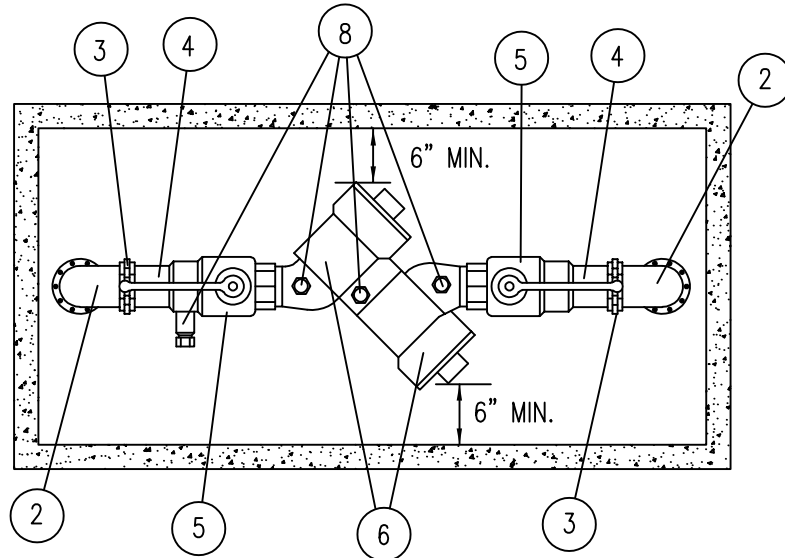
DWN. MKD

CKD. JEG

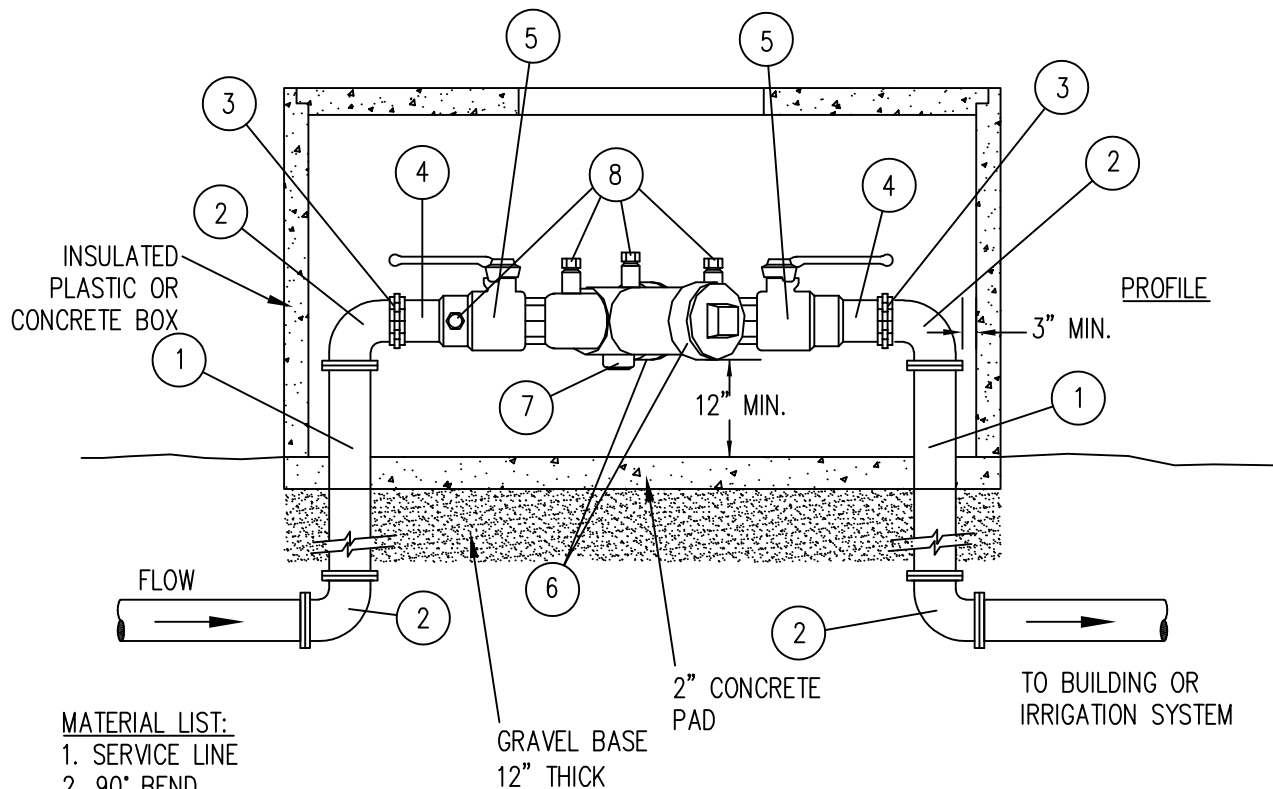
DWG. NO.

4-16

DATE
12/2016



PLAN



MATERIAL LIST:

1. SERVICE LINE
2. 90° BEND
3. UNION
4. NIPPLE
5. SHUT-OFF VALVE
6. CHECK VALVE (D.S.H.S. APPROVED)
7. RELIEF VALVE
8. TESTS COCKS
9. DRAIN TO DAYLIGHT
10. PLUGS IN TEST COCKS

GENERAL NOTES:

- A. THOROUGHLY FLUSH LINES PRIOR TO INSTALLATION.
- B. DIAMETER OF PIPE AND FITTINGS =
- C. REFER TO DEVELOPMENT GUIDELINES SECTION 6.110 FOR FURTHER INFORMATION.
- D. DO NOT INSTALL IN AREA SUBJECT TO FLOODING.



CITY OF YELM
REDUCED PRESSURE BACKFLOW
ASSEMBLY FOR 2" OR SMALLER

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

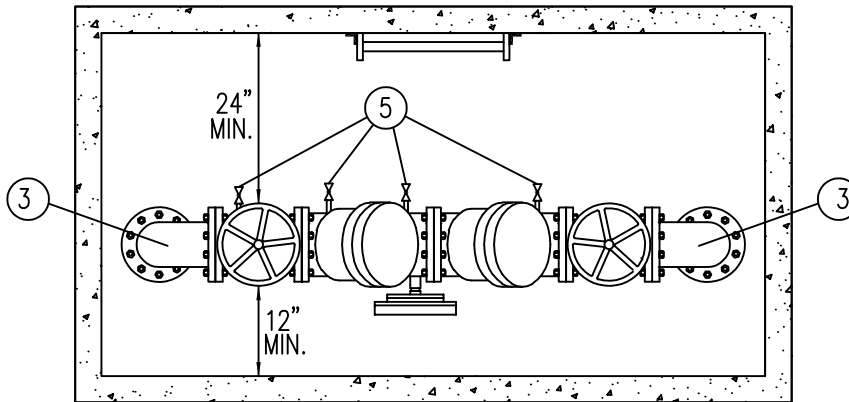
DWN. MKD

CKD. JEG

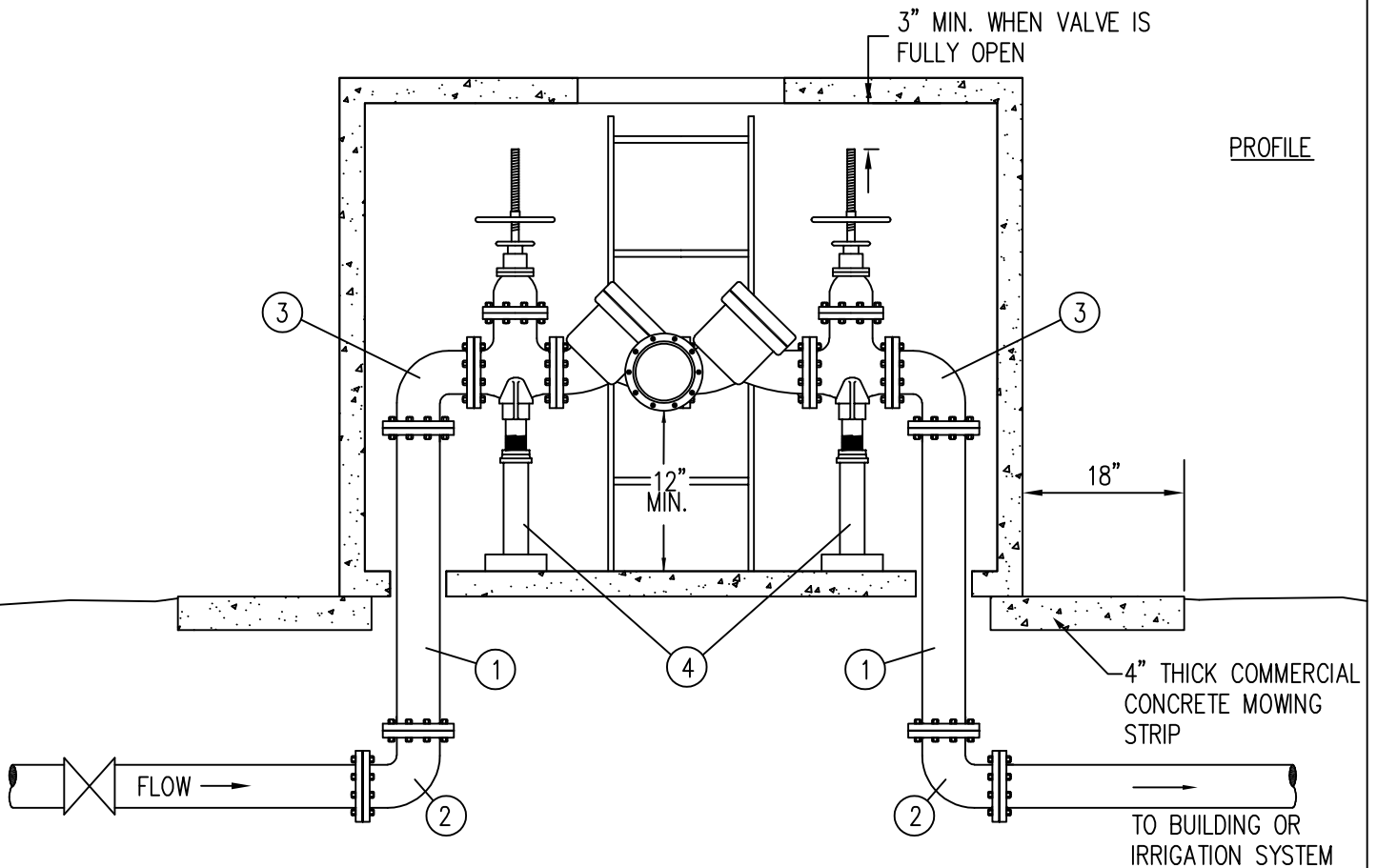
DWG. NO.

4-17

DATE
12/2016



PLAN



PROFILE

MATERIAL LIST:

1. PVC C900 OR CLASS 52 D.I. WALL PIPE FL X FL
2. 90° BEND FL X MEGALUG
3. 90° BEND FL
4. SUPPORT STANDS
5. TEST COCKS – 4 REQUIRED
6. PLUGS IN TEST COCKS

GENERAL NOTES:

A. WHERE PIPING PASSES THROUGH VAULT WALL, PROVIDE WATERPROOF MASTIC OR FLEXIBLE SEALANT.

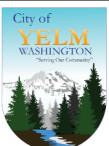
B. DIAMETER OF PIPE AND FITTINGS = _____

C. REFER TO DEVELOPMENT GUIDELINES SECTION 6.110 FOR FURTHER INFORMATION.

D. VAULT MUST BE EQUIPPED WITH AN ADEQUATELY SIZED FLOOR DRAIN OR TO ACCOMMODATE THE RELIEF VALVE DISCHARGE RATE.

E. THOROUGHLY FLUSH LINES PRIOR TO INSTALLING BACKFLOW ASSEMBLY.

MUST BE A FACTORY ASSEMBLY APPROVED BY DOH.



CITY OF YELM
REDUCED PRESSURE BACKFLOW
ASSEMBLY FOR 3" & GREATER

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. JEG

DWG. NO.

4-18

DATE
12/2016

YELM ENGINEERING SPECIFICATIONS AND STANDARD DETAILS

CHAPTER 5 SEWER

Table of Contents

CHAPTER 5.00 SEWER.....	2
5.00 GENERAL CONSIDERATIONS.....	2
5.00.010 GENERAL	2
5.00.020 DESIGN STANDARDS	3
GENERAL NOTES (SANITARY SEWER MAIN INSTALLATION)	4
5.10 STEP TANK SYSTEM	6
5.10.010 STEP TANKS	6
5.10.020 STEP TANK SIZING	6
5.10.030 LOADING CRITERIA	9
5.10.040 FIBERGLASS TANKS	9
5.10.050 CONCRETE TANKS.....	11
5.20 STEP PIPELINES	13
5.20.010 GENERAL	13
5.30 CONSTRUCTION REQUIREMENTS – STEP TANKS/PIPELINES	13
5.30.010 GENERAL	13
5.30.020 PIPELINE AND SERVICE LINE MATERIALS.....	13
5.30.030 STEP TANK INSTALLATION	14
5.30.040 PIPELINE AND SERVICE LINE INSTALLATION	16
5.40 STEP PUMP ASSEMBLIES	23
5.40.010 MATERIALS AND INSTALLATION	23
5.40.020 EFFLUENT PUMP - 4" SUBMERSIBLE PUMPS	24
5.40.030 PUMP VAULT, RISER, AND LID	26
5.40.040 INTERNAL SPLICE BOX	27
5.40.050 LEVEL CONTROL AND ALARM FLOATS	28
5.40.060 HOSE AND VALVE ASSEMBLY	29
5.40.070 ADDITIONAL MATERIAL REQUIREMENTS	29
5.40.080 ELECTRICAL CONNECTIONS.....	29
5.50 GRAVITY SEWER.....	32
5.50.010 GENERAL	32
5.50.020 SIDE SEWERS.....	32
5.60 RESTORATION	32
5.60.010 GENERAL	32
5.60.020 CRUSHED SURFACING.....	33
5.70 INSPECTION GUIDE FOR STEP SEWER INSTALLATION	33
LIST OF DRAWINGS - SEWER	34

CHAPTER 5.00 SEWER

5.00 GENERAL CONSIDERATIONS

5.00.010 General

The City of Yelm Technical Specifications were developed for use with onsite Septic Tank Effluent Pump (STEP) tank installations, onsite wastewater disposal system installations that are to be converted to STEP, and STEP collection line installations.

The City of Yelm Technical Specifications are subject to change as new regulations come into effect.

Within the corporate City limits where a public sewer is available it must be used. Where public sewer is not available within the City limits, connection is required provided that the premises are within 200 feet of the public sewer measured from the lot line closest to the existing portion of the City's collection system, except in the case of private residential or commercial developments. In this case, connection of all structures generating sewage shall be required to connect to the public sewer regardless of distance from the public sewer.

Prior to the release of any water meters, or operation of any STEP systems, all Public Works improvements must be completed and approved and all applicable fees must be paid.

See Section 13.08.010 YMC for definitions of specific sewers. Maintenance of the building or side sewer shall be the responsibility of the property owner. Maintenance of the lateral shall be the responsibility of the property owner.

All surveying and staking shall be performed by an engineering or surveying firm capable of performing such work. The engineer or surveyor directing such work shall be licensed as a Professional Engineer or Professional Land Surveyor by the State of Washington.

A preconstruction meeting shall be held with the City prior to commencing staking. All construction staking shall be inspected by the City prior to construction.

Ownership, operation and maintenance of the tank, pump, and pump controls shall be the responsibility of the City only after the system has been inspected and approved and an easement is granted, and ownership of the STEP component conveyed to the City and the warranty period of one year has expired. It is required by the City that the easements for a new development be granted on the plat, otherwise, an easement for each lot will have to be granted at the time of connection.

Power shall be provided by the customer. The customer shall be responsible for notifying the City when the control panel alarm buzzer is activated. All sewer pipe, drains and plumbing between the tank and the building shall be the responsibility of the customer. The customer shall be responsible for curtailing water usage until City forces respond to the customer's notification. The City will accept no responsibility for damages resulting from a plumbing backup, such as may occur if water usage is not curtailed during an alarm condition or if the customer disables the alarm.

The owner of commercial or residential property(s) with a City of Yelm STEP sewer system(s) shall not undertake any alterations of the sewer system(s), including covering or obstructing STEP tank riser lids, cleanouts, pump control panels and lockout switches, without the prior written approval of the City. Any damage caused by the owner or their agents, including tree and bush roots or unmaintained trimming of the same, shall be repaired by the City of Yelm at the owners expense.

Currently, only the Orenco STEP Pump System shown in the drawing section of this chapter has been approved by the City. Any alternate must be reviewed and approved by the City.

5.00.020 Design Standards

The design of any STEP sewer system shall conform to City standards and the latest version of the Criteria for Sewage Works Design prepared by the Department of Ecology (hereinafter referred to as the DOE Design Manual). In case of conflict between the two Standards, the most stringent conditions shall apply.

The layout of extensions shall provide for the future continuation of the existing system as determined by the City. In addition, main extension shall be extended to and through the side of the affected property fronting the main. Individual service boxes shall be installed to serve each lot.

Pump, STEP tank, and pipeline sizing shall conform to the criteria as set forth herein.

The applicable General Notes on the following pages shall be included on any plans dealing with pressure sanitary sewer design.

GENERAL NOTES (SANITARY SEWER MAIN INSTALLATION)

- A. All workmanship and materials shall be in accordance with City of Yelm standards and the most current copy of the State of Washington Standard Specifications for Road, Bridge and Municipal Construction (WSDOT/APWA).
- B. All approvals and permits required by the City of Yelm shall be obtained by the contractor prior to the start of construction.
- C. If construction is to take place in the County Right-of-Way, the contractor shall notify the County and obtain all the required approvals and permits.
- D. A preconstruction meeting shall be held with the City of Yelm prior to the start of construction.
- E. The City of Yelm shall be notified a minimum of 48 hours in advance of a tap connection to an existing main. A City representative shall be present at the time of the tap.
- F. The contractor shall be fully responsible for the location and protection of all existing utilities. The contractor shall verify all utility locations prior to construction by calling the Underground Locate Line at 1-800-424-5555 a minimum of 48 hours prior to any excavation.
- G. Side sewer services shall be PVC, ASTM D 3034 SDR 35 with flexible gasketed or solvent weld joints.
- H. All plastic pipe and services shall be installed with continuous tracer tape, installed 12" to 18" under the proposed subgrade. The marker shall be plastic non-biodegradable, metal core or backing marked "SEWER" which can be detected by a standard metal detector. In addition, step systems and force mains shall be installed with 14 gauge, heavy coated UF direct bury copper wire wrapped around all plastic pipe, brought up and tied off at valve body. Tape shall be Terra Tape "D" or approved equal. The tape and wire shall be furnished by the contractor.
- I. All buried power for STEP systems shall be installed with continuous tracer tape installed 12" above the buried power. The marker shall be plastic non-biodegradable, metal core backing marked "power". Tape shall be furnished by contractor.
- J. Bedding of the sewer main and all appurtenances shall be sand and compaction of the backfill material shall be required in accordance with the above mentioned specification (See general note 5.60-A).
- K. Temporary street patching shall be allowed for as approved by the City engineer. Temporary street patching shall be provided by placement and compaction of 2 inch minimum asphalt concrete cold mix. Contractor shall be responsible for maintenance as required.

