
Neskowin Regional Water District

Tillamook County, Oregon

WATER SYSTEM DESIGN STANDARDS MANUAL

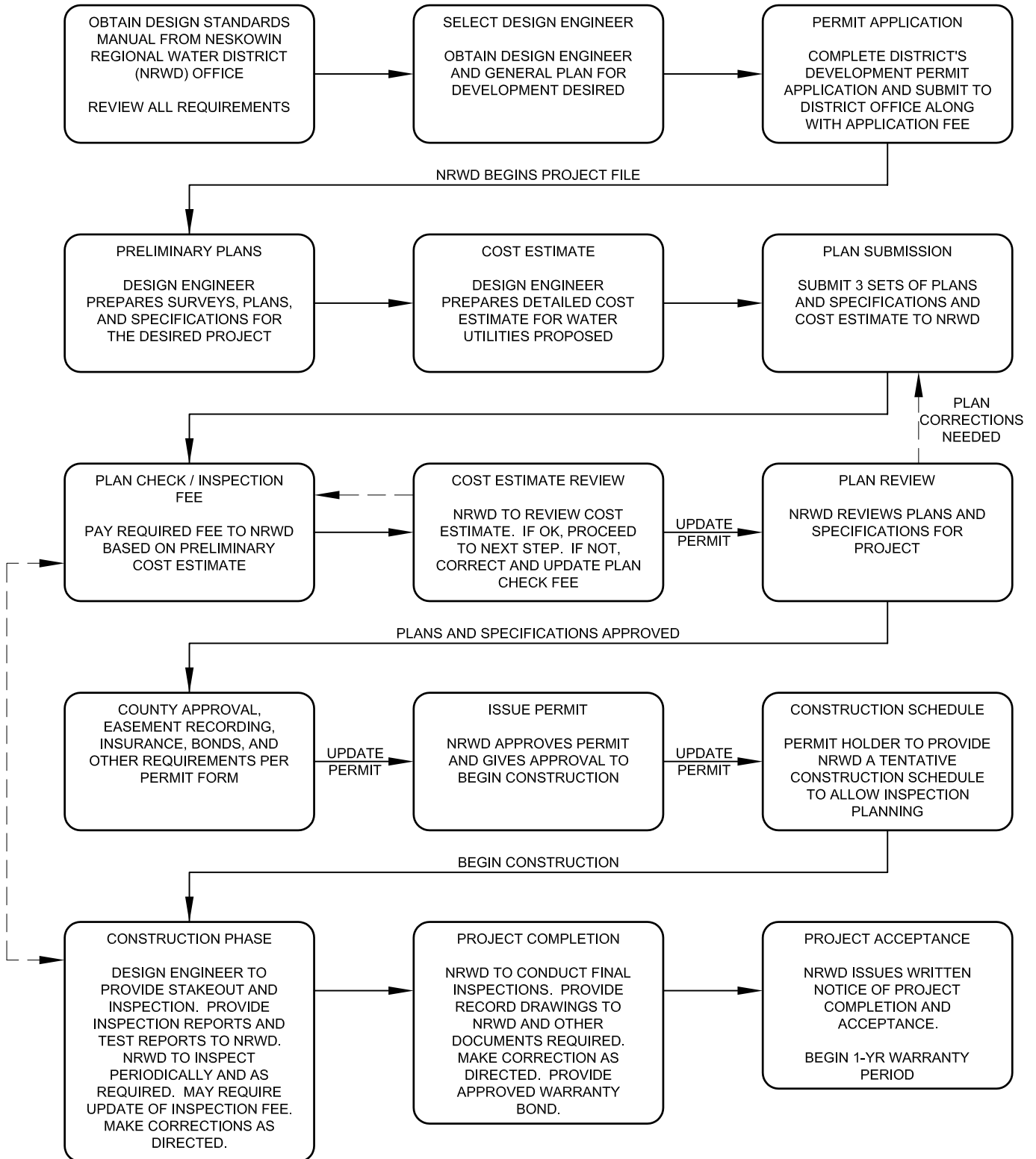
ENGINEERING POLICY, GUIDELINES FOR DEVELOPMENT, AND DEVELOPMENT DESIGN STANDARDS



**NESKOWIN REGIONAL WATER DISTRICT
WATER SYSTEM DESIGN STANDARDS MANUAL**



NESKOWIN REGIONAL WATER DISTRICT DEVELOPMENT PROCESS FLOW CHART



Neskowin Regional Water District

Tillamook County, Oregon

ENGINEERING POLICY **Guidelines for Development**

Effective: August 02, 2006

1.0 Applicability

This policy applies to applicants developing improvements that involve construction of public water system improvements. Such improvements shall be designed by the applicant in accordance with this Policy, and upon approval and acceptance of the construction by the District, the improvements shall become District owned and maintained.

2.0 General

- 2.0A Applicants shall design and construct all required public works improvements to District Standards. The Standards are set forth in the Water System Design Standards Manual. The latest version in effect at the time of the design shall be adhered to. Copies of these Standards are available at the District Office for a nominal price. Designs must also conform to the current Water Master Plan.
- 2.0B A Development Permit must be issued by the District prior to construction of any public works improvement. The Applicant must pay the current Permit Application Fee at the time of application.
- 2.0C Current Technical Plan Check and Inspection Fee shall be paid before approval of the final engineering plans for the required improvements. District approval of Applicant's construction documents and evidence of County and other agency approval must be obtained prior to the issuance of a Permit.
- 2.0D Applicant shall obtain all other necessary permits from Tillamook County, the Oregon Department of Environmental Quality (1200-C Erosion Control Permit if applicable), the Oregon Department of Transportation, and other agencies as required.
- 2.0E No connections to the system for dwellings or other structures will be allowed until the Applicant's improvements are complete and accepted by the District, or a satisfactory Improvement Agreement is entered into.

3.0 Water Distribution System Design Standards

- 3.0A Applicant shall provide water facilities for their development. This includes water mains, valves, fire hydrants, blow-offs, combination air valves, service laterals, meter boxes, pump stations, storage tanks, and other required appurtenances.
- 3.0B All required public water system improvements shall be designed and constructed in accordance with the District's latest Water System Design Standards Manual, and the Oregon Drinking Water Programs requirements.

4.0 Dedications and Easements

Applicant shall obtain and record all off-site easements required for the project before District approval of the construction plans. Permanent utility easements shall be granted to the District for future repair and maintenance of all public improvements. Applicant shall coordinate with District to determine adequate easement widths for utilities prior to finalizing easements. The minimum easement width is 15 feet. The actual width may be greater than the minimum as the required width shall be at least equal to the point where a theoretical 1:1 slope from the outside edge of the pipe zone would daylight. All costs for obtaining and recording easements created by private development shall be borne by the developer.

5.0 Applicant Engineering Requirements

- 5.0A Applicant shall retain a licensed Oregon Professional Engineer to design and prepare their construction plans and specifications. To avoid a conflict of interest, the Applicant's Engineer shall not be working as the District Engineer at the time of the application, plan check period, or construction period.
- 5.0B Applicant or Applicant's Engineer shall obtain a copy of the most recent revision of the District's Water System Design Standards Manual and adhere to the design and engineering requirements, and standard details and specifications contained therein.
- 5.0C Engineering Plans and Specifications for the work shall be prepared and submitted to the District for review.
- 5.0D Applicant shall submit a construction cost estimate for the water utilities to be provided. The costs for these utilities shall be complete and accurate. The cost estimate shall be submitted to the District along with the plans and specifications. District Engineer will review the cost estimate for reasonableness and may require updates and modifications. Final plan approval will not be issued until an approved cost estimate is provided.
- 5.0E Applicant shall provide a reasonable tentative schedule of construction progress.
- 5.0F Applicant's Engineer will provide construction staking to facilitate the construction of the improvements to the proper line and grade.
- 5.0G Applicant's Engineer will provide construction observation and inspection during the project work as required to ensure plan compliance and allow accurate as-builts to be prepared. Daily inspection reports shall be turned in to the District on a weekly basis. Reports shall include date and time of arrival, weather conditions, description of construction activities, and all testing procedures and results. If inspection is significantly deficient, a stop-work order may be issued.