- L. Erosion control measures shall be taken by the contractor during construction to prevent infiltration of existing and proposed storm drainage facilities and roadways.
- M. Provide traffic control plan(s) in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) as required.
- N. It shall be the responsibility of the contractor to have a copy of these approved plans on construction site at all times.
- O. Any changes to the design shall first be reviewed and approved by the City of Yelm.
- P. All STEP mains shall be hydrostatically tested in conformance with the above-referenced specification for testing water mains. (See note 1.) In addition, all STEP mains shall be pigged/cleaned in the presence of the City Inspector prior to placing STEP main in service.
- Q. Prior to backfill all mains and appurtenances shall be inspected and approved by the City of Yelm. Approval shall not relieve the contractor for correction of any deficiencies and/or failures as determined by subsequent testing and inspections. It shall be the contractor's responsibility to notify the City of Yelm for the required inspections.
- R. Pump control panels shall be located on garage wall or remote post, 5-feet from top of panel to finish grade, unless otherwise authorized by the City of Yelm.
- S. In the event that the Department of Labor and Industries or the city should require a separate "on-off" switch controlling power to the Pump Control Panel, said switch shall have a locking cover model # 5031-0 Rayntite Single Gang Weatherproof Cover 1.406" diameter.
- T. Inspections for onsite STEP installations are required. A 48 hour notice to the sewer department is required prior to the inspection.

Items needing inspection are:

- 1. Tank installation, ie; bedding and location
 - 2. Tank infiltration, exfiltration test
 - 3. S.S. pressure test
 - 4. Service line pressure test
 - 5. Final Inspection
- U. All posts used to support pump control panels, must be hot dip galvanized Unistrut or approved equal.

5.10 STEP TANK SYSTEM

5.10.010 STEP Tanks

STEP tanks shall be the size and type as denoted in these specifications and as shown on the standard drawings. Grease interceptors shall be sized in accordance with the EPA Design Manual (625/1-80-012) and shall be of a configuration consistent with industry standards. Grease interceptor vessels will be subject to requirements of the STEP tank.

STEP tanks with an influent pipe invert elevation of less than or equal to 4 feet, which are not placed in traffic bearing areas shall meet the loading criteria listed in section 5.10.030.

All models of tanks will be certified by a licensed structural engineer that they will meet the loading conditions specified herein. The Structural Engineer certifying each model of tank shall submit drawings including but not limiting to the following:

1. Plan view showing dimensions of tanks and the size and location of any openings in the tank.
2. Side section of tank showing dimensions and thickness.
3. End section of tank showing dimension and thickness.

STEP tanks with influent pipe inverts greater than 4 feet, and/or are subject to traffic bearing loading, shall meet the loading criteria listed in section 5.10.030.

All models of tanks will be designed by a licensed structural engineer. Calculations shall be submitted for review.

An inspection port will be required over the inlet baffle for all STEP tanks. A 24" diameter minimum riser inspection port/clean-out shall be required.

5.10.020 STEP Tank Sizing

STEP tanks for the City of Yelm will be sized and configured as outlined, and shall meet the DOE Design Manual criteria for vessel sizing and configuration.

TABLE 1 – STEP TANK SIZING	
<u>Descriptions</u>	<u>Tank Size</u>
Up to 4 bedroom home	Min 1,250 gallons liquid capacity
5/6 bedroom home/Duplex	Min 1,500 gallons liquid capacity

STEP tanks for any applications of institution, multi-family dwelling or, other structures not listed above shall be sized in accordance with the latest version of the DOE Design Manual. Peak-day flow for purposes of sizing STEP tanks shall be calculated using Table 2, Accepted Engineering Manual, or actual operating records, whichever is more stringent. All STEP tank configuration will be two compartment and shall meet requirements of the DOE Design Manual with the following additions:

- A. All concrete STEP tanks 1,250-3,000 gallons will be two compartment tanks divided by a baffle as shown in Drawing Detail 5-10 and 5-11. On 1,500 gallon tanks, install one 4-inch diameter hole centered on baffle wall 20 inches on center from bottom of floor. 3,000 gallon tanks will have one 4" diameter hole centered on tank baffle wall 29" on center from floor of tank.
- B. On 6,000-gallon tanks, install one 6-inch diameter hole centered across width of tank baffle 40 inches on center above floor of tank in each baffle.
- C. If approved by the Owner, 6,000-gallon tanks used in conjunction with a pump tank may not require a baffle depending on diameter.
- D. No tank larger than 6,000 gallons will be used in the City of Yelm STEP system.

Table 2 – Estimated Daily Sewer Flows	
Type of Establishment	Gallons per person per day (unless otherwise noted)
Airports (per passenger)	5
Apartments - multiple family (per resident)	65
Bathhouses and swimming pools	10
Camps:	
Campground with central comfort stations	35
With flush toilets, no showers	25
Construction camps (semi-permanent)	50
Day Camps (no meals served)	15
Resort camps (night and day) with limited plumbing	50
Luxury camps	100
Cottages & small dwellings with seasonal occupancy	50
Country clubs (per resident member)	100
Country clubs (per non-resident member present)	50
Dwellings:	
Boarding houses	50
additional for non-resident boarders	10
Luxury residences and estates	150

Multiple family dwellings (apartments)	65
Rooming houses	40
Single family dwellings	75
Factories (gallons per person, per shift, exclusive of industrial wastes)	35
Hospitals (per bed space)	250+
Hotels with private baths (2 persons per room)	60
Hotels without private baths	50
Institutions other than hospitals (per bed space)	125
Laundries, self-service (gallons per wash, i.e., per customer)	50
Mobile home parks (per space)	250
Motels with bath, toilet, and kitchen wastes (per bed space)	50
Motels (per bed space)	40
Picnic Parks (toilet wastes only) (per picnicker)	5
Picnic parks with bathhouses, showers, and flush toilets	10
Restaurants (toilet and kitchen wastes per patron)	10
Restaurants (kitchen wastes per meal serviced)	8
Restaurants additional for bars and cocktail lounges	2
Schools:	
Boarding	100
Day, without gyms, cafeterias, or showers	15
Day, with gyms, cafeterias, and showers	25
Day, with cafeteria, but without gyms, or showers	20
Service stations (per vehicle served)	10
Swimming pools and bathhouses	10
Theaters:	
Movie (per auditorium seat)	5
Drive-in (per car space)	5
Travel trailer parks w/o individual water and sewer hook-ups (per space)	50
Travel trailer parks with individual water and sewer hook-ups (per space)	100
Workers:	
Construction (at semi-permanent camps)	50
Day, at schools and offices (per shift)	15

All tanks install a 4-inch diameter hole within 1 inch of crown of baffle for venting or 11 ½ inch space between top of baffle wall and top of tank.

Designers to consult with Public Works Director prior to design of commercial STEP installation and tanks over 3,000 gallons to verify tank sizing, vault configuration, pump requirements, and electrical requirements.

Underestimating the wastewater flow anticipated to be received by either the STEP tank or primary tanks by the property owner or the owner's designer

based on estimated use will result in the property owner increasing the septic tank holding capacity to meet the above criteria. Refusal to increase the size of the septic tank to meet the design criteria will result in discontinuance of sewage collection services.

5.10.030 Loading Criteria

- A. 135 lb./cu. ft. weight of backfill.
- B. The water table is at ground level. Lateral loading is 85 lb.cu. ft., which includes hydrostatic water pressure.
- C. The tank will support a minimum 1000 lb. wheel load.
- D. Tanks designated as traffic bearing tanks shall be designed to withstand HS-20 truck loading with appropriate impact factors. All tanks shall be structurally sound and watertight and shall be guaranteed in writing by the tank manufacturer for a period of two (2) years from the date of final acceptance. The tank guarantee/warranty shall be furnished at the time of installation. Tank warranty shall not limit liability to replacement cost of the tanks.

5.10.040 Fiberglass Tanks

Unless superseded by the Standard Specifications, the fiberglass tanks will meet all requirements of IAMPO_1-87. If requested by the Owner, the manufacturer shall supply to the Owner, without charge, approved original laboratory report showing compliance with IAMPO PS 1-87 and requirements of the suppliers licensed Structural Engineer. All STEP tanks installed larger than 3,000 gallons shall be fiberglass tanks manufactured by either Containment Solutions Inc. or Xeres Inc. Any alternate must be approved by the City.

All fiberglass STEP tanks shall be installed by qualified installers, following the manufacturer test directions and shall be secured with tie-down straps with "Dead Men". Sizing and materials for Dead Men and strapping shall be per the manufacturer test recommendations.

A. Method of Calculations

Fiberglass tanks shall be analyzed using finite element analysis for buried structures.

Calculations shall address the following:

1. Strength with a safety factor of 2.5
2. Buckling with a safety factor of 2.5
3. Deflection of 5 percent of the tank diameter, based on service load (including long-term deflection lag).

4. Buoyancy

B. Performance Testing

In lieu of calculations for fiberglass tanks, the supplier may elect for in situ performance testing.

In situ testing of each tank model shall include use of strain gauges and deflection gauges. The tank will be subjected to external forces equal to twice the actual load.

Maximum initial deflection based on service loading shall not exceed 2 percent of the tank diameter.

Performance testing will be evaluated by a licensed Structural Engineer registered in the State of Washington. The Owner will have the sole responsibility to determine the maximum external loading on any of the tank models.

1. Inspections may be made by the Owner in the suppliers' yard, within the plant, upon delivery and again after installation. The wall thickness shall average at least 1/4 inch unless superseded by the requirements of the Structural Engineer. When less than 3/16 inch in thickness or any delamination is suspected within any portion of the tank wall for inspection purposes. If the required minimum 3/16-inch thickness is not found, repair, if feasible, shall be the responsibility of the Contractor. If repair is judged not feasible, the tank shall be rejected. If twenty percent or more of the tanks are rejected for any of the aforementioned reasons, each tank under this bid will become suspect of substandard quality and subject to rejection by the Owner. If the required minimum 3/16-inch thickness is found, and no delamination is present, the repair shall be the responsibility of the Owner.
2. The Structural Engineer shall specify the minimum weight of each tank model that will be allowed and submit those weights during the submittal process. The manufacturer will weight each tank and place that weight on the side of each tank in a manner that will not be affected by rain or inclement weather.
3. Holes required in the tank shall be provided by the manufacturer. Resin shall be properly applied to all cut or ground edges so that no glass fibers are exposed and all voids are filled.
4. Dual Tite or Ty-Seal neoprene gaskets, or equal, shall be used at the inlet to join the tank wall and the ABS inlet piping. ABS Schedule 40 pipe and fittings shall be used at the inlets.
5. Inlet plumbing shall penetrate 18-inches into the liquid from the

inlet flow line.

6. Each tank shall be water tested on the project site after assembly by the manufacturer and witnessed by the Owner. Every tank shall be assembled by the manufacturer and water raised to the brim of the manhole for a minimum of two (2) hours. The tank shall show no leakage from section seams, pin-holes or other imperfections. Any leakage is cause for rejection.
7. When leakage occurs, if the tank is not rejected by the Owner, an additional water test for a minimum of two (2) hours shall be made on the tank after repairs have been completed, upon request by the Owner. The manufacturer shall be responsible for making all corrective measures in production or assembly necessary to ensure a completely watertight tank.
8. After installation of tank with riser is completed each tank shall be filled with water 2" above the rim of the rider adapter ring installed into tank lid. Test shall hold for a two (2) hour period as per paragraph 6, to assure that there is no leakage. Every tank test shall be witnessed by the Owner.
9. Each tank will also include a serial number and date of manufacturer.
10. Installation shall be in accordance with the manufacturer's recommendations, and as shown on the contract plans, no variations.

5.10.050 Concrete Tanks

- A. Concrete tanks will be allowed in sizes up to 3,000-gallon capacity.
- B. Wall, bottom and top of reinforced-concrete tanks shall be designed across the shortest dimension using one-way slab analysis. Stresses in each face of monolithically-constructed tanks may be determined by analyzing the tank cross-section as a continuous fixed frame.
- C. The walls and bottom slab shall be poured monolithically; alternatively, water stops may be provided.
- D. Reinforcing steel shall be ASTM A-615 Grade 60, $f_y=60,000$ psi. Details and placement shall be in accordance with ACI-35 and ACI-318.
- E. Concrete shall be ready mix with cement conforming to ASTM C-150, Type II. It shall have a cement content of not less than six (6) sacks per cubic yard and maximum aggregate size of 3/4 inch. Water/cement ratio shall be kept low (0.35+), and concrete shall achieve a minimum compression strength of 4000 psi in 28 days. The

Contractor shall submit a concrete mix design to the Owner for review and approval. Three (3) concrete sample cylinders shall be taken and tested for each tank manufactured until the manufacturer and Owner are satisfied that the minimum compression strength is being obtained. To insure compliance, the manufacturer shall then make and test three (3) sample cylinders for a minimum of 20 percent of the remaining tanks at the discretion of the Owner. If the minimum compressive strength is not being obtained, the manufacturer shall be required to make and test sample cylinders for each tank manufactured. Calcium chloride will not be allowed in the mix design. The cost of testing cylinders shall be the tank manufacturer's responsibility. The tank manufacturer may supply a Swiss hammer for compressive testing in the field in lieu of sample cylinders.

- F. Form release used on tank molds shall be Nox-Crete or equal. Diesel or other petroleum products are not acceptable.
- G. Tanks shall not be moved from the manufacturing site to the job site until the tank has cured seven (7) days or has reached two-thirds of the design strength.
- H. Tanks shall be manufactured and furnished with access openings of the size and configuration to accommodate individual packaged pump systems. Modification of completed tanks will not be permitted.
- I. The septic tank and the top slab shall be sealed with a pre-formed flexible plastic gasket. The flexible plastic gasket shall be equal to the flexible butyl resin sealant conseal CS-102 or CS-202 as manufactured by Concrete Sealants, Inc. of New Carlisle, Ohio and shall conform to federal specification SS-S00210(210A) and AASHTO M-198.
- J. Tanks shall be furnished without concrete access hole lids and equipped with tank riser adapters as manufactured by Orenco Systems. In order to demonstrate water tightness, the tanks shall be tested as follows:
- K. Inlets to the septic tank will be water tight pipe seal as Ty Seal pipe seal or equal. Outlets for effluent filters shall be configured as shown on the contract plans.
 - 1. Factory Test: All of the tanks supplied by the precast manufacturer will be hydrostatically tested in the factory. The tank shall be tested by filling with clean water to the soffit and let stand for a minimum of 24 hours. After the 24-hour period, the water will be replaced to soffit. The water level shall be checked after 2 hours. Any water loss will not be acceptable.
 - 2. b. Field Tests: After the tanks have been set in place, but prior to

backfilling, each tank shall be tested for a 2-hour period. Any tank that fails the test as outlined in 12a shall be repaired and/or replaced until the tank passes said test. After backfilling, the tank shall be filled with water to 2 inches above riser and tank connection and tested for exfiltration over a two (2) hour period. No tank will be accepted if there is any leakage over the two (2) hour period.

3. The water required to fill a tank in order to conduct the tank pressure test and check for leaks shall be provided by the contractor and/or owner at their expense. This is a testing requirement associated with construction and considered "water for construction".

5.20 STEP PIPELINES

5.20.010 General

STEP pipelines constructed and sized within private developments and public Right-of-Way shall conform to the City of Yelm Sewer Comprehensive Plan and the DOE Design Manual, whichever is more stringent.

5.30 CONSTRUCTION REQUIREMENTS – STEP TANKS/PIPELINES

5.30.010 General

Installation and materials used for construction of the City of Yelm STEP system shall conform to the requirements of sections 13.08.030 through 13.08.080 of the Standard Specifications, unless amended herein.

All STEP tanks deemed commercial must utilize 2 inch piping for the service line.

5.30.020 Pipeline and Service Line Materials

- A. All pipe less than 2 inches shall meet the following requirements:

Schedule 40 PVC pipe shall be designed for solvent weld joints and shall comply with ASTM D 1785.

All pipe 2 inches and above shall meet the following requirements:

1. PVC 1PS 1120 SDR 21 Class 200 pipe shall have rubber ring gasket joints, shall comply with ASTM D 1784 and have a working pressure rating of 200 psi.
2. 2 inch service lines shall be schedule 40 PVC pipe designed for solvent weld joints and shall comply with ASTM D 1785.

- B. Bedding

1. Bedding shall be sand.
2. Bedding shall be installed as shown on the Standard Details.

C. Joints

1. Solvent Weld Joints

- a. Solvent cements and primer for joining PVC pipe and fittings shall comply with ASTM D 2564 and be as recommended by the pipe and fitting manufacturers. Primer shall be required for use on all solvent weld joints.

2. Rubber Ring Gasket Joints

- a. Rubber ring gaskets shall comply with ASTM D 1869 and ASTM D 3139 and shall be supplied by the pipe or fitting manufacturer with a sufficient amount of lubricant. The lubricant shall be water soluble, non-toxic, nonsupportive of bacterial growth and have no deteriorating effect on the PVC or gasket.

D. Fittings

All fittings shall have a minimum working pressure equal to the pipe with which they are connected.

1. Solvent Weld Fittings

- a. Solvent weld fittings for pipe less than 2 inches shall be socket type Schedule 40 fittings and shall comply with ASTM D 2466 and 2467.

2. Rubber Ring Gasket Fittings

- a. Rubber ring gasket fittings for pipe 2 inches and larger shall be PVC 1120 complying with ASTM F 477, as manufactured by Head Manufacturing Co., Preston, Idaho; Gault Fabrication Company, Stockton, California; Spears Fabrication, Stockton, California; or approved equal.

It is exceptable to use socket type 'T's on 2 inch Mainlines at the connection point for either a 2 Inch or 1 inch service connection.

5.30.030 STEP Tank Installation

It shall be the Contractor's responsibility to verify the location and the elevation of all existing sewer lines prior to installing the individual tank. STEP tanks shall be located in front of building unless otherwise approved by the City of Yelm.