- 5.0H Applicant's Engineer shall ensure that accurate markups are maintained during construction and shall prepare Record (As-Built) Drawings for the project. Record Drawings shall accurately show the locations and depths of the installed improvements with sufficient tie-out dimensions to permanent objects to allow easy location in the future. Each sheet of the drawings shall be stamped "Record Drawing". Drawings must be acceptable to the District and Applicant's Engineer shall correct any deficiencies noted by the District. As-Built elevations shall be within 0.1-foot of installed conditions. Horizontal dimensions shall be within 0.5-foot of installed conditions. Two (2) complete printed and signed sets of Record Drawings shall be delivered to the District upon project completion. An additional complete digital copy of the Record Drawings shall be provided to the District in AutoCAD format on a CD-ROM.
- 5.0I Following completion of construction, Applicant's Engineer shall submit (with the Record Drawings) a completion certification letter. The letter shall certify that the work was conducted in accordance with the approved plans and specifications and that the site and adjacent properties are stable with respect to settlement and subsidence, sloughing of cut and fill slopes, and proper erosion control measures have been placed.

6.0 Permit Issuance

- 6.0A Applicant shall apply for a Permit at the District Office to initiate the plan review process. The Permit Application Fee shall be paid at the time of application. The Permit Application Fees are shown in the Fee Schedule.
- 6.0B Applicant must provide evidence to District of Tillamook County approval showing the proposed project complies with all County planning, zoning, and other requirements. Evidence of any other permit or approval from other agencies as may be required by law shall also be obtained. Such evidence must be supplied to the District before a Permit will be issued. Preliminary plat approvals should be obtained prior to plan submission.
- 6.0C Applicant shall submit to the District, three (3) copies of detailed construction plans and specifications prepared by the Applicant's Engineer. District will review the documents for compliance with District Standards and Master Plans following receipt of required Plan Check and Inspection Fee. If acceptable, one (1) copy will be returned to the Applicant with a notice of plan approval. If changes in the documents are required, District will return one (1) copy back to the Applicant with deficiencies noted. The Applicant will then correct the documents and resubmit three (3) corrected copies.
- 6.0D Applicant shall provide a warranty or maintenance bond or other written guarantee acceptable to the District in the amount of 20% of the construction cost. This bond shall guarantee materials and workmanship for a period of one (1) year following acceptance of the improvements by the District, and it shall ensure the satisfactory repair or replacement of any facility damaged during construction. Bond shall list District as the Obligee and the Developer or Developer's Contractor as the Principal.

- 6.0E Applicant shall provide a copy of an insurance certificate showing that the Applicant or each of his/her contractors is covered by general commercial liability and property damage insurance in the amounts of not less than \$1,000,000/\$1,000,000 bodily injury liability/property damage with an aggregate limit of at least \$2,000,000. The policy shall include coverage for contractual liabilities. An insurance certificate shall also be provided showing that each contractor maintains an automobile liability insurance policy with combined single limits of at least \$1,000,000 per occurrence for bodily injury, personal injury, and property damage. Both policies shall include a 30-day notice of cancellation clause and shall include endorsements naming as additional insured "The Neskowin Regional Water District", its officers, agents, and employees while acting within their official capacity as such.
- 6.0F Contractor shall submit a hold harmless statement which holds the District harmless from all liability and loss based upon or arising out of damage or injury caused by or in connection with the performance of construction.
- 6.0G The District reserves the right to waive Engineering review for very minor improvements for individual single family dwellings. Professional Engineer preparation of minor drawings may also be waived at the District's discretion.
- 6.0H A permit shall lapse if construction for which the permit was issued has not commenced within ninety (90) days of the date of issuance. To reinstate the permit, the Applicant shall submit a written request to the District stating reasons for failure to commence, provide a new construction commencement date, and pay a permit reinstatement fee. The District may impose additional conditions deemed necessary for the project at that time.
- 6.0I The Development Permit will be issued and construction may begin after the following steps have been completed satisfactorily:
1. Approval of the construction plans by the District with written notification of plan approval.
 2. Submittal of acceptable calculations and other supporting documents to the District Engineer (including progress schedule) when requested.
 3. Approval of the detailed cost estimate by the District.
 4. Approval of the warranty security by the District.
 5. Receipt of Hold Harmless Statement.
 6. Approval of all legal documents, easements, and other documents as required by review comments.
 7. Submittal of written approval from Tillamook County for the subdivision, plat, streets, land use, etc. as may be applicable.
 8. Submittal of evidence of issuance/approval for any required erosion control permits and plans, or other permits as may be required.

9. Receipt of required Engineering Plan Check and Inspection fees.
10. Completion of all appeal periods such as land use approval or floodplain modification notices.

7.0 District Engineering Plan Check and Inspection

- 7.0A Initial Plan Check and Inspection Fee deposit is based on a percentage of the District-approved estimated construction cost of the water facilities to be constructed. Applicant's Engineer shall prepare a detailed cost estimate that includes all such facilities that are a part of the project. District Engineer will review the cost estimate and modifications may be required before approval of the cost estimate. The cost estimate shall be submitted along with the plans and specifications.
- 7.0B Fees are required to enable the District to thoroughly review the Applicant's plans and specifications, and to periodically inspect during construction, to ensure that constructed improvements meet District Standards and comply with the long-term planning efforts of the District. This is required when improvements are constructed that will become permanently owned and maintained by the District.
- 7.0C Periodic inspection of the construction by District representatives will be conducted. No concrete shall be poured or pipe backfilled without such inspections being made and approvals given. A tentative schedule for inspection shall be established when the permit is issued. The permit holder shall give the District a minimum of 2 working days advance notice before inspections fall due. It shall be the permit holder's responsibility to obtain District inspections and approvals before covering work.
- 7.0D Plan Check and Inspection Fee deposit will initially be set at 5% of the construction cost with a minimum fee as stated in the Fee Schedule. The fee is due upon submission of the initial plans for approval.
- 7.0E Final total fee will be determined by the level of effort required by the District in reviewing plans and providing inspections. Should the Applicant have well prepared plans and specifications that require little or no changes, and Applicant provides suitable inspection such that extensive inspection by the District is not required, the initial deposit may not be fully used and the remaining balance will be returned to the Applicant. Should review and inspection required by the District exceed the initial deposit fee; the Applicant will be required to pay an additional deposit before work can continue. In all cases, the total fee will cover the District's actual expenses for Engineering plan review and inspection.

8.0 Project Acceptance

The District shall provide the permit holder a letter formally accepting the improvements for District ownership, operation and maintenance, subject to the usual exception as to the 1 year guarantee on materials and workmanship, when the following conditions are met:

- 1) Construction is complete.
- 2) The District has inspected the finished work and found it acceptable.
- 3) The permit holder's Engineer submits a certificate of completion certifying the project was completed in accordance with the approved plans and the District Standards.
- 4) The permit holder's Engineer submits satisfactory "as-built" Record Drawings according to the requirements herein.
- 5) Copies of satisfactory passage of water line leakage tests, microbiological tests, and other tests as required have been furnished to the District. Written reports shall be furnished to the District using approved forms.
- 6) The permit holder furnishes the District with a copy of a non-lien affidavit certifying that all bills in connection with the work have been paid in full.
- 7) Satisfactory provisions have been made in the form of recorded plats or easements to ensure the District's access to the public works facilities for purposes of operation and maintenance.
- 8) District furnished copy of legal release from any claims of injury or property damage relating to the project.
- 9) District receives copy of recorded plat and applicable easement documents.

9.0 Improvement Agreement

If a developer desires to defer construction of a portion of the public works improvements to be constructed, and if such deferral is determined by the District to have no adverse effect on the District's interests, the developer shall enter into an improvement agreement with the District. Said improvement agreement shall set forth completion dates for the items of work to be deferred, and it shall constitute an assurance that all improvements will be made in a timely manner.

As a condition of the Improvement Agreement, Applicant shall provide a completion bond or other written guarantee acceptable to the District in the amount of 120% of the construction cost of the deferred improvements. Bond shall list District as the Obligee and the Developer as the Principal.

The District Board may impose other conditions of approval of such deferments.

10.0 Other Conditions

- 10.0A Issuance of a permit or acceptance of completed work does not guarantee that other District facilities will be expanded, enlarged, or altered in response to any increased demand or system loading that occurs because of the work covered under the permit.
- 10.0B The District retains the right to terminate District utility service or connections to such service at any time the Applicant or Applicant's Engineer or agent fails to comply with the provisions of the District Standards, this document, or other associated permits and approvals.
- 10.0C The District, nor the District Engineer, assumes responsibility or liability for the Applicant or Applicants Engineer recommendations or engineering design.
- 10.0D Plan approval means that the plans have been reviewed for reasonableness and compliance with the minimum District standards. This approval does not supercede those standards unless specifically verified in writing by the District. Plan approval does not relieve the Applicant's Engineer from responsibility for errors, omissions, or deficiencies in the plans.
- 10.0E It is intended that the District will provide only spot inspections to satisfy themselves that work is proceeding according to approvals and that adequate inspection is being provided by the Applicant's Engineer. Responsibility for ensuring compliance with approved plans and specifications lies with the Applicant. Should the District feel that inadequate inspection is being provided; the District may issue a stop-work order, or may provide a District representative to inspect the work more regularly. Should additional District inspection be required beyond the normal spot inspections, the Applicant fees for inspection may increase. Applicant's Engineer shall provide a tentative construction schedule to allow District to plan spot inspection dates and times.

Neskowin Regional Water District

Neskowin, OR. 97149
(503) 392-3966 Fax: (503) 392-4553

Development Permit Application For Public Works Improvements

Permit Number
Date Submitted
Received By
Projected Review Date

Project Name: _____

Project Address: _____

Description of Project: _____

Number of Lots Served by Project: _____ Immediate _____ Ultimate

Easements Required: Yes No Tax Lots: _____

Application Fee: \$ _____ Check No. _____ Received By: _____ Date: _____
(see reverse)

Applicant / Owner	Engineer / Designer
Name	Name
Address	Address
City/Zip	City/Zip
Phone	Phone
	License #

Plans Approved By: _____ Date: _____

Engineer's Approved Estimated Construction Cost: \$ _____

County Approval/Permit Evidence Obtained <input type="checkbox"/>	Date: _____
Required Easements Obtained and Recorded <input type="checkbox"/>	Date: _____
Other Agency Permits/Approval Obtained <input type="checkbox"/>	Date: _____
Public Liability Insurance Certificate Received <input type="checkbox"/>	Date: _____
Hold Harmless Statement Received <input type="checkbox"/>	Date: _____
Project Warranty Bond Received <input type="checkbox"/>	Date: _____
Test Records Received <input type="checkbox"/>	Date: _____
Project Record Drawings Received <input type="checkbox"/>	Date: _____
Project Complete and Accepted <input type="checkbox"/>	Date: _____

Contractor: _____ ID #: _____

Address: _____ Phone: _____

City / Zip: _____

Permittee (Owner) Signature: _____ Date: _____

Project will be complete by: _____

Permit Approved By: _____ Date: _____

Conditions of Permit: All work shall be done in accordance with all applicable provisions of Federal, state, and local law, ordinance, and administrative rules. All work shall conform to District Standards. Permittee shall indemnify, defend, and save harmless the Neskowin Regional Water District, its officers, employees, and agents from any and all claims arising out of or in connection with any work done under this permit.

Development Permit Application

For Public Works Improvements

Fee Schedule

Development Permit Application Fee (single lot)	\$50.00
Development Permit Application Fee (multiple lots, subdivision)	\$50.00 per lot
Development Permit Reinstatement Fee	\$15.00
District Engineering Plan Check and Inspection Fee	5% of Utility Construction Cost, \$500.00 minimum
Water System Design Standards Manual	\$65.00 paper / \$10.00 disk

Project Name: _____

Approved Estimate of Construction Cost: \$ _____

Plan Check/Inspection Fee (5% of construction cost): \$ _____
(\$500 minimum)

Initial Deposit (greater of 5% or \$500): \$ _____

Received By: _____ Date: _____ Check No. _____

Additional Plan Check and Inspection Fees may be necessary as described in the "Engineering Policy – Guidelines for Development" document.

Subsequent Deposit (#1, if required): \$ _____

Received By: _____ Date: _____ Check No. _____

Subsequent Deposit (#2, if required): \$ _____

Received By: _____ Date: _____ Check No. _____

Subsequent Deposit (#3, if required): \$ _____

Received By: _____ Date: _____ Check No. _____

PUBLIC IMPROVEMENT PROJECT
WARRANTY BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, insert name of Developer or Contractor here as Principal, and insert name of Surety here, a Corporation organized and doing business under and by virtue of the laws of the State of _____ and duly licensed to conduct a general surety business in the State of Oregon, as Surety, are held and firmly bound unto the Neskowin Regional Water District in Tillamook County, Oregon as Obligee in the sum of 20% of Improvement Cost (\$ _____) dollars for which payment, well and truly to be made, we bind ourselves, our heirs, executors and successors, jointly and severally firmly by these presents.

THE CONDITIONS OF THE OBLIGATION IS SUCH THAT:

WHEREAS, the above named Principal, as a condition of the Development Permit for development of insert name of project here, has agreed to properly complete said project in compliance with District standards and requirements.

WHEREAS, the above named Principal, as a condition of the Development Permit shall guarantee replacement and repair of improvements related to said project for a period of one year following final acceptance of said improvements;

NOW THEREFORE, if the above Principal shall indemnify the Obligee for all loss that Obligee may sustain by reason of any defective materials or workmanship which become apparent during the period of one year from and after acceptance of the said improvements by Obligee, then this obligation shall be void; otherwise it shall remain in full force and effect.

IN WITNESS WHEREOF, the seal and signature of said Principal is hereto affixed and the corporate seal and the name of the said Surety is hereto affixed and attested by its duly authorized Attorney-in-fact,

This _____ day of _____, 20____.

Principal

Surety

Principal Signature

Attorney-in-Fact

SAMPLE

HOLD HARMLESS

To the fullest extent of the law, *insert name of prime contractor here*, hereinafter referred to as Contractor, will defend, indemnify and hold harmless the Neskowin Regional Water District (NRWD), its officials, employees, servants, and agents from and against all claims, demands, and judgments (including attorney fees), made or recovered against them including but not limited to damages to real or tangible personal property or for bodily injury or death to any person, arising out of, or in any manner connected with the performance of work on the Project entitled *insert official name of project here*, by Contractor, its officers, employees, sub-contractors and agents.

Contractor agrees to provide insurance, as required by the NRWD Engineering Policy and by the permit issued by the NRWD for construction of Project.

The insurance certificates shall be submitted to the NRWD for approval prior to start of work on the Project and shall include an additional insured endorsement naming the “Neskowin Regional Water District” as an additional insured on the liability insurance policy.

Name of Contractor

SAMPLE

Signature of Authorized Representative

Title

Date

PUBLIC IMPROVEMENT PROJECT
COMPLETION BOND

KNOW ALL MEN BY THESE PRESENTS:

That we, insert name of developer here, as Principal, and insert name of bonding company here, a Corporation organized and doing business under and by virtue of the laws of the State of _____ and duly licensed to conduct a general surety business in the State of Oregon, as Surety, are held and firmly bound unto the Neskowin Regional Water District in Tillamook County, Oregon as Obligee in the sum of 120% of Improvement Cost (\$ _____) dollars for which payment, well and truly to be made, we bind ourselves, our heirs, executors and successors, jointly and severally firmly by these presents.

THE CONDITIONS OF THE OBLIGATION IS SUCH THAT:

WHEREAS, the above named Principal, as a condition of the Development Permit for development of insert project title here, entered into an Improvement Agreement with said Obligee to complete the improvements specified in said Agreement within the permitted time frame and in compliance with District standards and requirements.