It is anticipated that existing utility lines will be encountered during installation of the STEP tank and appurtenances. Prior to starting construction the Contractor will notify the proper utility for underground locations and also contact the property owner to determine location of foundation drains, electrical lines, etc.

The Contractor shall be responsible to obtain all necessary permits for work on public Right-of-Way such as street opening permit available at City hall. All cost for permits will be the Contractor's responsibility.

Excavations for all tanks shall be sufficient to leave a minimum of 6 inches of bedding (see tank bedding Detail Drawings 5-16 and 5-17).

Tanks set in holes with high water table issues or suspected high water table issues will be H-20 tanks with minimum 24 inches of cover (6" of sand bedding and 18" native backfill).

All tank installations shall adhere to the following:

- A. Location of the STEP tank site will be submitted to the City upon request for review and approval.
- B. All excavation and backfill of tanks shall conform to standard specification. Compaction for non traffic areas shall be 85 percent of maximum density. Compaction for traffic areas shall be 95 percent of maximum density.
- C. For work within public Right-of-Way, the contractor shall be responsible on a daily basis for providing ingress and egress for both pedestrian and vehicle traffic on all work sites. The contractor shall clean up his work area on a daily basis to avoid inconvenience to the public.
- D. For work within public Right-of-Way, the contractor shall safeguard his work on a daily basis to prevent possible injuries. The contractor shall submit to the City his method of safeguarding his work prior to beginning any construction on public Right-of-Way.
- E. Depth of Bury not to exceed 5 feet from invert elevation of influent pipe to finished grade on commercial systems.
- F. Any modifications resulting in an existing non-H20 tank ending up in a traffic/load bearing situation shall have a 6 inch concrete pad constructed over it. It shall extend 12 inches past all sides of tank and contain rebar/wire mesh embedded in concrete with aluminum rings and covers per detail DWG. No. 5-19.
- G. There shall be no hose bibs above pump control panels or disconnects and minimum of 2 feet separation from sides and bottom of disconnect and pump control panel.

- H. There shall be a hose bib within 50 feet of the farthest riser of the farthest tank for maintenance and pumping.
- I. STEP tanks shall not go under sidewalks, porches, porch overhangs, or roof eaves. Tanks shall be 5 feet minimum separation from property line, foundation of houses, and/or porch foundations, and located 2 feet on the side of the driveway closest to the inlet, and 2 feet minimum separation from utility easements.
- J. Residential non-traffic bearing risers shall be no higher than 24 inches from tank lid to finish grade, unless preapproved by the Director or their assigned designee.
- K. The owner of the property will have sole ownership and responsibility of side sewer and clean out from house to tank inlet.

Tanks in Driveways

- A. Tanks set in driveways shall be 5 feet from the building foundation, porch foundation, property line, and up to utility easement. Any undermined foundations will require backfill with controlled density fill (CDF).
- B. Access to tank risers shall have a traffic bearing lid set up according to sewer specifications, DWG. No. 5-19 with 12" of compacted crushed rock under concrete collars.
- C. Tanks under driveways shall be H-20 rated tanks.
- D. Concrete driveways shall be 4 inches thick with welded wire mesh placed in the concrete driveway. If a high water table is an issue, the concrete driveway shall be 6 inches thick with wire mesh to help with buoyancy of the tank when empty from pumping.
- E. The minimum depth of bury shall allow for the combination of an 18 inch riser, the thickness of the aluminum H-20 lid and 2-3 inches between fiberglass riser lid and bottom of aluminum H-20 lid.

5.30.040 Pipeline and Service Line Installation

A. Grade and Alignment

Service lines shall be placed a minimum of 18 inches of cover within private property. Deeper excavation may be required due to localized breaks in grade such as curbs, retaining walls, and terraced ground. Where required by the City of Yelm, the pipeline shall be laid to the profile or elevation shown, regardless of depth. Maximum cover of any mainline within public Right-of-Way or easement shall be 60", unless otherwise approved by the public works director or designee.

Sewer main line gate valves should be a distance of 1,000 feet on a case by case basis.

All ductile iron fittings shall be epoxy coated or P.E. lined both inside and outside. The coating material shall be designed for use with corrosive materials.

B. Trench Excavation and Backfill

Native material from trenches and excavations may be considered unsuitable for trench backfill. The City of Yelm shall determine the suitability of native material for trench backfill. If the native material is deemed unsuitable by the City, "Bank Run Gravel for Trench Backfill" shall be used. Bank run gravel shall be equal to Section 9-03.19 of the Standard Specifications.

The Contractor has the option of jacking or boring pressure sewer lines under existing improvements. The Contractor's proposed method of construction and material type shall be submitted for the City's approval prior to commencing work. Pipeline material shall be approved by the manufacturer for jacking or boring application. No jacking operation shall exceed 40 feet unless authorized by the City.

At locations where paved or graveled streets, shoulders, alleys, parking lots, driveways, patios, and sidewalks will be reconstructed over the trenches, the backfill shall be spread in layers not exceeding 8 inches in loose thickness and be compacted by mechanical tampers to 95 percent of maximum density. Proof of compaction is required. At locations where lawn, landscaping, and unimproved surfaces will be reconstructed over the trench, the backfill shall be spread in layers not exceeding 8 inches in loose thickness and be compacted by mechanical tampers to 85 percent of maximum density.

Maximum density and optimum-moisture content shall be determined using the modified Proctor maximum dry density procedure (AASHTO T180 or ASTM D 1557). In place density shall be determined using the Washington Densimeter method or Nuclear Gauge as outlined in the WSDOT Construction Manual.

C. Detectable Marking Tape

Heavy duty fourteen-gage insulated copper toning wire designed for direct-bury applications, shall be placed directly over all non-metallic pressure sewer lines and service lines. The Contractor shall bring the toning wire to the surface of the valve box and service boxes for purposes of attaching a utility detection device. All connection of the toning wire for service connections shall be stripped of insulation and

attached to the copper portion of the main line toning wire. The connection point shall be D.B.R. Direct Bury Splice Kits.

D. Hydrostatic Pressure Test

All sewer mains, service lines, and appurtenances shall be hydrostatically tested in lengths specified. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be accompanied with certifications of accuracy from a laboratory approved by the Owner.

The sewer pipeline shall be backfilled sufficiently to prevent movement of the pipe under pressure. All thrust blocks shall be in place and time allowed for the concrete to cure before testing. Where permanent blocking is not required, the Contractor shall furnish and install temporary blocking and remove it after testing.

The sewer lines shall be filled with water and allowed to stand under pressure a sufficient length of time to allow the escape of air.

The test shall be accomplished by pumping the sewer line up to the required pressure, stop the pump for 15 minutes, and then pump the sewer line up to the test pressure again. During the test, the section being tested shall be observed to detect any visible leakage. There shall not be an appreciable or abrupt loss in pressure during the 15-minutes test period.

The quantity of water required to restore the pressure shall be accurately determined by pumping through a positive displacement water meter with a sweep unit hand registering one gallon per revolution. The meter shall be approved by the Owner.

The maximum allowable leakage for sewer lines shall be, according to AWWA C600, Section 4 Hydrostatic Testing, as follows:

Test	Pipe Diameter			
Pressure	3"	4"	6"	8"
150 PSI	No Loss	No Loss	No Loss	No Loss

Portions of the sewer line that are determined to be critical, or suspected of leaking, should be left with the joints exposed during the testing procedure to allow visual inspection. The use of dye in the testing water will assist the location of leaks if ground water is present in the trench. Any visible leakage detected shall be corrected by the Contractor regardless of the allowable leakage specified above.

Should the tested section fail to meet the pressure test successfully as specified, the Contractor shall, at his expense, locate and repair the defects and then retest the pipeline.

Prior to calling out the Owner to witness the pressure test, the Contractor shall have all equipment set up completely, ready for operation and shall have successfully performed the test to assure himself that the pipe is in a satisfactory condition.

Defective materials or workmanship, discovered as a result of a hydrostatic field test, shall be replaced by the Contractor at his expense. Whenever it is necessary to replace defective material or correct the workmanship, the hydrostatic test shall be rerun at the Contractor's expense until a satisfactory test is obtained.

Service lines shall be sleeved under driveways, sidewalks, and where the service line can make contact with any part of the tank.

The Contractor shall provide the water necessary to fill the pipelines for testing purposes. Water may be purchased from the Water Utility. Contractor to coordinate with the City of Yelm Water Utility. The Contractor will be responsible for transporting the water to the project site. The Contractor will also be responsible for furnishing a backflow prevention device or other Owner approved method to avoid contamination of the water supply during loading, an appropriate water meter and all other appurtenances required. Water meter and appurtenances shall be approved by the Owner.

The Contractor shall demonstrate to the satisfaction of the Owner that the air release valves and vacuum release valves are operating correctly.

1. Sewer Main Line Testing.

Sewer Main Lines shall be tested under a hydrostatic pressure equal to 150 psi.

After the sewer main test has been completed, each mainline valve shall be tested by closing valves in turn and relieving the pressure beyond. This test of the valves will be acceptable if there is no immediate loss of pressure on the gauge when the pressure comes against the valve being checked. The Contractor shall verify that the pressure differential across the valve does not exceed the rated working pressure of the valve.

When testing sewer main lines, they shall be tested against service line test valve at 150 psi for 15 minutes after that has passed pressure will be reduced to 80 psi and test valves will be opened one at a time to put pressure against check valve. This service line

between check valve and test valve shall be prefilled with water before testing to reduce initial pressure drop. After that, remaining pressure shall have no drop for one minute.

Prior to any main line testing, all service lines within the main line test area shall be installed, tested, and approved. The Contractor shall test no more than 500 linear feet for the first test to qualify crews and materials. Sections of collection main line to be tested shall not exceed 1,000 linear feet per each individual test. Once successful test results have been achieved, the Contractor may request in writing test sections greater than 1,000 linear feet for the Owner's approval. The Contractor is required to keep his pipe testing and service line testing concurrent with his pipeline laying operations.

2. Sewer Service Line Testing.

In order to test the service line, the ball valve (or self-tapping saddle if used) at the sewer main shall be closed and the test pump shall be attached at the end of service line with ball valve and check valve, if required. This portion of the service line shall be tested under a hydrostatic pressure of 70 psi. The test will be deemed successful if the pressure is constant for a minimum of 1 minute.

3. The contractor shall be responsible for replacing any shut-off valve or check valve in carson box, if it does not hold pressure during testing.

E. Air and Vacuum Release Valves

Air release valves and air/vacuum valves shall be located at the high points of the line. Profiles for each pipe run shall be submitted with the hydraulic gradeline for both static and dynamic flow conditions to show where the critical points are for air release valves. Vehicular access to air/vacuum valves is required for maintenance.

Because the air released by these valves will contain hydrogen sulfide, the valves and their enclosures have to be constructed of corrosion resistant materials. The air released from the valve will be quite odoriferous, thus, each vent will be equipped with an odor control system such as activated carbon filters impregnated with sodium hydroxide. All air release, vacuum release, and combination air release/vacuum release valves shall be a model D-021 combination air valve "MINI SAAR".

F. Pigging Ports/Cleanouts

A pipeline pig is a projectile that is forced through the inside of a pipe to clean pressure pipelines. A pigging port/cleanout is used as a point to send the pig (see Standard Detail 7-20).

Pigging ports are required:

1. At every 2-inch diameter change in pipeline size;
2. At the end of every dead end line;

Specific locations are subject to review and approval by the city.

G. Thrust Blocking

Location of thrust blocking shall be shown on plans. Thrust block concrete shall be Class B poured against undisturbed earth. A plastic barrier shall be placed between all thrust blocks and fittings.

See drawing numbers 4-13 and 4-14 in Chapter 4. Designed and approved restraining joint systems may be allowed in lieu of thrust blocking. Restraining joint brand, type and size shall be specified on the plans. Material shall be stainless steel, epoxy coated, or approved equal.

H. Service Connections

This work consists of installing the service line and appurtenances. The service connection at the sewer main includes a check valve and ball valve, without valve boxes, and a saddle or tee at the sewer main.

I. Service Interruption/Line Connections

The contractor shall give the City a minimum of 72 hours notice of any planned connection to an existing pipeline. This includes all cut-ins and live taps. Notice is required so any disruptions to existing services can be scheduled. The City will notify customers involved or affected of the sewer service interruption. The contractor shall make every effort to schedule sewer main construction with a minimum interruption of sewer service. In certain situations, the City may dictate scheduling of sewer main shutdowns so as not to impose unnecessary shutdowns during specific periods to existing customers.

All connections made to sewer lines 2" – 6 " can be live taps that can be performed by the contractor using SPEARS "Hot Tap Saddle", or saddle previously approved by the City. Any pipe greater than 6" or C900 pipe shall be performed by a certified tapping company. Tap installation must be inspected and approved by the City.

Tap installation shall be performed by a professional company that specializes in this work, and the company doing this work will first be approved by the sewer department. When tapping non-C900 main

lines (6" or less), "Hot Tap Saddles" as manufactured by Spears are acceptable and can be used by the underground sewer main installer with prior approval from the Sewer department and installation must be inspected by City Sewer Inspector.

5.40STEP PUMP ASSEMBLIES

5.40.010 Materials and Installation

A. General

This work shall include but not be limited to providing and installing pump assemblies, effluent filters, risers, electrical equipment and pump control and alarm assemblies in accordance with the plans and these specifications. The pump assemblies provided shall restrict the discharge to low flow over a wide range of head conditions to assure that solids remain in the STEP tank and not be transmitted into the pressure line. Pumps installed shall be protected by a screen to prevent solids greater than 1/8 of an inch entering the pressure line and prevent plugging the intake to the impeller or the flow restriction device.

B. Ball Valves

One-inch ball valves shall be PVC ball valves and shall comply with ASTM D 2846. It shall be designed for use with corrosive fluids, for low torque manual operation, and for a working pressure of 150 psi. The PVC material shall be Type 1 (NSF). The valve shall be Model No. LT-1000-S as manufactured by KBI (King Brothers Industries), or equal approved by the City.

C. Gate Valves

Gate valves for sewer systems shall be NRS gate valves, complying with AWWA C509. Buried valves shall have 2-inch square AWWA Standard operating nuts. Valve stem extensions, if necessary, shall be installed on valves deeper than 5 feet and provided by the same supplier as the gate valves. All Gate valves to be Resilient Wedge epoxy coated

All gate valves shall be equipped with operator extensions that bring the operating nut to within 24" inches of the surface for valves over 5 feet deep.

D. Check Valves

Check valves for sewer systems shall be PVC swing check valves designed for use with corrosive fluids and shall have a Buna-N seal on a swing gate which lifts to allow for unobstructed flow. The PVC material shall be Type 1 (NFS). The valve shall have no metallic parts. It shall have a working pressure of 150 psi and shall require only 1/2 psi back pressure for complete closure. It shall be as manufactured by KBI (King Brothers Industries), or equal approved by the Owner.

E. Valve Boxes

The word Sewer shall be cast into the lid. The top section shall be made of cast iron conforming to the following specifications: ASTM A 4876; WWP 401; and CS-88. It shall be slip type with top flange, weight 40 pounds or more, be at least 10 inches in length, have an inside diameter sufficient to house the bottom section, and have an average material tensile strength of 30,000 psi. It shall be Rich Model 910 heavy duty, or equal approved by the City. The bottom section of the valve box shall be 6-inch PVC pipe (ASTM 3034), white in color. the entire valve box top and bottom shall perform as a unit that has the ability to extend.

F. Saddles

Standard saddles shall be band-type saddles designed for use on PVC pipe. The material shall be UNS S 30400 stainless steel for the shell, bolts, washers, nuts, and tapped outlet. Gaskets shall be NBR compounded rubber complying with ASTM D 2000-343K515_E34. Saddles shall be Style 304, manufactured by Romac Industries, Inc., or equal approved by the City.

Self tapping saddles shall have a PVC body and be secured in place by four stainless steel bolts and nuts. After tapping, the tapping mechanism shall retain the coupon from the pipe and serve as a shut-off valve. The tapping mechanism shall be operated by a 5/8" allen head wrench and have a PVC cover to prevent fouling of the mechanism when not in use. The saddle shall have an O-ring seal glued in place by the manufacturer.

G. Standard Service Box

The Standard Service Box shall be made from a structural plastic, have extensions as required, and have a bolt down cover. It shall be Model No. 1419, as manufactured by Carson Industries, Inc. or equal approved by the City. Larger carson boxes for 2" services may be required as approved by City of Yelm

H. Traffic Bearing Service Boxes

All Traffic Bearing Service Boxes shall be a model MSBCF 1324-BCF-12", manufactured by Old Castle Manufacturing. Larger carson boxes for 2" services shall be model 1324-18-BCF by Old Castle Manufacturing.

I. Traffic bearing carson boxes shall have 6"-8" compacted crushed rock under base of box, per manufacturer's recommendation.

5.40.020 Effluent Pump - 4" Submersible Pumps

A. Simplex Pumps: Systems for tanks 1,500 gallons or less.

1. General - For Discharge to a STEP Collection System provide Orenco Model P10 05 11 or approved equal. Pumps shall be listed by an approved testing laboratory, e.g., UL or CSA or use as an effluent pump.

Pumps shall be stainless steel and/or thermoplastic.

All wetted fasteners shall be 300-series stainless steel.

2. Motors

Motors shall be permanent split phase-type operating at 3450 RPM. Motors shall be 1/2 HP, 115 volt, single phase, 60 Hz.

Motors shall be thermally-protected with an automatic-reset feature.

3. Operating Conditions

The effluent pump shall be of the submersible turbine type capable of delivering 5 gpm against a TDH of 105 feet, and with a shut-off head of not less than 160 feet. Pumps will be provided with an orifice installed in the discharge piping to restrict flow to a maximum of 9 gpm over any head condition. The supplier shall provide a head curve showing performance of the pump with the orifice installed.

4. Bypass

A 1/8" bypass orifice shall be drilled in the discharge head of the pump to allow for cooling pump motor during periods of no discharge.

5. No flow restrictors in 10 or 20 gpm pump discharge systems.

B. Duplex Pump Systems and Triplex Pump Systems for 3,000 Gallon Tanks or Larger.

1. General - For Discharge to a STEP Collection System

All STEP tanks housing more than one pump must utilize 2 inch piping for the service line.

Provide Orenco Model P20 05 11 or approved equal.

Pumps shall be listed by an approved testing laboratory e.g., UL or CSA for use as an effluent pump.

Pumps shall be stainless steel and/or thermoplastic.

All wetted fasteners shall be 300-series stainless steel.

2. Motors

Motors shall be permanent split phase-type operating at 3450 RPM. Motors shall be 1/2 HP, 115 volt, single phase, 60 Hz. The supplier shall provide a head curve showing performance of the pump with the orifice installed.

Motors shall be thermally-protected with an automatic-reset feature.

3. Operating Conditions

The effluent pump shall be of the submersible turbine type capable of delivering 20 gpm against a TDH of 105 feet, and with a shut-off head of not less than 160 feet.

4. Bypass

A 1/8" bypass orifice shall be drilled in the discharge head of the pump to allow for cooling pump motor during periods of no discharge.

5.40.030 Pump Vault, Riser, and Lid

A. General

Provide an internal pump vault which will be of sufficient size and structural integrity to house and support the pumping equipment necessary for transportation of effluent. The pump vault will have a screen to prevent solids larger than 1/8" from entering the pipeline and to protect the pump and flow restriction device from plugging. The internal vault will be removable for access into the STEP tank for septage pumping. All risers and connections to the septic tank with risers shall be water tight. Any hour meter for pump installed in pump control panel with more than 100 hours at the time of sewer final will be considered a used pump and meter and shall be replaced.

B. Internal Vault

Simplex pump assemblies shall be a Biotube Pump Vault as manufactured by Orenco Systems, Inc., Model Number X4S 1254-18 19. Vaults for duplex 4" submersible pump assemblies shall be a Biotube Pump Vault Model Number X4D 12xx-18 19 as manufactured by Orenco Systems, Inc., or equal.

C. Risers

Risers shall be required for access to internal vaults and access into the septic tanks for septage pumping. All risers shall be constructed of PVC, fiberglass, or polyethylene and shall be constructed water tight. Risers over pump vault shall be 30-inches in diameter. All risers shall be of sufficient length to meet minimum requirement of the latest version of the National Electric Code (NEC) and shall vary depending

on the depth of bury on the various tanks. The risers shall be attached to the tanks such that a watertight seal is provided. Epoxy required to adhere the PVC or fiberglass risers to fiberglass or concrete tanks shall be a two part epoxy as supplied by the manufacturer of the riser, or equal as approved by the City.

When applicable, Neoprene grommets shall be installed by the manufacturer for discharge piping, vent piping and/or the electrical conduit to assure a watertight seal. Neoprene grommets will not be allowed on risers not requiring discharge piping, etc.

Risers shall be Model RR24 (length as required) for solids chamber, and RR30 (length as required) for pump chamber as manufactured by Orenco Systems, Inc., or approved equal approved by the City.

D. Lids

1. Standard Lid: The standard lid shall be a flat fiberglass lid, green in color, with a non skid aggregate finish. The lid shall be the diameter required to fit the required riser and shall be supplied with a minimum of two stainless steel bolts and the lid shall have a gasket. Allen wrench will not be included as part of the pump packages but 2 wrenches will be included in the spare parts. Lids shall be as manufactured by Orenco Systems, Inc., Model Number FLD24XX or FLD30xx or equal approved by the City.
2. Traffic Bearing Lid: All traffic bearing lids shall be an HS-20 loading with all frames and covers to be constructed of aluminum composite material unless otherwise approved by the City. The cover shall have the words "YELM SEWER" cast into it. Reference EJ 1480 30" with quarter turn paddle lock and pick slot. Reference EJ 1584 36" with quarter turn paddle lock and pick slot.

5.40.040 Internal Splice Box

For applications with 5 or less residential units, each residential riser requiring electrical connections shall have a PVC splice box located in the interior of the riser. All splice boxes shall be installed within 1'0" of the riser lid for access purposes. The splice box shall be complete with cord grips and dual wall heat shrink with butt connectors. Splice boxes shall be UL listed for the application. The number of cord grips and heat shrink connectors shall be equivalent to the number of floats and electrical leads within the pump vaults. The splice box and accessories shall meet all requirements of labor and industries and shall be UL listed for wet locations.

For all Class I, Division I installations more than 5 residential units or non-residential applications, risers requiring electrical connections shall have two separate splice boxes. All splice boxes shall be installed 10" from the top of

the riser to center of conduit access for access purposes. One splice box shall be for the pump wire and one splice box shall be for the low voltage wire for the float system. The splice boxes for the pump leads shall meet all requirements of the Department of Labor and Industries for a Class I, Division I, Type D gas application. The splice box for the low voltage float leads on an intrinsically safe relay shall be a non-metallic PVC splice box. The PVC splice box shall be complete with cord grips and dual wall heat shrink butt connectors. The number of cord grips and heat-shrink butt connectors within the PVC splice box shall be equivalent to the number of floats. The pump wire splice box simplex assemblies shall be single gang Model SBX-S as supplied by Orenco Systems, Inc., and the splice box for duplex assemblies shall be two gang Model SBX-D as supplied by Orenco Systems, Inc. or equal as approved by the Owner. Mounting box shall be mounted to riser with stainless steel bolts. An explosion proof EY fitting shall be provided directly outside of the mounting box for the pump wire connection

5.40.050 Level Control and Alarm Floats

Level control floats shall be UL or CSA listed for use in effluent on an adjustable or preset PVC stem which attaches directly to the pump vault. Floats shall consist of high level alarm, on/off, model Super G. Level control floats shall be Model PG for simplex pump assemblies and Model P2GN for duplex pump assemblies as manufactured by Orenco System, Inc. or equal as approved by the City.

- A. Pump control and alarm panels for simplex pump assemblies shall be Model S1 RO ETMCT as manufactured by Orenco Systems, Inc. or equal as approved by the City. Pump control panels for simplex commercial and intrinsically safe applications shall be Model S1 1R RO ETMCT as manufactured by ORENCO or equal as approved by the City.
- B. Pump control and alarm panels for duplex pump assemblies shall be Model DAX1 IR2 RO ETMCT as manufactured by Orenco Systems, Inc. or equal as approved by the City.
- C. All pump control panels shall have NEMA 4x fiberglass enclosures, an audio and visual alarm, an elapsed time meter, event counter, stainless steel latch and internal 120-volt, 20-amp circuit breaker for each pump. Commercial and residential applications shall also include a 10-amp circuit breaker for controls.
- D. Residential float set-ups shall not have low level, redundant off floats or "T" floats. Electrician is still required to pull the lead wire from pump control panel to tank "J" box and use silicone filled wire nuts, heat shrink butt connectors, or pre-approved equal on each end of spare wire.

5.40.060 Hose and Valve Assembly

Hose and valve assembly for a 4" submersible shall include 1" diameter 100 psi PVC hose with PVC union and ball valve and anti-siphon valve Model Number HV100BASX as manufactured by Orenco Systems, Inc., or approved equal.

5.40.070 Additional Material Requirements

All equipment including but not limited to pump vault, riser, standard lid, bonding epoxy, splice box, discharge piping, control float assembly, pump(s), pump control and alarm panels, etc. shall be supplied by one single supplier or manufacturer as a packaged unit. The supplier or manufacturer shall upon request by the City, submit information on availability of replacement parts, maintenance records of operating pump assemblies. The package as supplied by the manufacturer or supplier will have a standard guarantee against material defect for a period of not less than 1 year. The date of guarantee shall begin on the date equipment is delivered on a particular site and may be a single guarantee incorporating all the components or individual guarantees on the various components. The manufacturer or supplier will be responsible to handle replacement or repair of defective parts.

5.40.080 Electrical Connections

All electrical equipment and materials shall be installed in conformance to requirements of the latest edition of the National Electrical Code as enforced by the State of Washington Labor and Industries Electrical Section. The Contractor shall be required to acquire all necessary permits and coordinate directly with the appropriate authority on the necessary inspection.

Splice boxes shall be installed in the STEP tank riser in accordance with the instruction from the supplier or manufacturer. The control panel shall be installed either on a remote post constructed of hot dipped galvanized unistrut or approved equal, or on the garage wall, unless approved by the City of Yelm. The panel shall be affixed by stainless steel screws to either the structure or the post. The screws shall be of sufficient size and length to securely fasten the panel.

Power and control wire from the splice box in the riser to the pump control shall be UL approved with a minimum of 12 gauge for each control or power wire. Power and control wire shall be color-coded for ease of tracing between the alarm panel and pumps and float switches. The Contractor shall submit type and size of cable for review and approval by the City and Labor & Industries. Cable attached to the exterior of the building shall be contained in approved electrical conduit. All wire connections shall be made with heat shrink butt connectors.

Power and control wire for commercial or intrinsically safe applications shall be contained in two IMC or rigid metal conduits for separation of low and high voltage lines between the control panel and pump vault and shall meet the requirements of Labor & Industries.

All exterior electrical wire shall be contained within PVC conduit. Exterior conduit and wire will be on the exterior of the house directly below the control panel and will be installed plumb and vertical. Underground electrical cable shall have a minimum of 24 inches of earth cover. All cable or wire shall be contained in PVC conduit.

Electrical: All materials used for control and electrical connections shall meet requirements of labor and industries and the Uniform Electrical Code.

The Pumping Assemblies shall comply with the latest State of Washington's Department of Labor and Industries Electrical Inspection Section Policy.

Power supply for I.R. Commercial Systems from house breaker panel to the pump control panel shall be a 20 amp dedicated circuit for each pump with separate neutral wires. A dedicated 10 amp circuit shall be required for the control system. Residential (non I.R.) Symplex applications shall have one dedicated 20 amp breaker in-house panel.

Disconnects are required for power to all Pump Control Panels. Symplex (non I.R.) applications shall use a model B-5V one gang weatherproof outlet box as manufactured by Intermatic and a single pole switch rated for 20 amp.

Duplex systems (2 pumps) shall use a Deep, one gang outlet box with 3 threaded outlets Model # DB-75V as manufactured by Intermatic. The switch shall be a three pole single throw, AC manual motor starting switch. Model # MS303 as manufactured by Leviton.

All disconnect switches shall include a Rayntite single Gang Weatherproof cover Model # 5031-0 as manufactured by Bell.

Surge arrestors shall be installed in the Pump Control Panel For all Class I Division I installations. Surge arrestors shall be a Model # AG2401 as manufactured by Intermatic, or equal approved by the City, and shall be installed on the power wire supplying power to the control circuit, and be installed within the pump Control Panel.

Buildings served by STEP sewer, utilizing on-site backup generators for power outages, must have electrical service installed in such a manner that the STEP system will also be supplied power by the auxiliary generator.

The pump control panels for all STEP tanks housing 2 or more pumps shall be fitted with the transfer switch model DT323 URK you are K as manufactured by Cutler Hammer or approved equal and a male plug, model

70530 AMB WP as manufactured by Byrant for use with the city's portable auxiliary generator or approved equal.

5.50 GRAVITY SEWER

5.50.010 General

The use of gravity sewer lines shall be limited to the collections of sewerage or transport of sewerage to the City STEP system. All gravity sewers shall be privately maintained. The City will maintain gravity sewer lines with prior arrangements and approval from the Director of Public Works.

5.50.020 Side Sewers

Minimum slope for any 4" gravity side sewer lines shall be no less than 2 percent or 1/4 inch of rise to 1 foot of run. Slopes less than 2 percent will only be allowed if approved by the City. Installation of gravity clean-outs shall meet the requirements of the City of Yelm, the uniform plumbing code (see Standard Detail 5-7). At a minimum, a gravity clean-out with a 2-way sanitary sweeping T will be required 2 ½ feet from the foundation of the structure.

Grade stakes will not be provided by the City for side sewers. It shall be the Contractor's responsibility to determine the differential in elevation between the invert to the STEP tank and the invert at the building side sewer. Based on that information the Contractor shall determine the percent of fall between the STEP tank and the connection point at the side sewer.

Side sewer clean-outs shall be installed per "Sewer Service" 7A.010, Definition of Terms per Yelm Ordinance 505 (YMC 13.08), "House Drain" or "Building Drain".

5.60 RESTORATION

5.60.010 General

This work shall consist of various types of surface restoration. As required by the City of Yelm for all work on public Right-of-Way, all surfaces and surface improvements effected by the Contractors operations shall be restored to conditions equal to or better than preconstruction conditions. The City shall be the sole judge as to the equality of materials and work when comparing post-construction conditions to preconstruction conditions.

Cement concrete sidewalk and driveway repair shall conform to the Standard Specifications and Standard Detail 5-3, except that the finish, dimensions, and joints shall be the same as the original work. Cement concrete driveways shall be defined so as to include cement concrete alleys and parking lots.

Curb repair shall conform to the Standard Specifications, except that the finish, dimensions, and joint shall be the same as the original work.

5.60.020 Crushed Surfacing

Shoulders, driveways and other graveled or crushed surfaced areas which are disturbed by the Contractor's operations shall be resurfaced with 2 inches of crushed surfacing. All work and material shall conform to the requirements of the Standard Specifications.

5.70 INSPECTION GUIDE FOR STEP SEWER INSTALLATION

A basic sketch of the proposed installation must be submitted to the Public Works Office prior to issuance of permit.

The City of Yelm Sewer Department will perform the following required inspections:

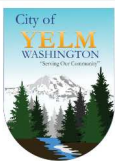
1. Tank placement (See tech. spec. for req)
2. Leak test tank (2 hours, no loss)
 Pressure test service line. (70 p.s.i. water for 1 minute)
 All pipe before backfill. (See bedding and toning wire req)
3. A final inspection is required after all work (including electrical) has been completed. A record drawing is required before system can be excepted.

Additional inspections beyond the 3 shown above will be at the Contractor's expense. We try to combine these 3 inspections into 3 trips to the site if possible. 48 hours notice is required for inspection. *We do however make every effort to be out sooner, if possible.* For inspection call the City of Yelm Inspection Hotline 458-8410 If no answer leave a detailed message.

LIST OF DRAWINGS - SEWER

Title	Drawing
Typical 1" Service Connection	5 - 1
Typical Double Service Connection.....	5 - 2
Typical Pipe Trench	5 - 3
Remote Post - Residential Pump Control Panel Installation.....	5 - 4
Typical Pump Control Panel Installation on Existing House	5 - 5
Typical Pump Control Panel	5 - 6
Typical Connection	5 - 7
Vacant	5 - 8
Typical Simplex STEP Tank Installation	5 - 9
1,000-1,500-Gallon STEP Tank	5 - 10
3,000 Gallon STEP Tank/Pump Tank	5 - 11
Typical Sewer Automatic Air Release Valve	5 - 12
Float Setting Vault Dimensions for a Simplex Pump Vault	5 - 13
Float Setting Vault Dimensions for a Duplex Pump Vault.....	5 - 14
Float Setting Vault Dimensions for a Triplex Pump Vault.....	5 - 15
Fiberglass Tank Bedding	5 - 16
Concrete Tank Bedding	5 - 17
Typical Riser	5 - 18
Traffic Bearing Lid	5 - 19
Typical End of Line Cleanout	5 - 20
Typical Sewer Mainline Gate Valve	5 - 21
Mainline Cleanout Plan	5 - 22
Mainline Pig Port Detail.....	5 - 23
Pig Launcher	5 - 24
Typical Duplex Effluent Pumping System	5 - 25

1. ALL SERVICE LINE CARSON BOXES SHALL BE LOCATED 4' FROM EDGE OF CURB TO CENTER OF CARSON BOX IN PLANTER STRIP ON BOTH SIDES OF ROADWAY.
2. GANG CARSON BOXES SHALL BE LOCATED 3' APART TO CENTER OF BOXES
3. BALL AND CHECK VALVES TO BE INSTALLED IN CARSON BOXES ACCORDING TO DRAWING.
4. NO THREADED CONNECTIONS IN SERVICE LINES UNLESS PRE-APPROVED BY THE DIRECTOR OF HIS/HER DESIGNER.



CITY OF YELM
TYPICAL 1" AND 2" SERVICE
CONNECTIONS

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

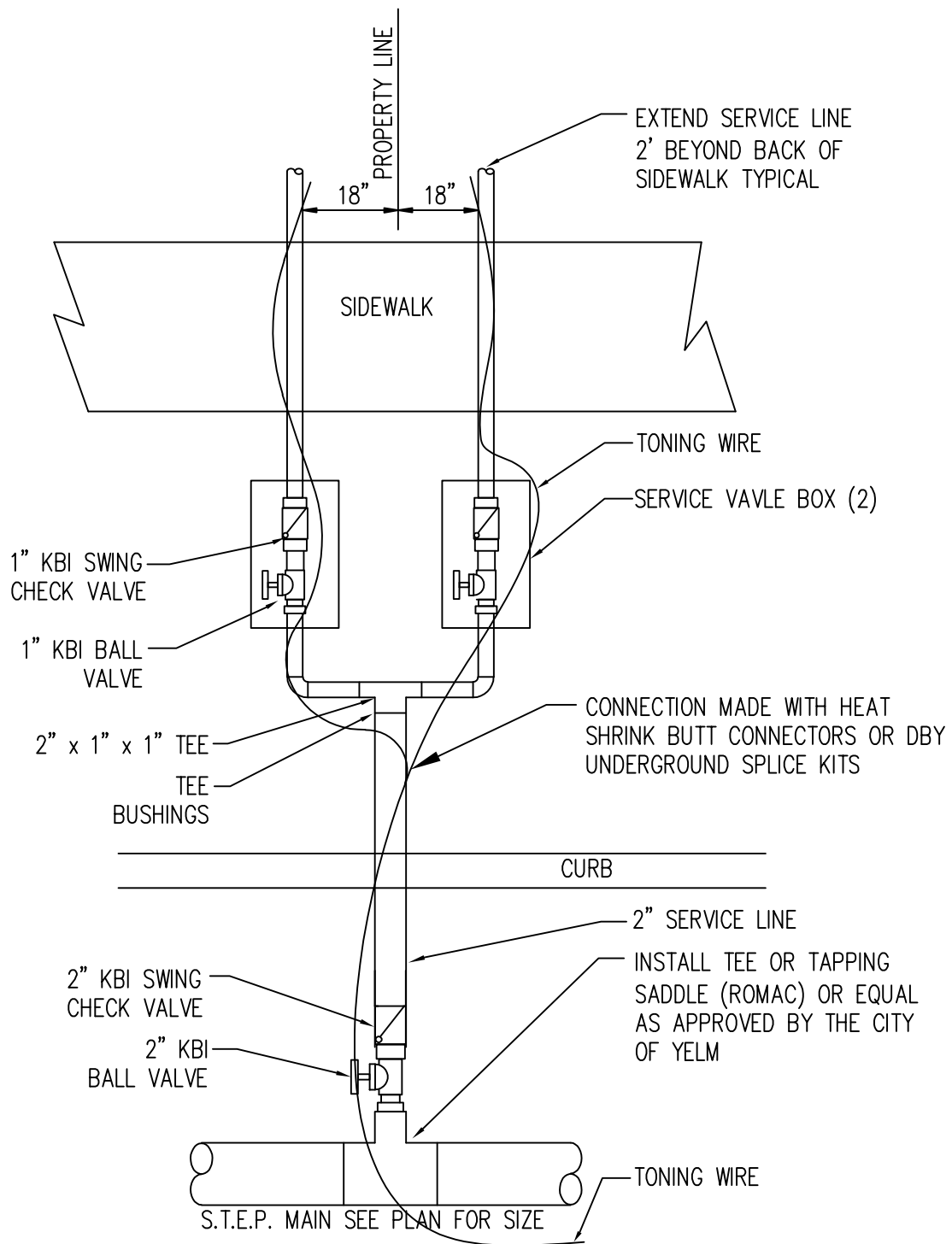
DWN.	MKD
------	-----

CKD.	DMM
------	-----

DWG. NO.