NOW THEREFORE, the condition of this obligation is such, that if the above Principal shall well and truly perform said agreement during the original term thereof or of any extension of said term that may be granted by the Obligee with or without notice to the Surety, this obligation shall be void, otherwise it shall remain in full force and effect.

IN WITNESS WHEREOF, the seal and signature of said Principal is hereto affixed and the corporate seal and the name of the said Surety is hereto affixed and attested by its duly authorized Attorney-in-fact,

This _____ day of _____, 20____.

Principal

Surety

Principal Signature

Attorney-in-Fact

SAMPLE

This document is required only if Developer enters into an Improvement Agreement for deferred improvements or as otherwise required by the NRWD

**PUBLIC IMPROVEMENT PROJECT
WARRANTY BOND**

KNOW ALL MEN BY THESE PRESENTS:

That we, _____, as Principal,
and _____, a
Corporation organized and doing business under and by virtue of the laws of the State
of _____ and duly licensed to conduct a general surety business in
the State of Oregon, as Surety, are held and firmly bound unto the Neskowin Regional
Water District in Tillamook County, Oregon as Obligee in the sum of
_____ (\$ _____)
dollars for which payment, well and truly to be made, we bind ourselves, our heirs,
executors and successors, jointly and severally firmly by these presents.

THE CONDITIONS OF THE OBLIGATION IS SUCH THAT:

WHEREAS, the above named Principal, as a condition of the Development Permit for
development of _____, has
agreed to properly complete said project in compliance with District standards and
requirements.

WHEREAS, the above named Principal, as a condition of the Development Permit shall
guarantee replacement and repair of improvements related to said project for a period of
one year following final acceptance of said improvements;

NOW THEREFORE, if the above Principal shall indemnify the Obligee for all loss that
Obligee may sustain by reason of any defective materials or workmanship which become
apparent during the period of one year from and after acceptance of the said
improvements by Obligee, then this obligation shall be void; otherwise it shall remain in
full force and effect.

IN WITNESS WHEREOF, the seal and signature of said Principal is hereto affixed and
the corporate seal and the name of the said Surety is hereto affixed and attested by its
duly authorized Attorney-in-fact,

This _____ day of _____, 20_____.

Principal

Surety

Principal Signature

Attorney-in-Fact

HOLD HARMLESS

To the fullest extent of the law, _____, hereinafter referred to as Contractor, will defend, indemnify and hold harmless the Neskowin Regional Water District (NRWD), its officials, employees, servants, and agents from and against all claims, demands, and judgments (including attorney fees), made or recovered against them including but not limited to damages to real or tangible personal property or for bodily injury or death to any person, arising out of, or in any manner connected with the performance of work on the Project entitled _____, by Contractor, its officers, employees, sub-contractors and agents.

Contractor agrees to provide insurance, as required by the NRWD Engineering Policy and by the permit issued by the NRWD for construction of Project.

The insurance certificates shall be submitted to the NRWD for approval prior to start of work on the Project and shall include an additional insured endorsement naming the "Neskowin Regional Water District" as an additional insured on the liability insurance policy.

Name of Contractor

Signature of Authorized Representative

Title

Date

**PUBLIC IMPROVEMENT PROJECT
COMPLETION BOND**

KNOW ALL MEN BY THESE PRESENTS:

That we, _____, as Principal,
and _____, a
Corporation organized and doing business under and by virtue of the laws of the State
of _____ and duly licensed to conduct a general surety business in
the State of Oregon, as Surety, are held and firmly bound unto the Neskowin Regional
Water District in Tillamook County, Oregon as Obligee in the sum of
_____ (\$ _____)
dollars for which payment, well and truly to be made, we bind ourselves, our heirs,
executors and successors, jointly and severally firmly by these presents.

THE CONDITIONS OF THE OBLIGATION IS SUCH THAT:

WHEREAS, the above named Principal, as a condition of the Development Permit for
development of _____,
entered into an Improvement Agreement with said Obligee to complete the improvements
specified in said Agreement within the permitted time frame and in compliance with
District standards and requirements.

NOW THEREFORE, the condition of this obligation is such, that if the above Principal
shall well and truly perform said agreement during the original term thereof or of any
extension of said term that may be granted by the Obligee with or without notice to the
Surety, this obligation shall be void, otherwise it shall remain in full force and effect.

IN WITNESS WHEREOF, the seal and signature of said Principal is hereto affixed and
the corporate seal and the name of the said Surety is hereto affixed and attested by its
duly authorized Attorney-in-fact,

This _____ day of _____, 20____.

Principal

Surety

Principal Signature

Attorney-in-Fact

*This document is required only if Developer enters into an Improvement Agreement for deferred
improvements or as otherwise required by the NRWD*

Neskowin Regional Water District
Tillamook County, Oregon

WATER SYSTEM DESIGN STANDARDS MANUAL
Guidelines for Development

Effective: August 02, 2006

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Section 1 – General Requirements

- 1.1 The purpose of this manual is to set standards for the design and construction of water system improvements to serve new and future development. This manual may be updated periodically and the design engineer shall ensure that they have the latest version.
- 1.2 Developer shall design and install all water system improvements necessary to provide proper water service to the area being developed. Proper water service shall include meeting peak domestic demands and providing fire flows at the required pressures.
- 1.3 Persons planning to construct development must obtain a Development Permit from the Neskowin Regional Water District and pay the necessary engineering review fees in accordance with the “Engineering Policy – Guidelines for Development”. Other permits required may include a construction permit issued by Tillamook County, a construction permit issued by the Oregon Department of Transportation, a 1200-C Erosion Control Permit from the Oregon Department of Environmental Quality (DEQ), and other as required by Federal, State, and County laws and regulations.
- 1.4 All surveys for development of public works facilities shall be performed under the direction of a Professional Engineer (PE) or Professional Land Surveyor (PLS) licensed in the State of Oregon. At least one Benchmark shall be established or located within the project limits. Elevations shall be referenced to the NGVD 29 or NAVD 88 datum and noted on the drawings. The existing Benchmark used to establish local elevations shall also be indicated on the drawings. Survey shall be sufficient to accurately show existing facilities and topography.
- 1.5 Design drawings, specifications, and calculations shall be conducted by an Oregon licensed Professional Engineer.
- 1.6 The engineer preparing the plans shall make necessary arrangements for locates on all underground utilities in the vicinity for use in preparing the plans. Such utilities shall be shown accurately in the plans.
- 1.7 Materials and details shall conform to the requirements of this manual.
- 1.8 All applicable laws, codes, regulations, and permit requirements shall be complied with.
- 1.9 Project should begin with consultation with the District to determine preliminary requirements and general approach.
- 1.10 All construction plans and specifications must receive approval from the Oregon Department of Human Services – Drinking Water Program prior to final approval by the NRWD.

Section 2 – Design Plan Format

- 2.1 Engineering plans and specifications shall be prepared for all public works improvements. Plans shall be clear and legible and show all improvements in sufficient detail to allow for determination of compliance with District standards, and proper field construction. District engineer may require additional detail if deemed necessary.
- 2.2 Plans shall be computer generated in an AutoCAD compatible format.
- 2.3 The plans shall be submitted on 22 x 34-inch sheets unless otherwise pre-approved. Plans shall be blackline prints. Blueline copies are not acceptable. Letter size may not be less than 0.07-inches.
- 2.4 Plans shall be drawn to scale. The scale shall be 1-inch = 2, 3, 4, 5 or 10-feet vertically and 1-inch = 10, 20, 30, 40 or 50-feet horizontally. Details may be drawn at larger scales for clarity. Plan scale shall be called out for each drawing. A graphical scale bar shall be included on each sheet.
- 2.5 A north arrow shall be shown on each plan view sheet and other plan detail oriented differently than the main drawing on the sheet.
- 2.6 A title block shall appear on each sheet of the plan set placed in the lower right-hand corner, across the bottom edge of the sheet, or across the right-hand edge of the sheet. Title block shall include the name of the project, the engineering firm, the owner, the sheet title, and the sheet number.
- 2.7 The seal of the registered Oregon Professional Engineer responsible for the preparation of the plans shall appear on each sheet. Final Plans must be stamped and signed by a Professional Engineer licensed in the State of Oregon. Plan approval will not be granted until final signed sets are received. Approval by the District does not relieve the Applicant's Engineer from the responsibility of the design.
- 2.8 Plans shall begin with a title sheet identifying the project and including a vicinity map showing the location of the project within the District. General notes and a sheet index should also be included.
- 2.9 Plan views must show existing and proposed improvements and features within or adjacent to the project including survey monuments, edge of pavement, road centerline, buildings, curbs, gutters, sidewalks, culverts, ditches, streams, utility poles, and other surface improvements and features. The location of underground utilities including power, gas, water and sewer shall be shown as accurately as possible. Right-of-way, property lines, easements, street names, lot numbers, and other labels shall also be shown. Existing and finish grade contours (2 foot maximum) should be shown where possible.
- 2.10 Plan shall show the location, stationing, and size of all water mains and services including appurtenances such as water meters, blow-offs, hydrants, combination air valve assemblies and fittings. Stationing shall be called out for specific items to be installed. Matchlines shall be used when continuing to other sheets.

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- 2.11 At least one composite utility plan shall be included which shows all proposed improvements (water, sewer, streets, sidewalk, curb, culverts, storm drainage, etc.) in one plan view to help avoid conflicts and designate horizontal separations and locations.
 - 2.12 Profile view with stationing and elevation shall be provided for water mains. Any required vertical fittings shall be shown (horizontal fittings should be shown in plan view and not repeated in profile view). Profile shall show existing ground, finish grade, depth of cover, backfill class materials, and all existing and proposed utilities crossing the profile. Profile shall be generated at the centerline of the water piping. Vertical separation shall be shown for crossing utilities. Locations of any required air valves or blow-off valves shall be shown.
 - 2.13 Detail drawings shall be provided for typical trench sections, specific complex valve and fitting clusters, fire hydrant assemblies, combination air valve assemblies, water service laterals and meter installations, valve setting details, vaults, and others as required.
 - 2.14 Project specifications shall be provided covering materials and workmanship in accordance with this document and standard engineering practice. Specifications not detailed herein shall generally conform to 2002 Oregon Standard Specifications. All specifications shall be subject to District approval.
 - 2.15 Benchmark used to establish elevations shall be shown on the plans.
 - 2.16 When project requires pump station(s) and/or storage tank(s), detailed mechanical, electrical, and control plans shall be provided. Site plan, mechanical plans, elevation views, etc. shall be provided to completely detail the proposed improvements in a manner consistent with standard engineering practice and acceptable to the NRWD.
 - 2.17 Refer to the District's "Engineering Policy – Guidelines for Development" document for additional requirements and submittal procedures.

Section 3 – Construction Provisions

- 3.1 All work within the public right-of-way shall be conducted by a licensed and bonded contractor. This requirement shall be stated on the construction drawings.
- 3.2 District shall be notified at least 3 working days in advance prior to commencing construction work.
- 3.3 Work shall not begin unless District has approved plans and given approval to begin work. Contractor shall have a set of the approved plans on site at all times.
- 3.4 Traffic control shall be signed, flagged and conducted in a manner conforming to ODOT standards (Manual of Uniform Traffic Control Devices, MUTCD) and approved by Tillamook County. If road closures or detours are anticipated, prior approval from the proper agency must be obtained.
- 3.5 Safety Requirements. The contractor is responsible for observing the safety of the work and all persons and property coming into contact with the work. The contractor shall conduct his work in a manner complying with the requirements prescribed by OSHA.
- 3.6 Progress. Construction shall proceed in a systematic manner to minimize public inconvenience and disruption of services. All excavations, embankments, stockpiles, waste areas, etc. shall be kept protected. All roads, ditches, etc. shall be kept free from debris and shall be continually cleaned during the work. Dust control measures shall be employed as required and directed by the District and/or County.
- 3.7 Protection of Existing Improvements. Contractor shall contact the Utility Notification Center at least 48 hours in advance of digging operations to get approximate locations for buried utilities. Exact locations of buried facilities may not be known or shown and contractor is responsible to pot-hole carefully in advance of the work to avoid such facilities. Contractor shall coordinate with all utilities and notify them immediately in the event of any damage. Contractor shall protect, repair, and replace any damaged utilities as directed by the persons responsible for such utility. All landscape, grass, shrubs, signs, pavements, mail boxes, driveways, culverts, gravel surfacing, fencing, etc. shall be protected from damage and returned to conditions as good, or better than existed prior to construction. All costs for protection, repair, and replacement of all existing items shall be borne entirely by the contractor. Contractor shall obtain a release from any property owners for any claims of injury or property damage prior to final acceptance of the work by the District.
- 3.8 All existing survey monuments and control shall be protected, including individual property corner stakes. Any such monuments destroyed or altered during construction shall be restored by the contractor or developer in accordance with ORS.
- 3.9 Any temporary disruption to water service must be coordinated with, and approved by the District and kept to the minimum length of time necessary. District shall be notified at least 2 working days in advance of when an approved shut-down is desired as necessary to make tie-ins. Contractor shall not operate any valves or hydrants without District approval.

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- 3.10 Trench foundation grades shall be constructed to within 0.1 feet of the grade shown in the plans. Surface tolerances shall be within 0.02 feet of plan elevation at any one point.
 - 3.11 Compaction testing equipment (nuclear gauge) shall be furnished and operated by the contractor or an independent testing firm shall be retained by the contractor or developer to perform compaction testing. Testing shall conform to the ODOT Manual of Field Testing Procedures (MFTP). Compaction testing shall be conducted in the presence of the District's inspector. Sufficient tests will be taken to ensure that the materials and compaction efforts being used are adequate to obtain the required density. Several tests shall be taken on each lift placed during the first day of backfill operations. Additional tests will be taken periodically during the work. At minimum, 2 compaction tests shall be taken for each 500 feet of trenchline on waterlines. Alternate materials or methods will be required if adequate compaction is not being obtained. In no case shall pipe laying continue if inadequate compaction results until a resolution is provided. Written compaction test results shall be submitted to the District.
 - 3.12 Construction staking shall be provided by the Developer's Engineer for establishing the location of the system. Offset stakes shall be placed at no more than 100 foot intervals along the mainline. Each service and appurtenance location shall be staked.
 - 3.13 Open trench length at any one time shall not exceed 300 feet unless otherwise approved. Related resurfacing shall be completed within 800 feet of the open trench limit.

Section 4 – Water System Design Requirements

- 4.1 Minimum size for new water mains is 6-inches unless otherwise approved. Water pipe sizes shall also conform to the requirements in the latest Water System Master Plan. Hydraulic calculations shall be provided to show that pipe size is adequate for conveying fire flows during peak demand periods for each specific development.
- 4.2 Peak domestic water demand used in calculations shall be at least 10 gpm per single family dwelling or EDU for developments with 1-10 lots, 5 gpm for 10-25 lots, and 3 gpm for larger developments.
- 4.3 Minimum depth of cover is 36-inches over top of pipe barrel. Individual water services shall have at least 30-inches of cover.
- 4.4 Water piping shall be located 10 feet horizontally away from any sanitary sewer mains or laterals when possible. Vertical separations less than 18-inches shall not be designed into new improvements. All water line and sewer line shall be separated in accordance with OAR 333-061-0050 provisions.
- 4.5 Permanent utility easements shall be provided granting the District access to the public water system improvements for future maintenance and repair. Minimum easement width is 15 feet for a single pipeline at normal depths. Waterlines shall be located at the center of the easement except where the public portion of an individual service terminates at the edge of the easement. Wider easements may be required for deep piping.
- 4.6 Creation of dead-end water mains shall be avoided by looping new piping to connect to existing system piping in at least two locations. If a dead-end is allowed by the District for unusual cases, a fire hydrant shall be provided at the end of the line.
- 4.7 Fire Flow and Hydrant Requirements:
 - 4.7.1 A minimum flow of 1,000 gpm is required at hydrants for one- and two-family dwellings not exceeding 3,600 square feet and located greater than 10 feet apart. Dwellings 10 feet or closer apart require a flow of 1,500 gpm.
 - 4.7.2 Other structures or situations will require greater fire flows. Greater flow shall be determined by using the “Guide for Determination of Needed Fire Flow”, latest edition published by the Insurance Services Office (ISO) to obtain an optimum public protection classification.
 - 4.7.3 Fire flow is the flow rate of water supply available measured at the hydrant with at least a 20 psi residual pressure remaining at all points in the system.
 - 4.7.4 Fire Hydrants shall be located to provide easy access from streets. Hydrants shall be spaced such that the entire perimeter of all buildings can be reached within a 400-foot radius from a hydrant. A hydrant shall also be available for each 160,000 square feet of developed area.
 - 4.7.5 Fire flows and hydrant locations may be subject to Fire District approval. District(s) reserves the right to modify fire flow requirements and hydrant spacing on a case-by-case basis.