5-1

DATE
10/2019



CITY OF YELM

**TYPICAL DOUBLE SERVICE
CONNECTION**

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

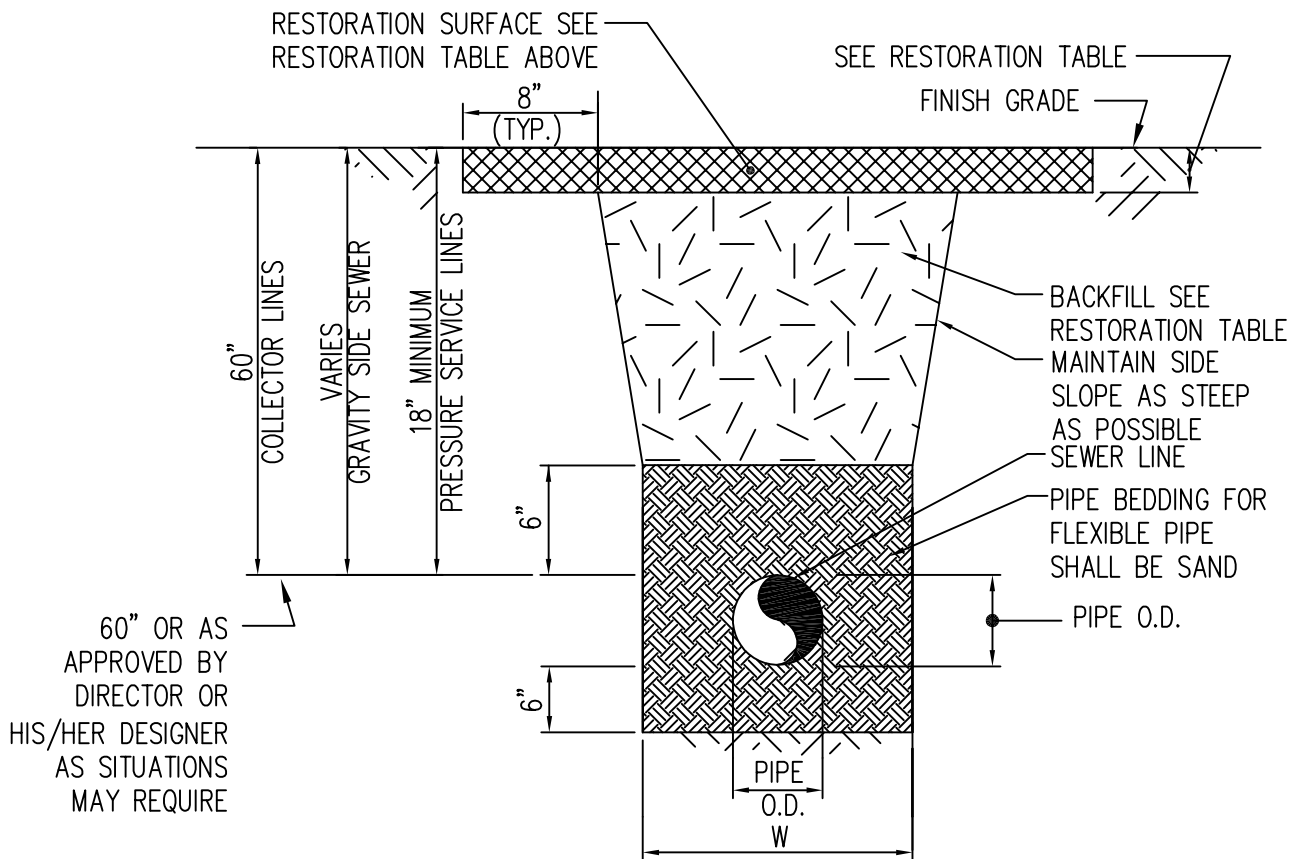
DWN. MKD

CKD. DMM

DWG. NO.

5-2

DATE
10/2019



RESTORATION TABLE 1

SURFACE TYPE	THICKNESS	BACKFILL/ COMPACTION REQMNTS.	COMMENTS/ OTHER REQUIREMENTS
CRUSHED SURFACE	4" CRUSHED SURFACE TOP COURSE	SELECT BACKFILL COMPACT TO 95%	FINISH GRADE SHALL BE SMOOTH & CONSISTANT WITH EXISTING
A.C. PAVEMENT OVER GRAVEL BASE	3" MIN. GRADE B A.C. PAVING OVER 4" CRUSHED SURFACE TOP COURSE	SELECT BACKFILL COMPACT TO 95%	FINISH ROADWAY TO CONFORM TO ALL EXISTING GRADES AND CURBS SLOPES SHALL MATCH
CONCRETE SURFACE (DRIVEWAY/SIDEWALK)	MATCH EXISTING CONCRETE THICKNESS	SELECT BACKFILL COMPACT TO 95%	MATCH EXISTING FINISH TEXTURE, AND GRADE.
LAWN/LANDSCAPE	HYDROSEED/ PLANTINGS OVER 4" MIN. TYPE A TOP SOIL	NATIVE BACKFILL COMPACT TO 85%	FINISH GRADE SHALL BE SMOOTH & CONSISTANT WITH EXISTING GRADE
UNIMPROVED SUFACE	N/A	NATIVE BACKFILL COMPACT TO 85%	MOUND BACKFILL 2" ABOVE EXISTING GRADE & SMOOTH

CSBC = CRUSHED SURFACE BASE COURSE
CSTC = CRUSHED SURFACE TOP COURSE



CITY OF YELM

TYPICAL PIPE TRENCH

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

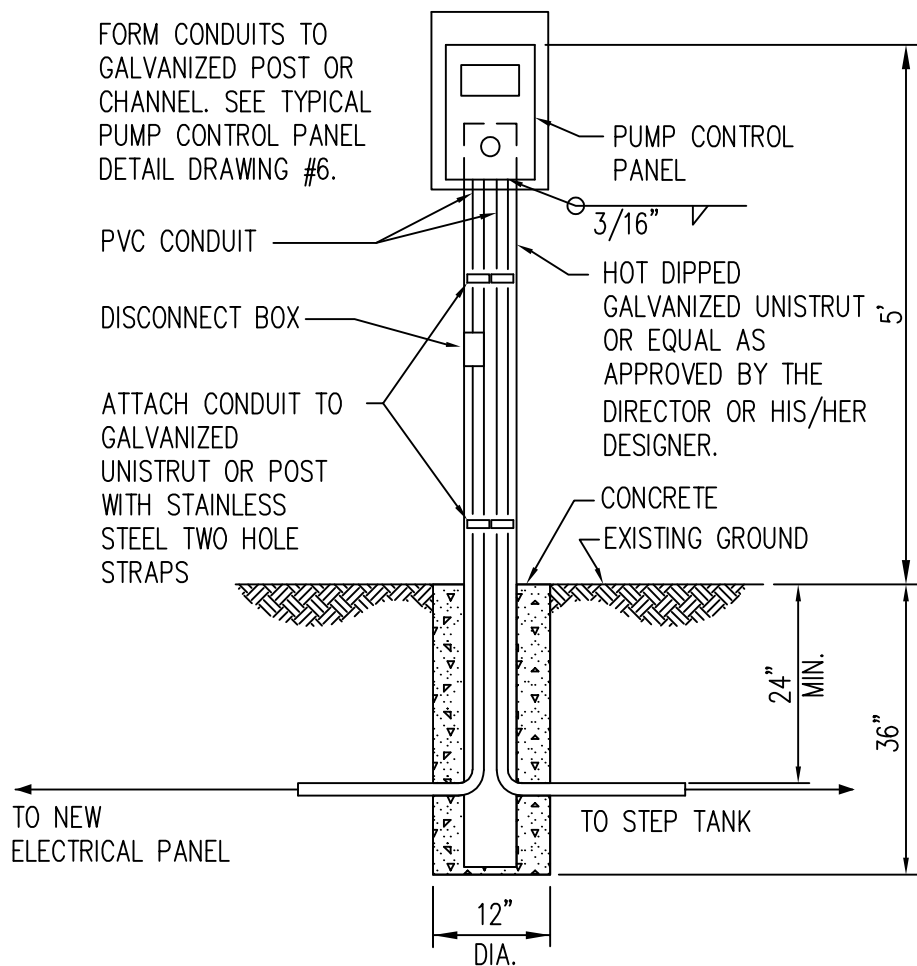
DWN. MKD

CKD. DMM

DWG. NO.

5-3

DATE
10/2019



NOTE:

1. DISCONNECT COVER SHALL BE 5031-0 RAYNTITE SINGLE GANG WEATHERPROOF COVER 1.406" DIAMETER.



CITY OF YELM
REMOTE POST - RESIDENTIAL PUMP
CONTROL PANEL INSTALLATION

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. DMM

DWG. NO.

5-4

DATE
10/2019

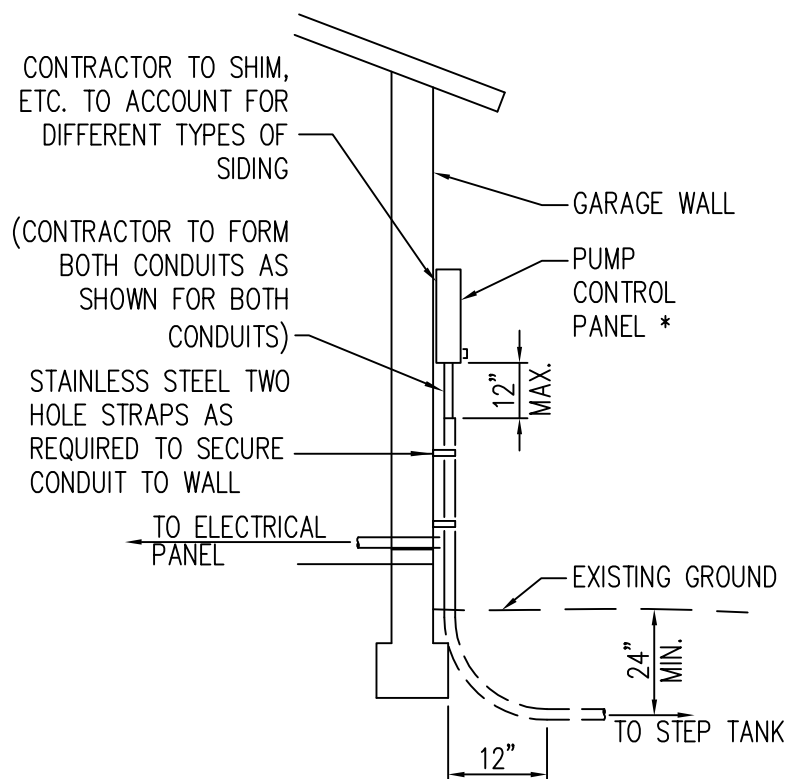
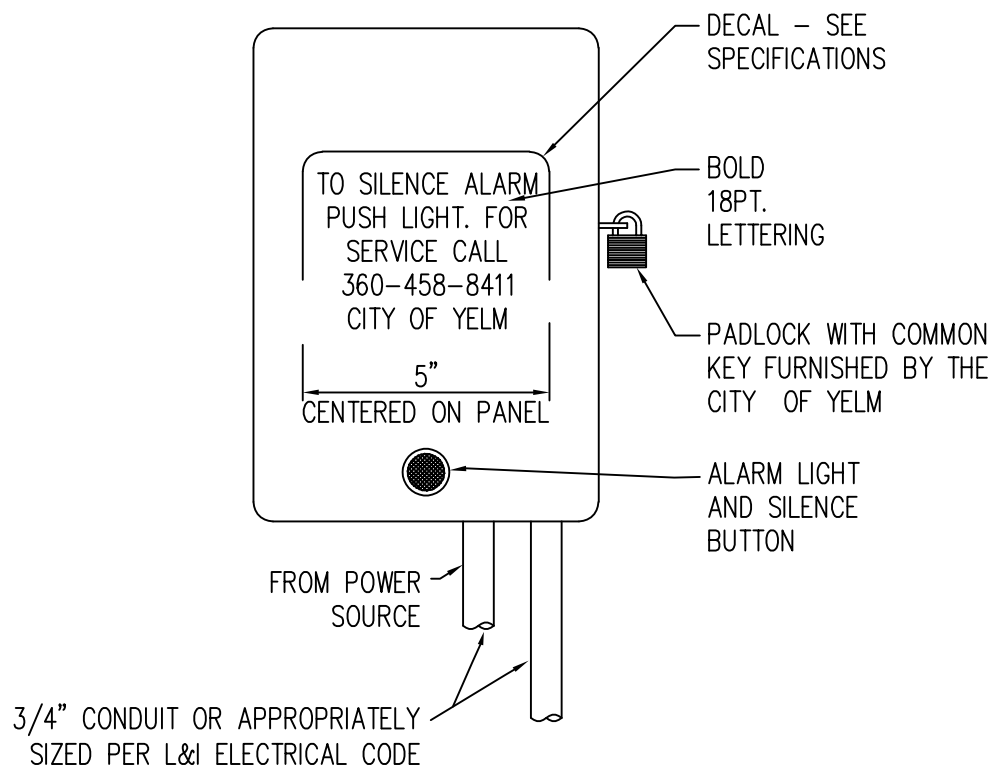


TABLE FOR FEEDER WIRE RUN	
WIRE SIZE	MAXIMUM DISTANCE
#12 AWG COPPER	150 FEET
#10 AWG COPPER	250 FEET
#8 AWG COPPER	350 FEET

(SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION).



NOTE:
 PANEL SIZE MAY VARY
 DEPENDING ON APPLICATION.



CITY OF YELM

TYPICAL PUMP CONTROL PANEL

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. DMM

DWG. NO.

5-6

DATE
 10/2019



CITY OF YELM

TYPICAL CONNECTION

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

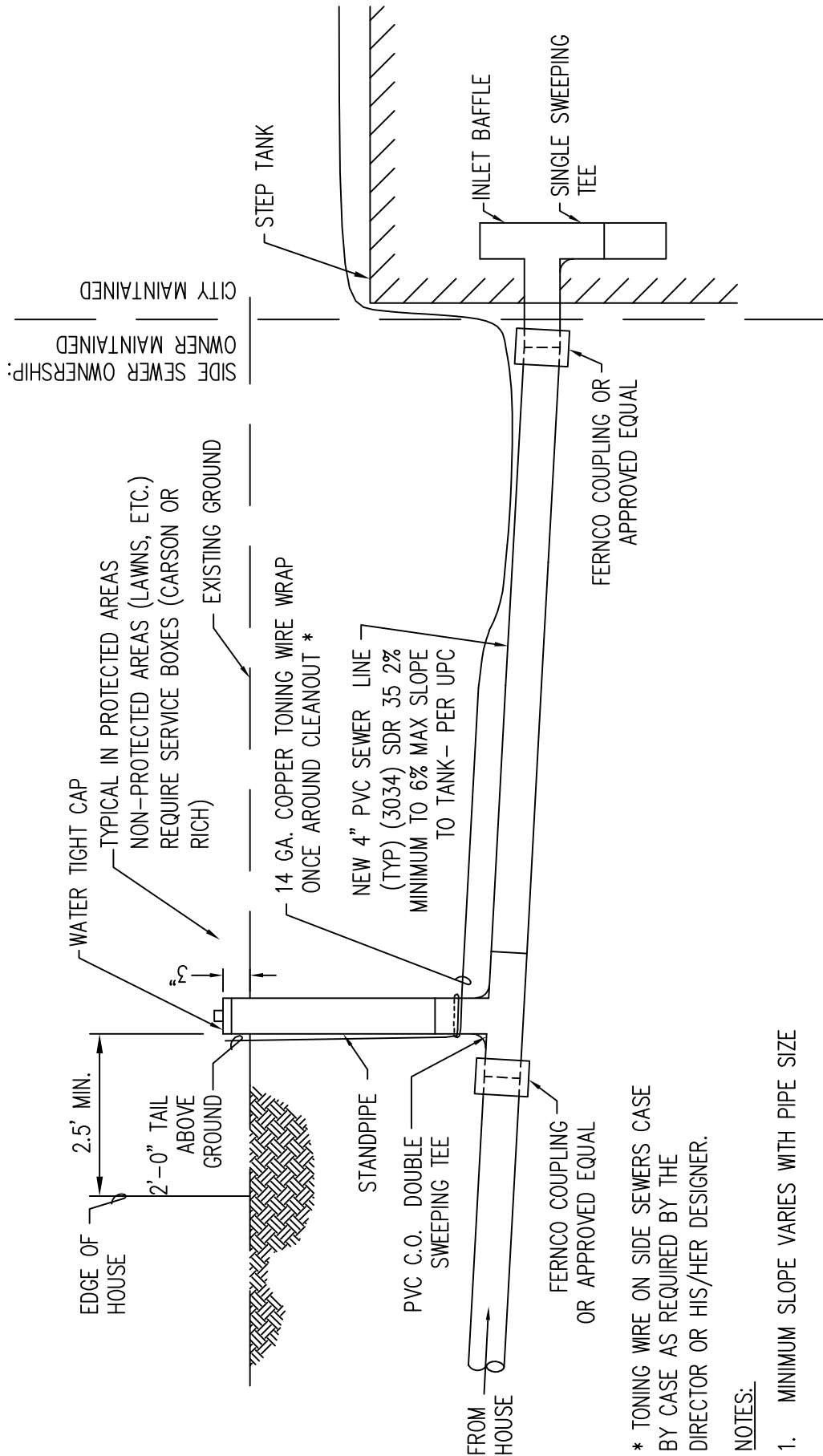
DWN. MKD

CKD. DMM

DWG. NO.

5-7

DATE
10/2019



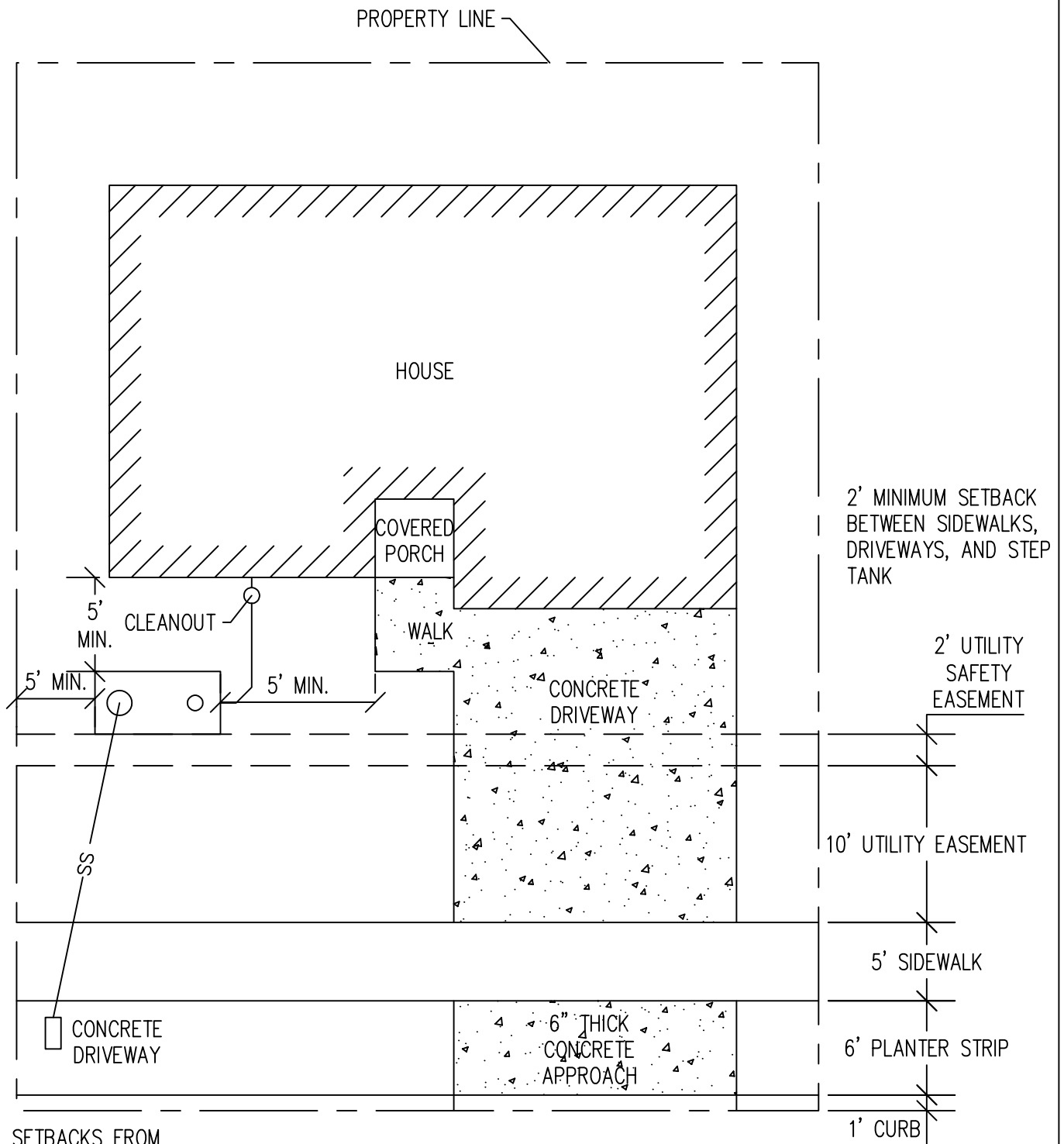
* TONING WIRE ON SIDE SEWERS CASE BY CASE AS REQUIRED BY THE DIRECTOR OR HIS/HER DESIGNER.

NOTES:

1. MINIMUM SLOPE VARIES WITH PIPE SIZE

HOUSE DRAIN DEFINITION:

"HOUSE DRAIN" PR "BUILDING DRAIN" MEANS THE PIPE USED FOR CONVEYING SEWAGE FROM THE BUILDING TO THE CLEAN-OUT OR TO A POINT 2.5' BEYOND THE OUTER LINE OF ANY FOOTING, PILING, BUILDING SUPPORT OR PORCH UNDER WHICH IT MAY RUN; WHETHER SUCH DRAIN CONSISTS OF ONE LINE EXTENDING FROM THE BUILDING OR OF TWO OR MORE SUCH LINES.

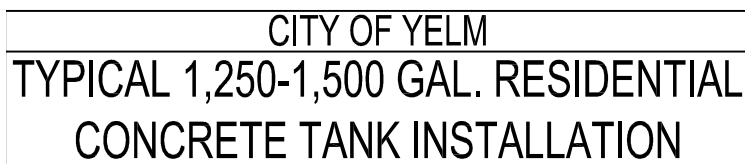
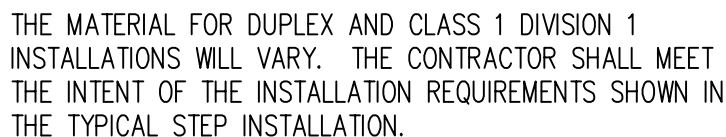


5' MINIMUM SETBACKS FROM
PROPERTY LINE, HOUSE
FOUNDATION, AND PORCH
FOUNDATION TO TANK

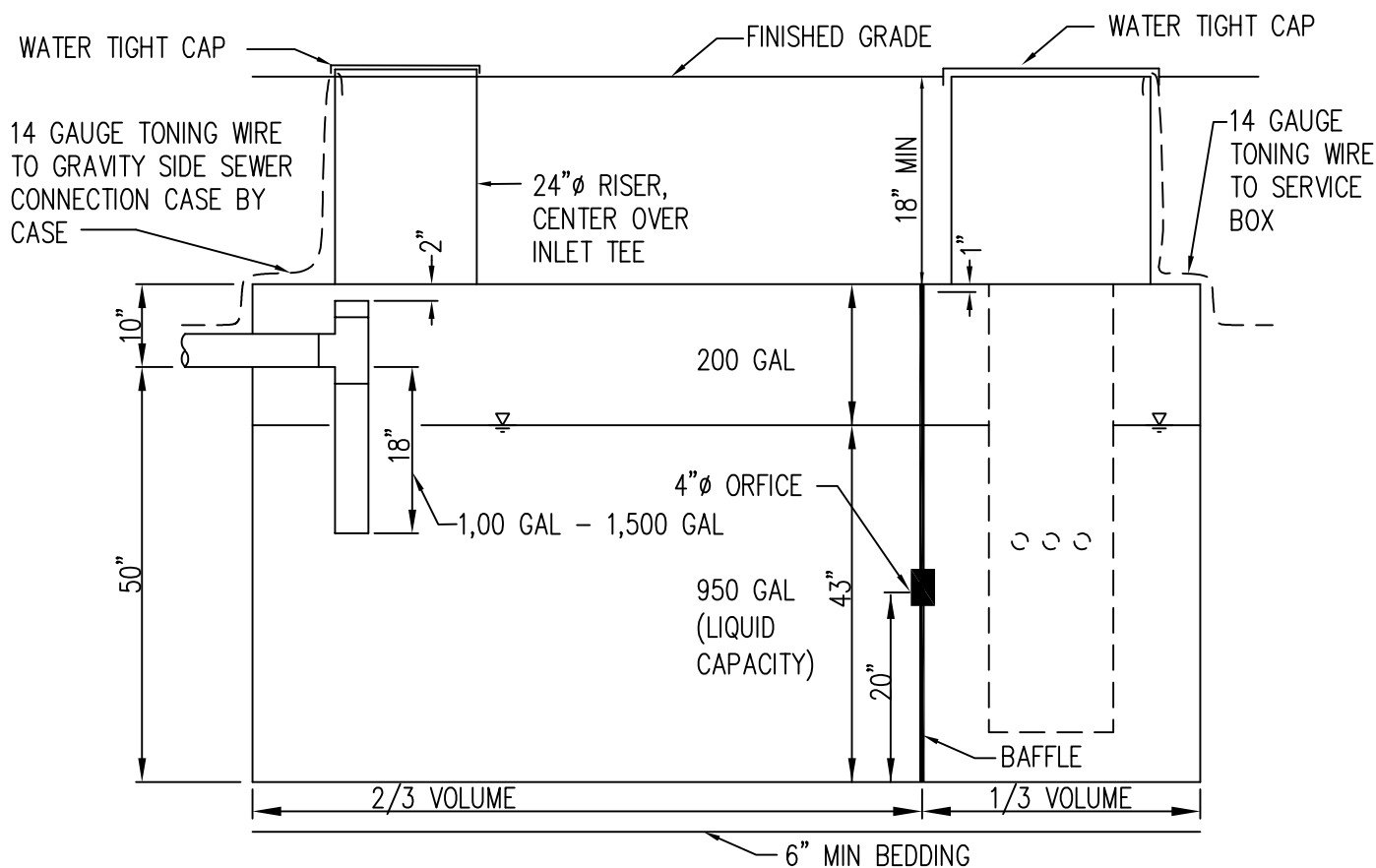


CITY OF YELM SETBACK DETAIL

APPROVED BY			DWG. NO.
PUBLIC WORKS DIRECTOR			5-8
DES. MKD	DWN. MKD	CKD. DMM	DATE
			10/2019



DATE
10/2019



NOTE:

1. FOR THE APPROPRIATE FLOAT LEVELS, SEE DRAWINGS #5-13, #5-14 AND #5-15 (SIMPLEX, DUPLEX AND TRIPLEX) AS THEY APPLY.



CITY OF YELM

1,250 GALLON - 1500 GALLON

CONCRETE STEP TANKS

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

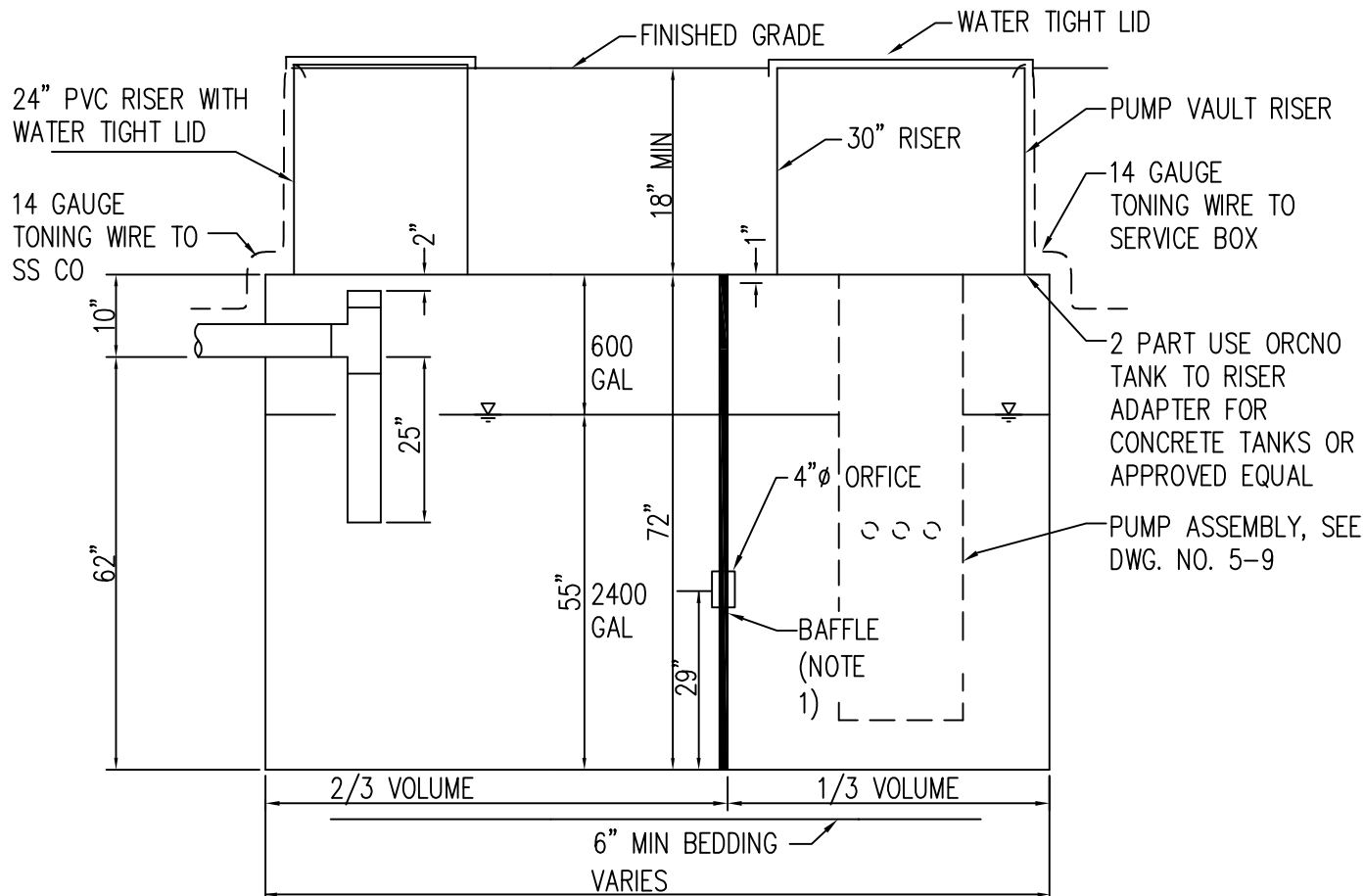
DWN. MKD

CKD. DMM

DWG. NO.

5-10

DATE
10/2019

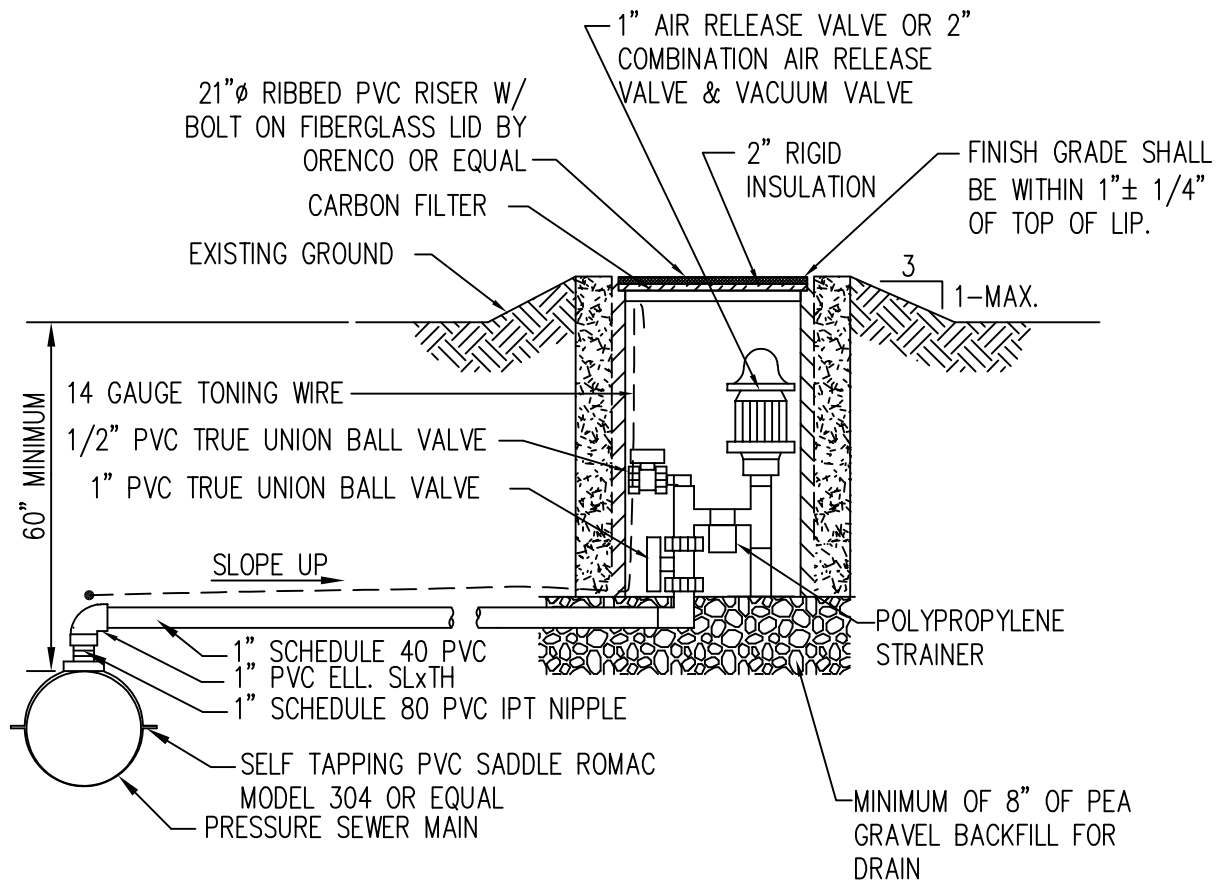


NOTES:

1. DELETE BAFFLE FOR A 3000 GALLON TANK UTILIZED AS A TRIPLEX PUMP VAULT.
2. THE OWNER WILL REVIEW TOLERANCES IN EXCESS OF DIMENSIONS SHOWN.
3. THE TRIPLEX PUMP VAULT REQUIRES TWO VAULTS AND TWO COMPLETE RISERS. ONE VAULT CONTAINS FLOATS AND ONE PUMP. THE SECOND VAULT CONTAINS TWO PUMPS.



CITY OF YELM 3, 000 GALLON STEP TANK/PUMP TANK	APPROVED BY			DWG. NO.
	PUBLIC WORKS DIRECTOR			DATE
	DES. MKD	DWN. MKD	CKD. DMM	DATE 10/2019



NOTE:

PLACE IN A NON-TRAFFIC AREA,
UNION JOINTS SHALL BE SOLVENT
WELDED. CITY TO FIELD LOCATE.