- 4.8 Provisions for system flushing of all segments of water mains shall be incorporated into the design. Flushing may be accomplished through fire hydrants and/or blow-off assemblies. A velocity of at least 5 feet per second shall be possible in the water main through the operation of the hydrant or blow-off assembly.
- 4.9 Combination air valve (CAV) assemblies shall be placed at all high points in the piping system where air could potentially accumulate. Additional valves may be required on long sections of pipe. Pipelines shall be designed to minimize the number of CAVs required.
- 4.10 Backflow prevention assemblies are required on all domestic lines for commercial buildings, all fire service lines, and all irrigation lines. Backflow prevention assemblies are also required on residential domestic service lines greater than or equal to 2-inches in diameter, or when internal plumbing is greater than 32 feet above the water main, or when the property has a well connected to the domestic plumbing. Other instances may require backflow prevention devices when required by the District. The type of backflow prevention device required is dependent on the degree of hazard and must be approved by the District and in accordance with OAR. Device must be included in the current "Approved Backflow Prevention Assembly List" published by the Oregon Drinking Water Program. All backflow prevention devices shall be located on the applicant's property and are the property owner's responsibility to test and maintain in accordance with the manufacturer's instructions and Oregon statutes. All devices shall be installed downstream from a water meter or shall include flow detectors as applicable. Devices shall be installed as close to the water meter as possible and as directed.
- 4.10.1 Reduced Pressure Backflow Assemblies generally required for:
- Any tax lot with an auxiliary water supply on or available to it, including above or below ground source (wells are most common)
 - Commercial buildings within industrial zones
 - Medical or veterinary centers
 - Dry cleaners and commercial laundries
 - Any water system which has a pump to supplement pressure
 - Sewage pump stations
 - Irrigation systems designed to use chemical injection
 - Gas stations
 - Mortuaries
 - Other high hazards as determined by the District
- 4.10.2 Double Check Backflow Assemblies generally required for:
- Any fire system or water line to a private fire hydrant (see Section 9)
 - Multi-story buildings with plumbing in excess of 32 feet above the water main
 - Shopping centers or large retail stores
 - Restaurants or fast food establishments
 - Any water service which is larger than 2-inches in diameter
 - Any tax lot served by two water services
 - Irrigation systems with pop-up sprinkler heads
- 4.11 Minimum system operating pressures shall be 20 psi at the property line during peak domestic flow conditions and simultaneous fire flows. This minimum pressure applies to the entire distribution system. All public water system improvements shall be designed to provide pressures not less than 40 psi and not greater than 80 psi during normal peak

- demand periods without fire flows. If minimum pressures cannot be obtained, developer must provide a high-level water system for the development area subject to District approval. Individual private pressure reducing valves shall be provided for any service with an excess of 80 psi.
- 4.12 All new water services shall be individually metered. Each tax lot shall have a separate water service. Minimum service line size is ¾-inch. Commercial and industrial user service line sizing greater as required. Services shall be perpendicular to the water main with no horizontal direction changes between the connection and the water meter. Service laterals shall be located close together for two adjoining lots to facilitate quick meter reading. Location of meters is subject to District approval.
- 4.13 Main extensions shall be installed through new development to allow logical extension of the District waterline grid to allow future development of adjacent undeveloped or underdeveloped properties. This will include the extension of water mains in easements across the property to adjoining properties and across street frontages of the property to adjoining properties when the main is located in the street right-of-way. Property with multiple frontages will be required to extend water along all frontages. This will allow future connection without disrupting improvements constructed for the development.
- 4.14 For pipe placed on slopes steeper than 15%, restrained joint pipe or joint restraint devices shall be installed.
- 4.15 A temporary connection with an approved backflow device is required for flushing and disinfection procedures. Permanent connection to the existing system shall not be made until passing disinfection results are obtained and approved by the District. See Section 8.8.
- 4.16 All details shall conform to the Standard Detail Drawings. Required items or installations for which no detail drawing exists, applicant's engineer shall submit sufficient design data and drawings for District approval. All such submitted drawings may require modification prior to approval for use.

Section 5 – Water System Materials

- 5.1 All materials shall be newly manufactured. No rebuilt, reconditioned or used material will be allowed. Materials shall be made in USA unless otherwise approved.
- 5.2 All materials in contact with potable water shall be ANSI/NSF-61 listed.
- 5.3 Oregon Standard Specifications (OSS) – Means the 2002 Oregon Standard Specifications for Construction produced by ODOT and APWA, including latest revisions.
- 5.4 Concrete shall conform to OSS Section 00440, Commercial Grade Concrete. Compressive field strength shall not be less than 3,000 psi at 28 days. Maximum aggregate size shall be 1½-inches. Slump shall be between 2 and 4 inches.
- 5.5 Non-Shrink Grout. Grout shall be Sika 212, Euco N-S, Five Star, or approved equal nonmetallic cementitious commercial grout exhibiting zero shrinkage per ASTM C827. Grout shall not be amended with cement or sand and shall not be reconditioned with water after initial mixing. Nonshrink grout shall be placed and packed only with the use of an approved commercial bonding agent. Unused grout shall be discarded after 20 minutes.
- 5.6 Trench Backfill Materials
- 5.6.1 Foundation Stabilization: 1½”-0 or 2”-0 aggregate base rock meeting OSS Sections 00641 and 02630. Required when native trench foundation material contains groundwater, or is unsuitable to provide a firm foundation in the opinion of the District Engineer.
- 5.6.2 Pipe Bedding and Zone: ¾”-0 dense-graded aggregate, uniformly graded from coarse to fine and meeting OSS Section 02630.10.
- 5.6.3 Class A Backfill: Native or common excavated material, free from organic or other deleterious material, free from rock larger than 3-inches, and which meets the characteristics required for the specific surface loading or other criteria of the backfill zone in the opinion of the District Engineer. If stockpiled material becomes saturated or unsuitable, Class B, C or D Backfill shall be substituted.
- 5.6.4 Class B Backfill: ¾”-0 or 1”-0 dense-graded aggregate, uniformly graded from coarse to fine and meeting OSS Section 02630.10.
- 5.6.5 Class C Backfill: Clean sand with no particles larger than ¼-inch.
- 5.6.6 Class D Backfill: Pit run or bar run material, well graded from coarse to fine, with maximum aggregate size of 3 inches.
- 5.6.7 Class E Backfill (CLSM or CDF): Controlled Low-Strength Material (cement slurry) conforming to OSS Section 00442.
- 5.6.8 Compaction: Material (except Class E Backfill) shall be compacted in multiple lifts (6-inch maximum lift) to obtain 95% of the maximum dry density as determined by AASHTO T-99.