CITY OF YELM
TYPICAL SEWER AUTOMATIC AIR
RELEASE VALVE

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

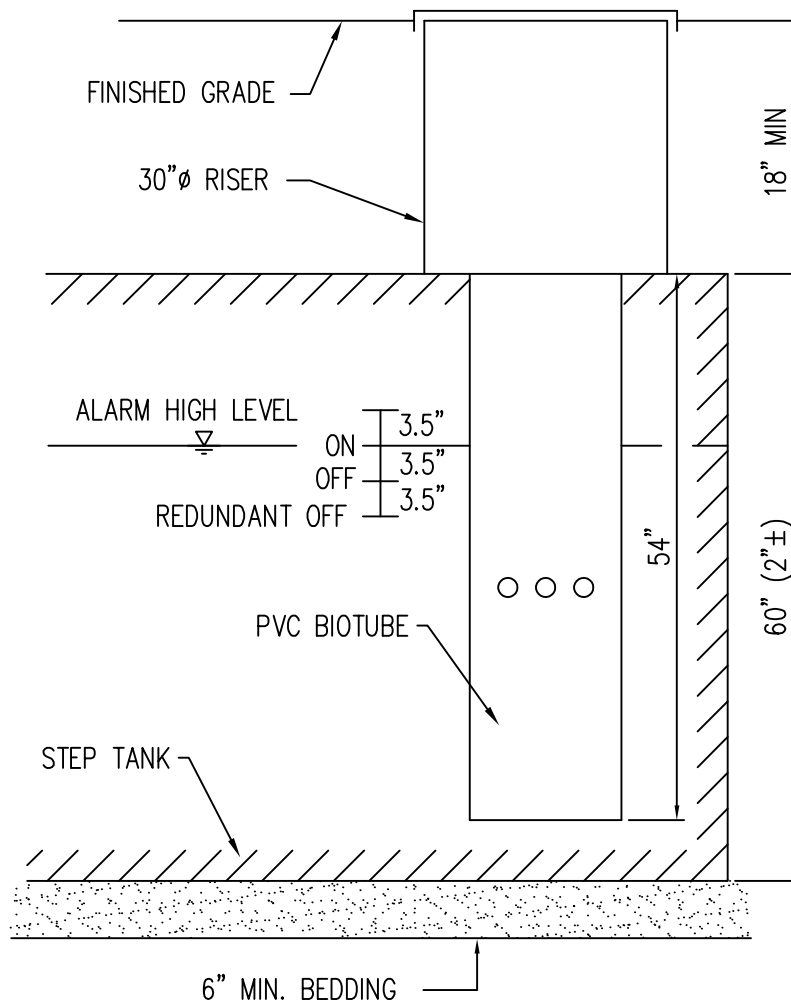
DES. MKD

DWN. MKD

CKD. DMM

DWG. NO.
5-12

DATE
10/2019



NOTES:

1. 1,000 – 1,500 GAL. TANKS



CITY OF YELM
FLOAT SETTING VAULT DIMENSIONS
FOR SIMPLEX PUMP VAULT

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

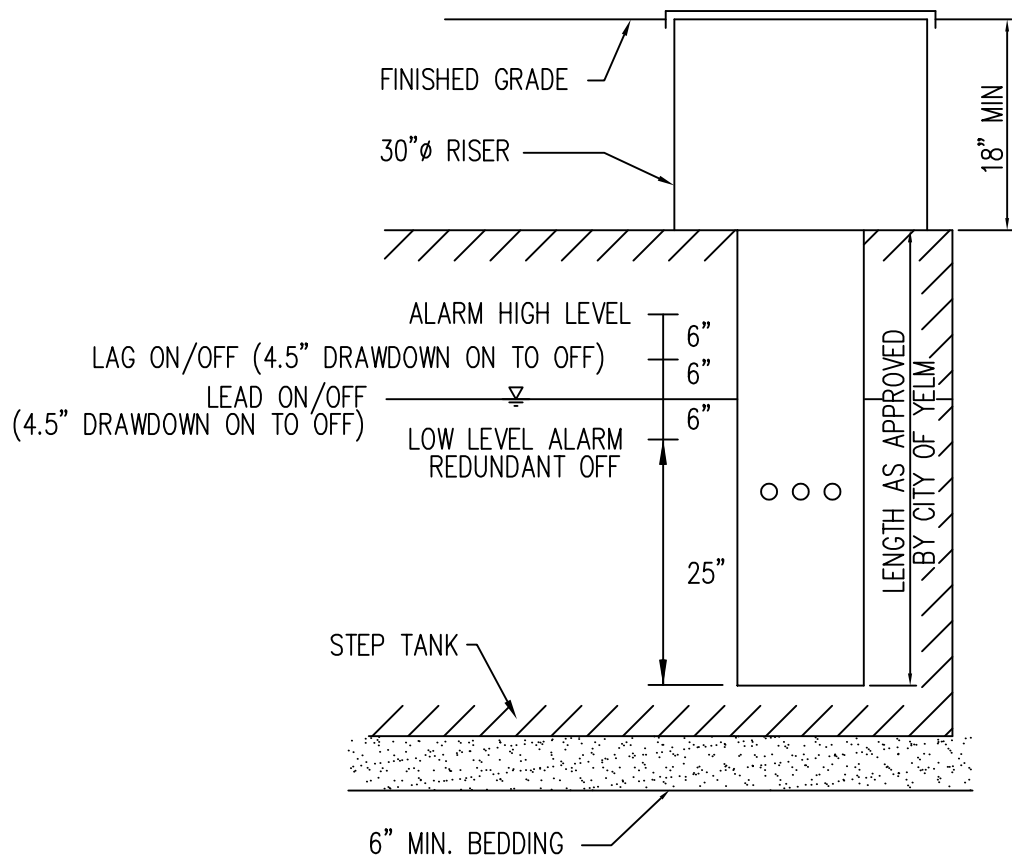
DWN. MKD

CKD. DMM

DWG. NO.

5-13

DATE
10/2019



CITY OF YELM

**FLOAT SETTING VAULT DIMENSIONS
FOR DUPLEX PUMP VAULT**

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

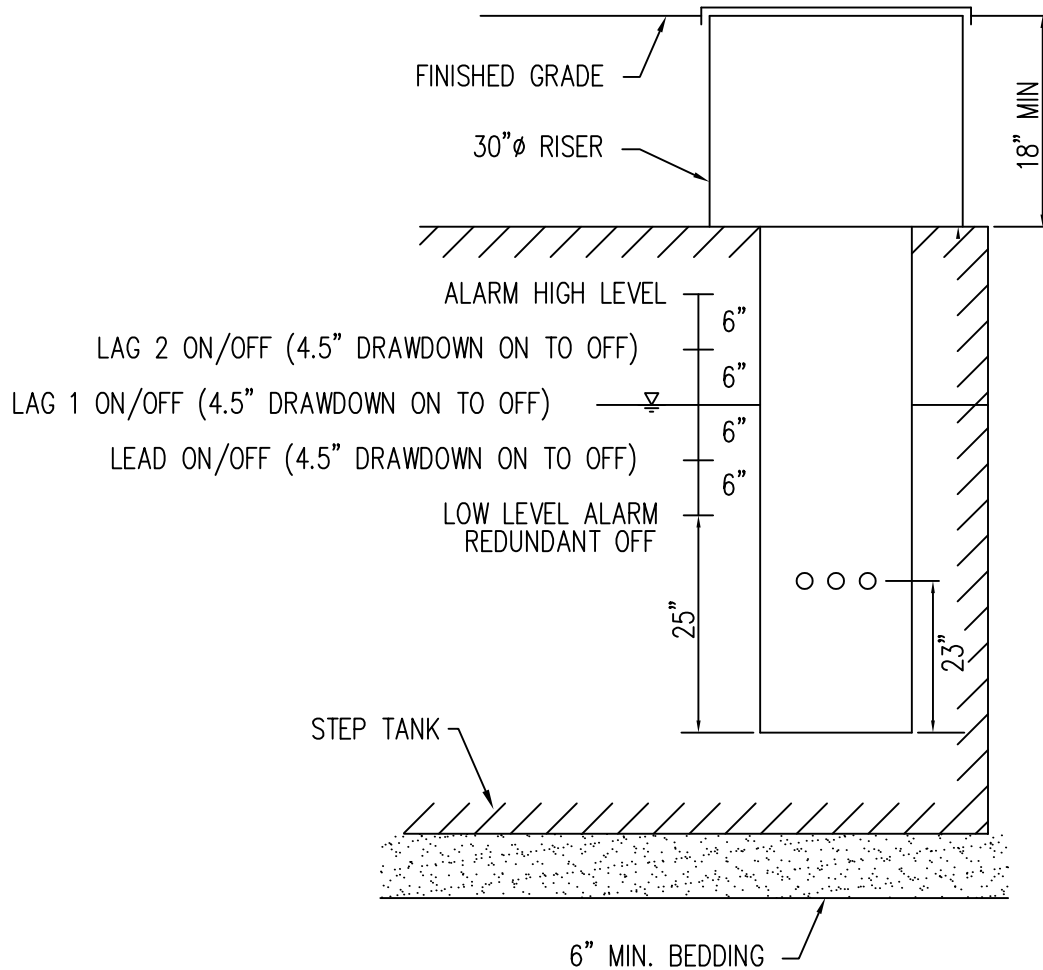
DWN. MKD

CKD. DMM

DWG. NO.

5-14

DATE
10/2019



NOTE:

THE TRIPLEX PUMP VAULT REQUIRES TWO VAULTS AND TWO COMPLETE RISERS. ONE VAULT CONTAINS FLOATS AND ONE PUMP. THE SECOND VAULT CONTAINS TWO PUMPS.



CITY OF YELM

FLOAT SETTING VAULT DIMENSIONS

FOR TRIPLEX PUMP VAULT

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

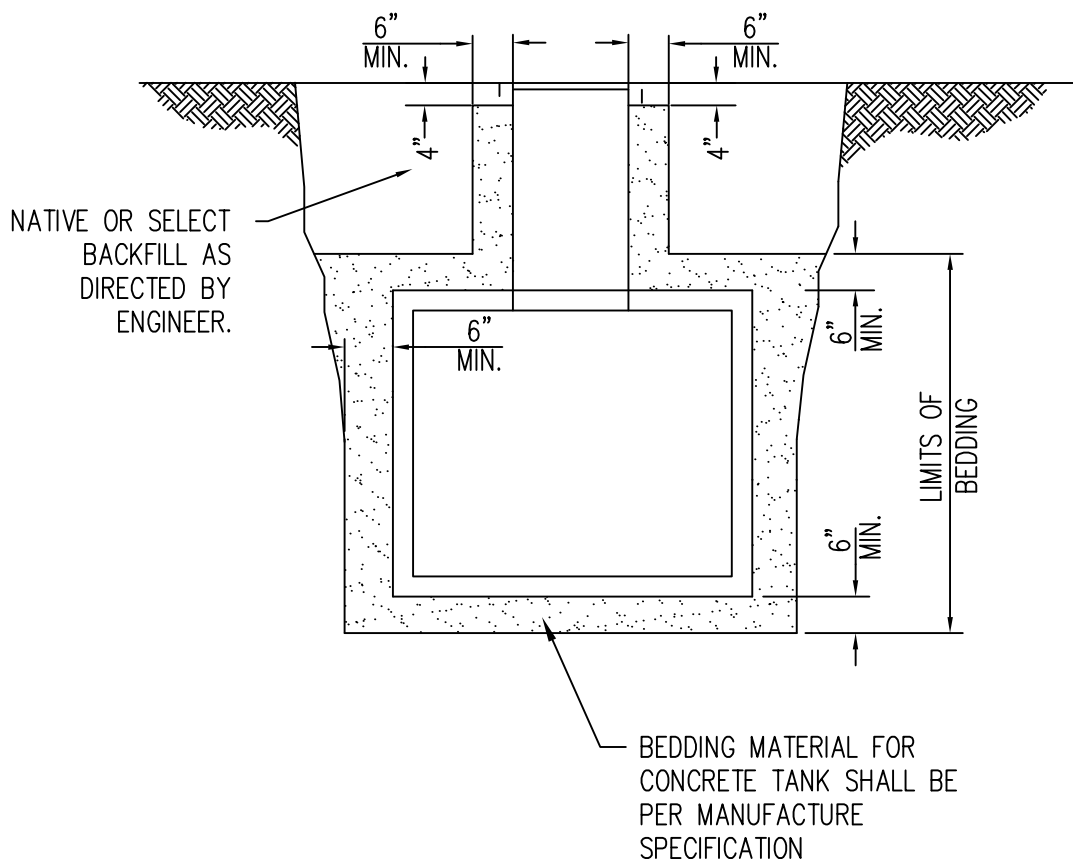
DWN. MKD

CKD. DMM

DWG. NO.

5-15

DATE
10/2019



CITY OF YELM CONCRETE TANK BEDDING

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

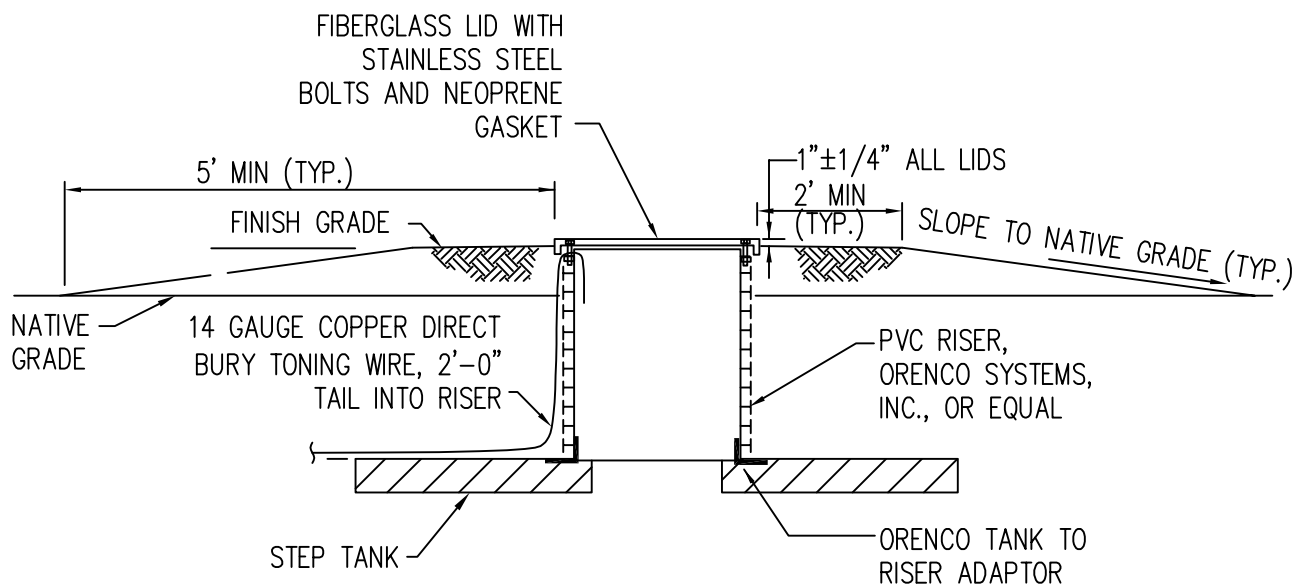
DES. MKD

DWN. MKD

CKD. DMM

DWG. NO.
5-17

DATE
10/2019



NOTE:

RISER AND LID SHALL BE 30" ON ALL PUMP VAULT INSTALLATIONS.



CITY OF YELM

RISER (NON-TRAFFIC RATED)

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

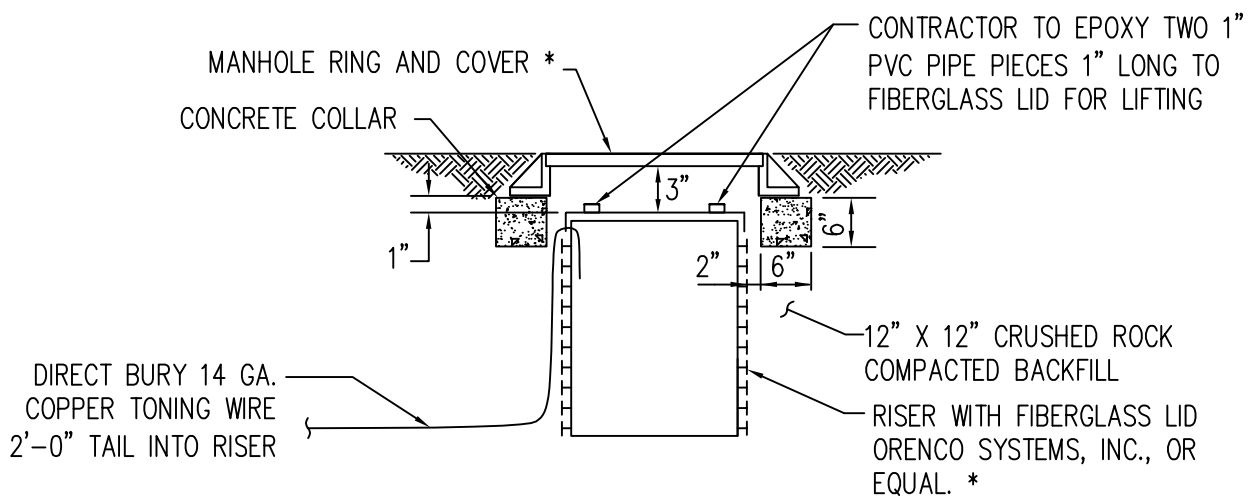
DWN. MKD

CKD. DMM

DWG. NO.