- 5.6.9 All Backfill within public right-of-ways or within 5 feet of a traveled surface shall be Class B Backfill, except where Class E Backfill is required under pavements by Tillamook County.
- 5.7 Water Pipe Materials
- 5.7.1 Water mains shall generally be constructed of PVC unless ductile iron pipe is called for. Exposed piping in vaults and vault penetration spools shall be ductile iron. PVC and DI pipe shall be made in the USA.
- 5.7.2 PVC pipe, 4- through 12-inch nominal diameter shall be rigid PVC made from class 12454-A or B compounds as defined in ASTM D1784. Pipe shall be NSF 61 approved for use as water distribution piping. Pipe shall be Class 150 meeting DR18, minimum, conforming to all requirements of AWWA C900. Pipe shall integral wall-thickened bells with bonded-in elastomeric gaskets meeting ASTM F477.
- 5.7.3 PVC pipe, 14- through 30-inch nominal diameter pipe shall meet the requirements of AWWA Standard C905 and shall be NSF 61 approved for use as water distribution piping. Pipe shall integral wall-thickened bells with bonded-in elastomeric gaskets meeting ASTM F477. Joint design shall conform to ASTM D3139. Pipe shall be Class 165 meeting DR25, minimum.
- 5.7.4 Ductile iron pipe shall be Class 52 minimum thickness manufactured in accordance with ANSI/AWWA C151/A21.51 under method of design outlined in ANSI/AWWA C150/A21.50. Pipe interior shall be cement mortar lined in accordance with ANSI/AWWA C104/A21.4. External pipe coating shall be an asphaltic coating in accordance with ANSI/AWWA C151/A21.51.
- 5.7.5 Galvanized steel pipe shall be Schedule 40, hot-dipped galvanized, seamless or electric resistance welded type, standard weight, threaded fitting type, conforming to ASTM A53.
- 5.7.6 Polyethylene pipe, $\frac{3}{4}$ - through 2-inch nominal diameter shall be high-density polyethylene pressure rated pipe (PE3408) meeting cell classification 345464A and having NSF 14/61 certification. Pipe shall be compatible with IPS fittings. SIDR 7, 200 psi, meeting the requirements of ASTM D2239 and AWWA C901. Pipe shall have a 50-year manufacturer's warranty.
- 5.8 Fittings
- 5.8.1 Gray and ductile iron fittings shall be used for water main piping. Fittings shall conform to ANSI/AWWA C110/A21.10 Standard (full body) or ANSI/AWWA C153/A21.53 (compact), with 250 psi minimum working pressure rating. Fittings shall be made in the USA as manufactured by U.S. Pipe, Clow, Union, American Ductile Iron Pipe, or Tyler.

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- 5.8.2 All gray and ductile iron fittings shall be cement mortar lined and seal coated inside in accordance with ANSI/AWWA C104/A21.4. Interior seal coat shall be NSF-61 certified. Exterior of fittings shall have an asphaltic coating in accordance with ANSI/AWWA C110/A21.10.
- 5.8.3 Joints and gaskets for mechanical joint fittings shall conform to ANSI/AWWA C111/A21.11 Standard. Gasket material shall be standard SBR rubber, or EPDM.
- 5.8.4 Bolts and hardware for mechanical joint fittings shall be corrosion resistant “T” head bolts and hexagonal nuts conforming to AWWA C111 and ASTM A325. Bolts and nuts for mechanical joints shall be 300 series stainless steel or Cor-Blue coated. Bolts and nuts for flanged fittings, couplings, and other fittings shall be 300 series stainless steel or Cor-Blue coated.
- 5.8.5 Flange fittings shall be faced and drilled to standard 125-pound template per ANSI B16.1 Standard unless otherwise indicated or required to connect to other 250-pound fittings. Flange gaskets shall be virgin SBR rubber, 1/8-inch thick. Gasket shall be full-face cut with holes to pass bolts.
- 5.8.6 Joint restrainers for MJ fittings shall be Megalug by EBAA Iron, or approved equal, specifically designed for the type of pipe material used.
- 5.8.7 Restrained flange adapters shall be Megaflange by EBAA Iron specifically designed for the type of pipe material used.
- 5.8.8 Red brass pipe nipples shall be seamless, M.I.P threaded, rated for 150 psi and conforming to ASTM B43 and ASTM B687. Bronze fittings shall meet the requirements of ASTM B62 with NPT threaded ends conforming to ANSI/ASME B16.15.
- 5.8.9 Galvanized iron fittings shall be 150-lb standard malleable iron fittings with NPT standard threads, conforming to ASTM A53 and ASTM A153.
- 5.8.10 Tapping Sleeves shall have ASTM A240 Type 304/304L stainless steel shell and lugs and ASTM A536 Grade 65-45-12 ductile iron flange. Bolts shall be ASTM A193 Type 304 stainless steel. Nuts shall be ASTM A194 Type 304 stainless steel, heavy hex, coated. Gaskets shall be SBR per ASTM D2000 MAA 610 compounded for water service. Romac Industries “SST”, or approved equal.
- 5.8.11 Couplings shall have ASTM A536 Grade 65-45-12 ductile iron center sleeves and end rings. Bolts and nuts shall be trackhead, heavy hex, rolled thread, high strength, low alloy, corrosion resistant steel per AWWA C111. Gaskets shall be SBR per ASTM D2000 MBA 710, compounded for water service.
- 5.8.12 Service brass shall only be as shown in the Standard Details and as otherwise approved.

5.9 Valves

- 5.9.1 Valves shall be placed at logical locations in accordance with the minimum locations shown in the standard details. Valves shall be sized equivalent to the water piping adjacent to the valve. Valves 8-inch and smaller shall be gate valves. Valves 10-inch and larger shall be butterfly valves. Valves shall be approved by the District.
- 5.9.2 Gate Valves 2-inch through 8-inch shall be iron bodied, resilient wedge, non-rising stem (NRS), O-ring sealed, fusion bonded epoxy lined and coated valves conforming to the latest revision of AWWA C509. Valves shall have a 200 psi working pressure (water, non-shock) rating. Valve ends shall be mechanical joint or flanged joint as applicable. Furnish with standard 2-inch square operating nut when buried and handwheel operator where exposed. Bonnet bolts shall be stainless steel.
- 5.9.3 Butterfly Valves shall be rated for buried service and meet the requirements of the latest revision of Class 150B, AWWA C504. Valves shall have cast iron body, ASTM A126 Class B, resilient Buna-N rubber seat and cast iron disc with stainless steel contacting edge. Shaft shall be 18-8 type 304 stainless steel conforming to ASTM A276. Valve ends shall be mechanical joint or flanged joint as applicable. Furnish with standard 2-inch square operating nut when buried and lever operator where exposed.
- 5.9.4 Bolts and nuts for buried valves shall be 300 series stainless steel or Cor-Blue coated.

5.10 Hydrants

- 5.10.1 Fire hydrants shall meet or exceed AWWA C502, latest revision for dry barrel fire hydrants. Rated working pressure shall be 250 psig. Test pressure shall be 500 psig.
- 5.10.2 Nozzle section, upper and lower standpipes, and hydrant base shall be ductile iron. All exterior fasteners below grade shall be stainless steel.
- 5.10.3 Main valve closure shall be compression type, opening against the pressure and closing with the pressure. Seat diameter shall be 5¼ inches. The seat shall be bronze threaded into bronze mating material for easy field repair.
- 5.10.4 Nozzle section shall be designed for easy 360 degree rotation by the loosening of no more than 4 bolts.
- 5.10.5 Hydrant shall be designed so that removal of all working parts can be accomplished without excavating.
- 5.10.6 The draining system shall be bronze and be positively activated by the main operating rod. Hydrant shall have a sliding bronze drain valve.