5-18

DATE
10/2019



MANHOLE RING AND COVER SIZES:

- *21" PVC RISER REQUIRES 24" RING & ALUMINUM COVER
- 24" PVC RISER REQUIRES 30" RING & ALUMINUM COVER
- 30" PVC RISER REQUIRES 36" RING & ALUMINUM COVER



CITY OF YELM

RISER (TRAFFIC RATED)

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

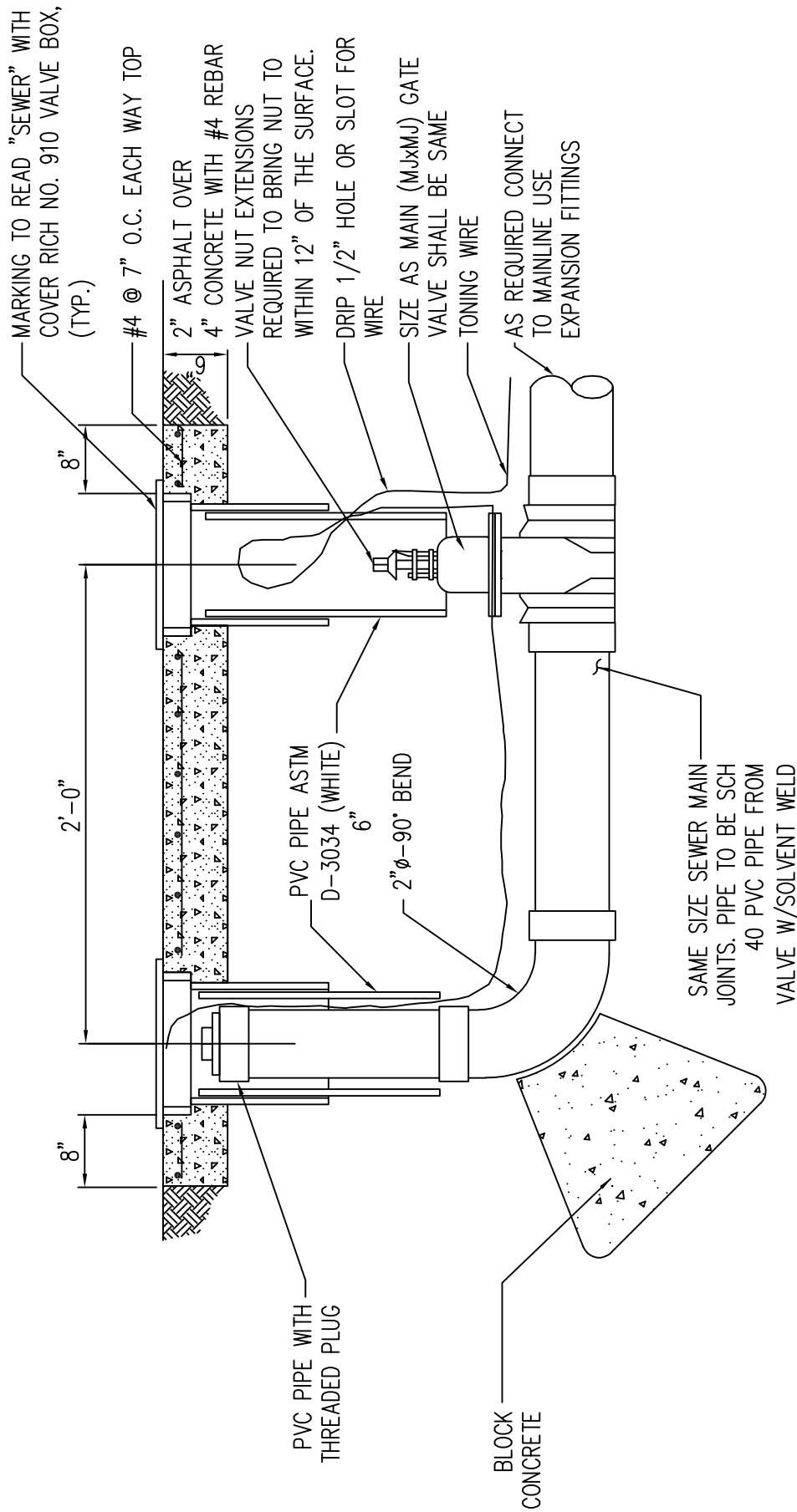
DWN. MKD

CKD. DMM

DWG. NO.

5-19

DATE
10/2019



CITY OF YELM END OF LINE CLEANOUT

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

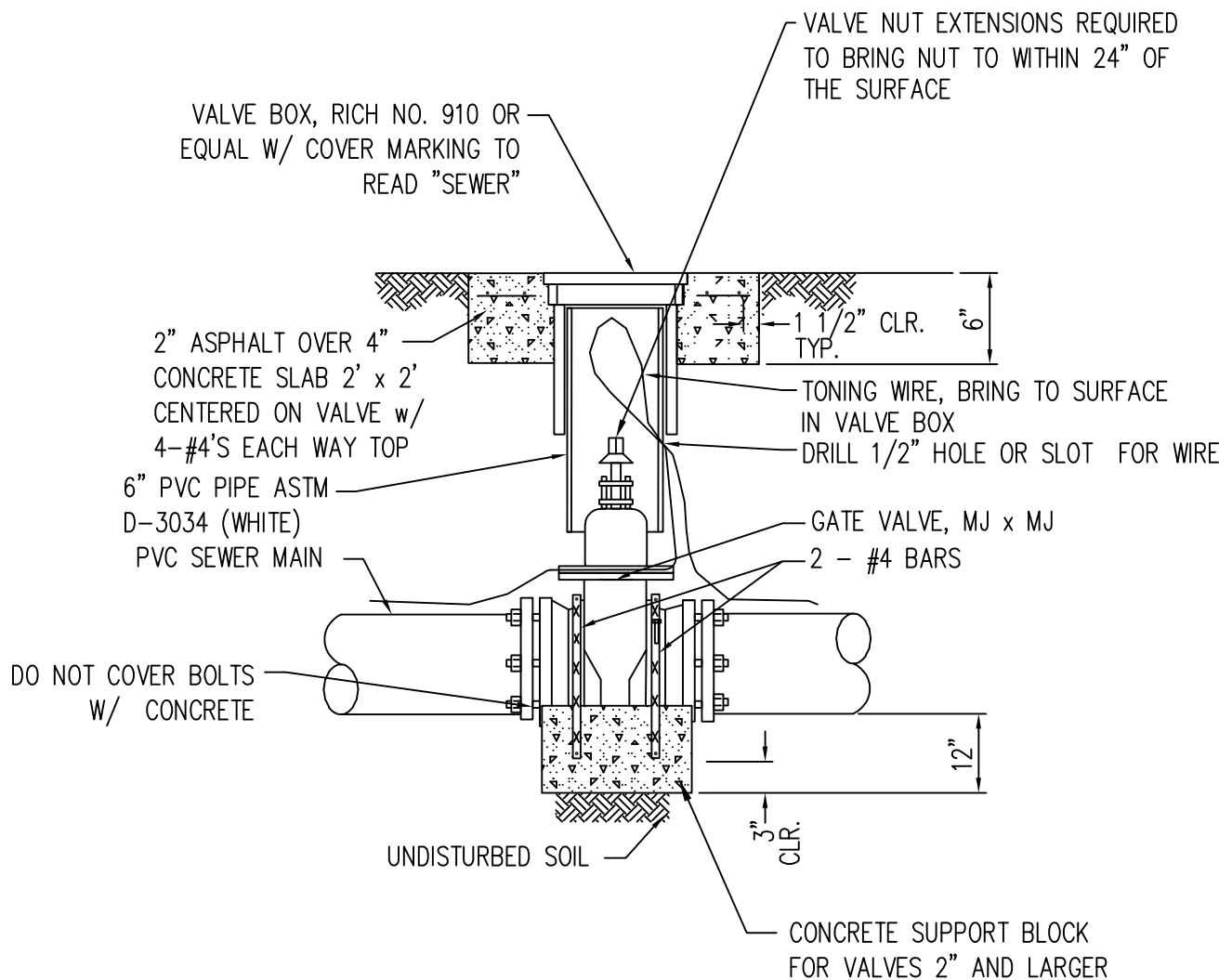
DWN. MKD

CKD. DMM

DWG. NO.

5-20

DATE
10/2019



CITY OF YELM
TYPICAL SEWER MAIN LINE GATE
VALVE

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

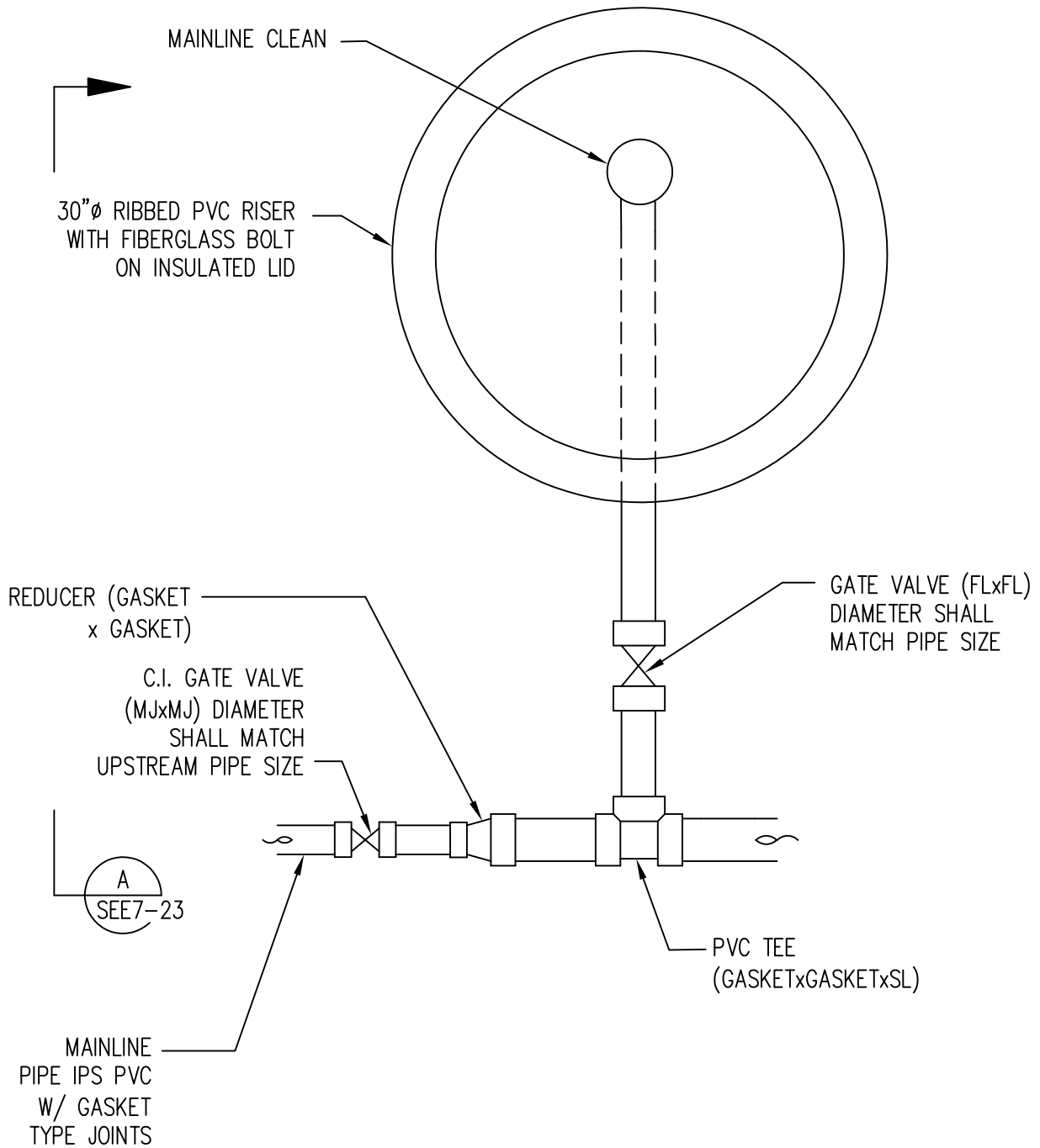
DWN. MKD

CKD. DMM

DWG. NO.

5-21

DATE
10/2019



CITY OF YELM

MAIN LINE CLEANOUT PLAN

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

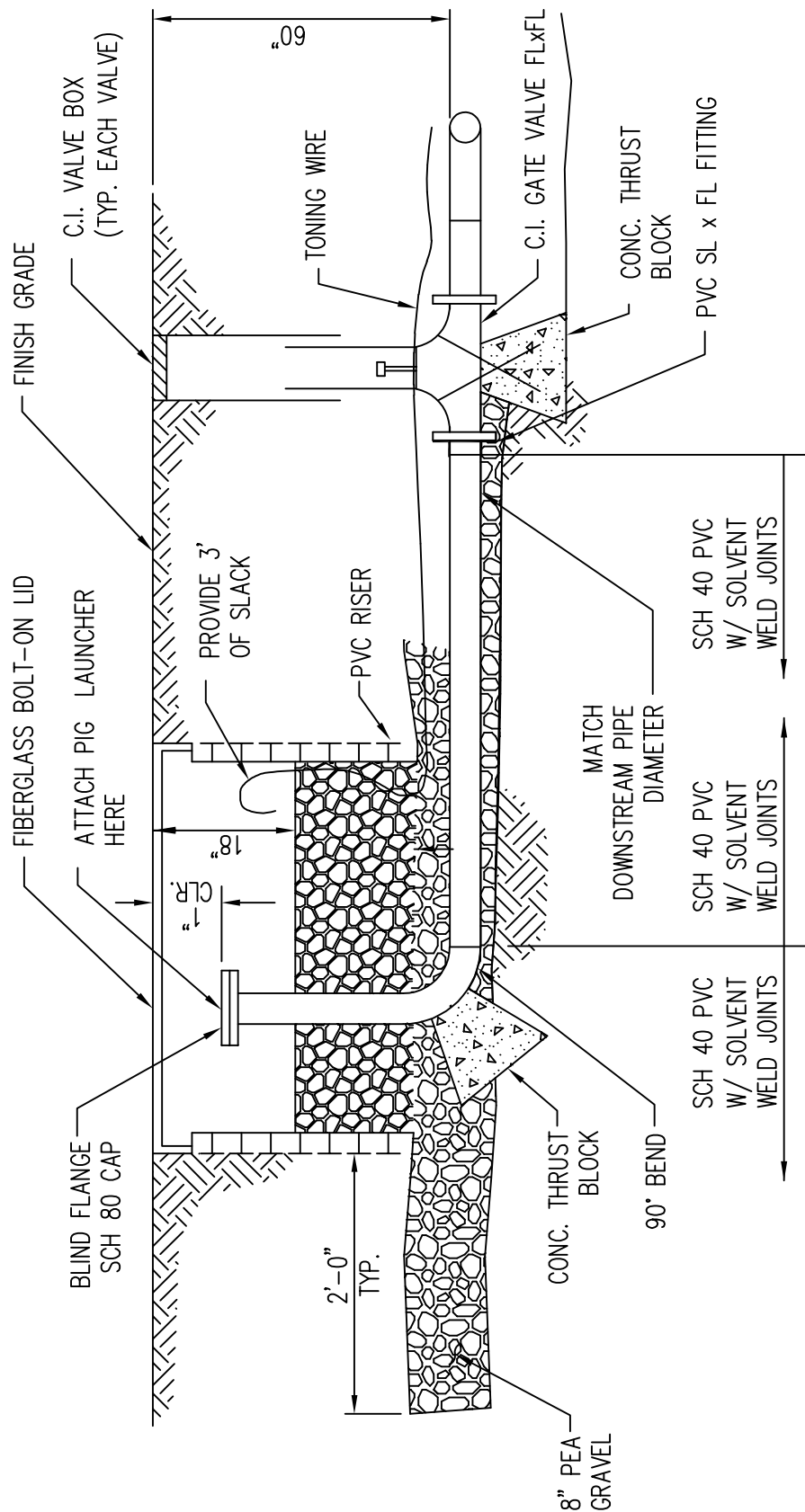
DES. MKD

DWN. MKD

CKD. DMM

DWG. NO.
5-22

DATE
10/2019



ELEVATION A



CITY OF YELM

MAINLINE PIG PORT DETAIL

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

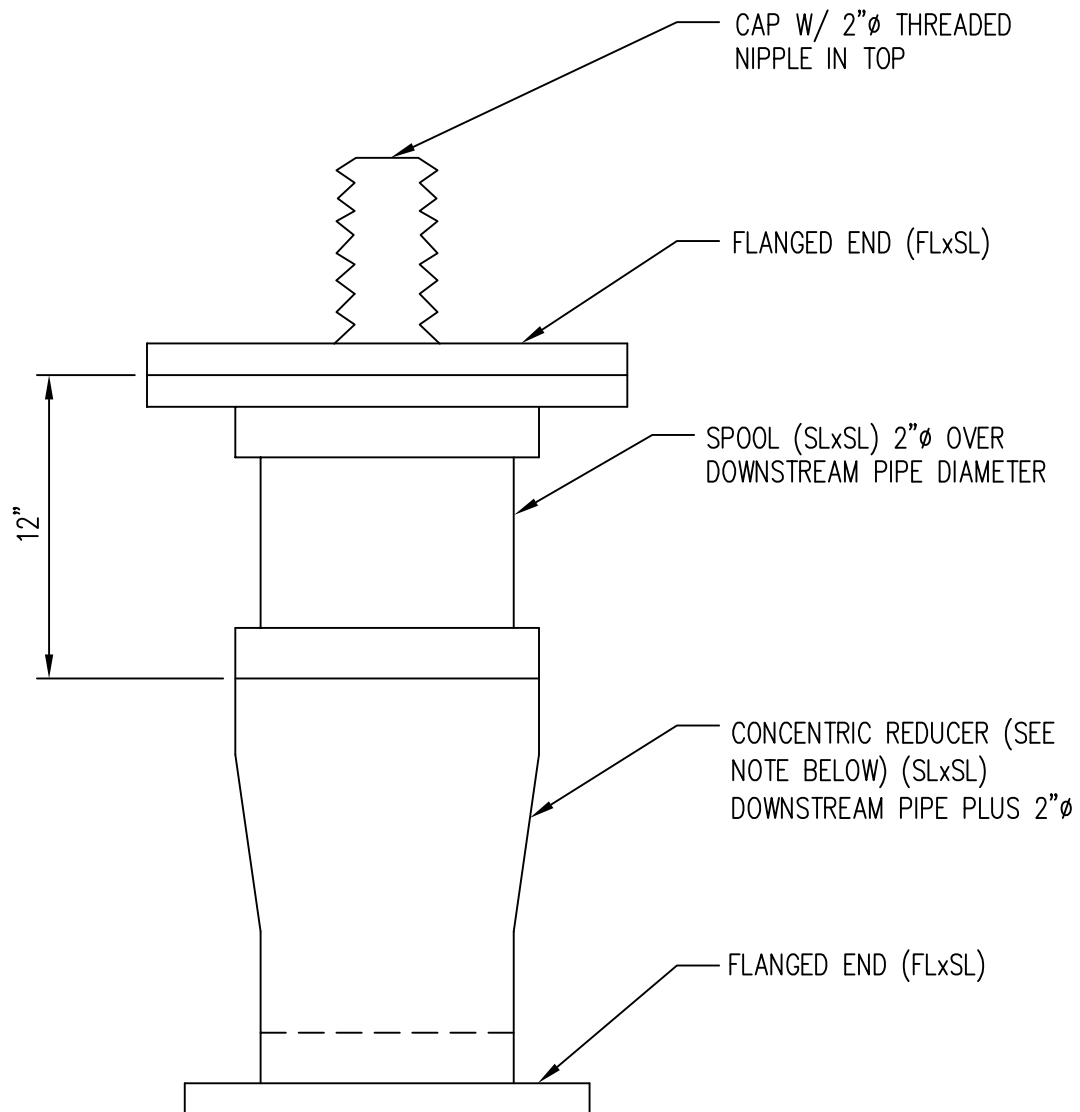
DWN. MKD

CKD. DMM

DWG. NO.

5-23

DATE
10/2019



NOTE:
 CONTRACTOR SHALL PROVIDE 1 LAUNCHER FOR EACH PIG PORT INSTALLED.
 USE SCH 80 PVC UNO SOLVENT WELD ALL FITTINGS.



CITY OF YELM

PIG LAUNCHER

APPROVED BY

PUBLIC WORKS DIRECTOR DATE

DES. MKD

DWN. MKD

CKD. DMM

DWG. NO.

5-24

DATE
10/2019