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- 5.10.7 Hydrant shall have an internal travel stop nut in the top housing. Operating threads shall be factory lubricated and be O-ring sealed from water, moisture, and dirt.
 - 5.10.8 Hydrant shall be of the traffic type. A frangible barrel and rod coupling designed to break upon traffic impact will protect the hydrant and connecting piping. Main valve shall remain closed upon impact.
 - 5.10.9 Upper operating nut shall be ductile iron, 1½-inch pentagon standard. Opening direction shall be counter-clockwise (CCW).
 - 5.10.10 Hydrant shall have two (2) 2½-inch hose nozzles, and one (1) 4½-inch pumper port. Threads shall conform to NFPA National Standard Fire Hose Coupling Screw Threads.
 - 5.10.11 Each hydrant shall include a 4-inch Storz Adapter on the pumper port. Storz adapter shall have metal sealing surface designed for permanent mounting on the hydrant. Storz adapter shall be aluminum and shall have a protective cap with stainless steel, plastic coated cable. Storz shall meet the current NFPA-Fire Hose Connection Standard. Adapter shall be Hydra-Shield model HYST-40ST-45NH with SnapCap 4ST (orange) or approved equal.
 - 5.10.12 Hydrant bottom connection shall be 6-inch nominal diameter mechanical joint. Flange joint may be approved in some cases due to space constraints.
 - 5.10.13 Hydrants shall be painted Fire Hydrant Red. Field touch-up will be required if scratched or marred.
 - 5.10.14 Hydrants shall be U.S. Pipe Metropolitan M-94.
 - 5.11 Miscellaneous Materials
 - 5.11.1 Tracer wire shall be No. 10 AWG, solid or stranded copper with blue colored insulation. Insulation shall be 30 mil thick HDPE designed for direct bury.
 - 5.11.2 Warning tape shall be 6-inch wide, 4-mil thick, blue color, reading “CAUTION – WATERLINE BURIED BELOW.”
 - 5.11.3 Other materials not covered herein should generally conform to the 2002 Oregon Standard Specifications and are subject to District approval. Service brass shall be as shown in the standard detail drawings.

Section 6 – Water System Installation

- 6.1 Prepare trench in accordance with the standard detail in a safe manner. Place and compact foundation stabilization materials as required. Notify District to allow for inspection of trench bottom.
- 6.2 Place and compact pipe bedding material before placing pipe in the trench. Dig depression for pipe bells to provide uniform bearing along the entire pipe length. Thoroughly compact bedding material.
- 6.3 Prior to lowering pipe into the trench, the Engineer and District's representative will check for damage to the pipe. The Contractor shall repair or replace, as directed, all damaged or flawed pipe prior to installation.
- 6.4 PVC pipe shall be installed and handled in accordance with the Uni-Bell Plastic Pipe Association standards UNI-B-3, AWWA C605, these specifications and the manufacturer's installation guide. The Contractor shall have on site all proper tools and equipment to properly and safely install the pipe.
- 6.5 Thoroughly clean inside the pipe before laying. Prevent foreign material from entering the pipe while it is being placed in the trench. Remove all foreign material from the inside of the pipe and joint before the next pipe is placed. Keep debris, tools, rags or other materials out of the pipe at all times. When pipe laying is not in progress, cover the exposed end of the pipe using a watertight expanding plug, or by other approved means to prevent entry of trench water or other foreign materials into the pipe.
- 6.6 Lay pipe with bell ends facing the direction of laying. For lines on an appreciable slope, face bells up-grade unless otherwise directed by the District.
- 6.7 Thoroughly clean the ends of the pipe to remove all foreign matter from the pipe joint. Lubricate the bell and spigot ends with NSF approved pipe lubricant, as recommended by the manufacturer. Furnish the gaskets required for the joint being assembled. Install the gasket with uniform tension around the joint groove before placing the pipe in the trench.
- 6.8 Provide concrete thrust blocking at all bends, valves, tees and other fittings in accordance with the Plans, as required to prevent movement due to thrust. Mechanical joint restraints shall also be installed.
- 6.9 At no time shall pipe be deflected, either in the vertical or horizontal plane, in excess of the maximum deflection recommended by the pipe manufacturer. Deflection at any joint shall not exceed $2\frac{1}{2}^{\circ}$. Maximum deviation from grade shall not exceed $\frac{1}{2}$ -inch.
- 6.10 Where new water pipe is installed near existing or new sanitary sewer lines, all provisions of current OAR 333-61-050 (Crossings – Sanitary sewers and waterlines), regarding placement of pipe near, under, or over sanitary sewer lines shall be followed.
- 6.11 Tracer wire shall be brought to the surface and connected at each valve box. All joints and/or splices in the wire shall be made with a designed waterproof splice kit. Wire shall be taped to pipe every 5 feet and shall be run straight with a small amount of slack.

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- 6.12 Place materials in the pipe zone in layers not greater than 6 inches thick and in a manner that equalizes the pressure on the pipe and minimizes stress. As required under the haunches of pipe and areas not accessible to mechanical tampers or to testing, compact with hand methods to ensure thorough contact between the material and the pipe. Before placing the pipe zone material, condition, aerate, or wet the material so that the moisture content of each layer is within minus 4% to plus 2% of optimum moisture content.
- 6.13 Provide proper Backfill Class material as required. Backfill the trench above the pipe zone in successive lifts. Do not allow the backfill to free-fall into the trench until at least 3 feet of cover is provided over the top of the pipe. Modify the compaction as necessary to protect the pipe. Compact each lift to not less than 95% of the maximum density.
- 6.14 Warning tape shall be placed over the pipe zone material, approximately 15 to 18 inches below finish grade, in accordance with the Standard Detail Drawings. Lay tape flat and untwisted, centered over the pipe and with wording facing upwards.
- 6.15 If the specified compaction is not obtained, contractor shall remove material, modify compaction procedures, and/or reduce the thickness of lifts as required. Do not proceed with additional excavation or pipe laying until the backfill can be compacted to the satisfaction of the District.
- 6.16 CLSM. When CLSM Backfill is required, backfill above pipe zone with CLSM material. If the CLSM is to be used as a temporary surfacing, backfill to top of the trench and strike off to provide a smooth surface. If CLSM is not to be used as a temporary surface, backfill to bottom of the proposed resurfacing. Use steel plates to protect the CLSM from traffic a minimum of 24 hours. Comply with Tillamook County requirements.
- 6.17 Restore all surfaces after backfill is complete. Base rock, asphalt paving and concrete paving methods and materials shall conform to Oregon Standard Specifications as approved by the District and Tillamook County.
- 6.18 Do not make permanent connections to existing mains until disinfection is completed. A temporary connection with an approved backflow device is required for flushing and disinfection procedures. Permanent connection to the existing system shall not be made until passing disinfection results are obtained and approved by the District.
- 6.19 Filling and Flushing. After installation of water piping, fill pipes slowly with potable water at a maximum rate of 500 gpm while venting all air. Take all required precautions to prevent entrapping of air in the pipes. Flush all sections of pipe to remove any solids or material that may be in the pipe. If no hydrant is installed at the end of the main, provide a tap large enough to develop sufficient flow rates to achieve a velocity of at least 5 feet per second in the main. If sufficient velocity cannot be obtained, pigging is required. Control and dispose flushing water in a proper manner to avoid erosion, flooding, property damage, and discharge of chlorinated water in an unacceptable manner.
- 6.20 Pigging
- 6.20.1 If a flushing velocity rate of 5 fps is not attainable with the available pipe configuration or fittings, the new piping shall be pigged to obtain a cleansing flush of the piping.

- 6.20.2 Pigging shall be accomplished with at least three (3) polyurethane foam pigs designed for cleaning of waterline piping. Pigs shall be as manufactured by Knapp Polly Pig, Inc. or approved equal.
 - 6.20.3 The Contractor shall have the option to run a single pig three times or to run three separate pigs at the same time. If the pigs are rammed at the same time, they shall be numbered so as to identify them when they are ejected from the piping.
 - 6.20.4 Necessary fittings, ejection ports, and other facilities shall be designed and shown on the plans.
 - 6.20.5 Contractor shall provide adequate erosion control means to prevent damage from the flushing or pigging process.
 - 6.20.6 The District's inspector shall be given 48 hours notice prior to pigging beginning and shall be on-hand to observe and approve the pigging procedure and process that is utilized.
 - 6.20.7 If after pigging the new line the bacteriological test fails, the line shall be re-pigged and retested.
 - 6.20.8 Pigging can be used as an option to flushing at the Contractor's discretion.
- 6.21 Testing and Disinfection. After flushing, water system shall be tested for leakage and disinfected according to the following Sections. Provide all temporary taps as required. All items not passing tests shall be repaired or replaced as required.

Section 7 – Water System Pressure (Hydrostatic) Testing

- 7.1 All waterlines and service lines shall be subjected to hydrostatic pressure testing. Testing shall be conducted by the Contractor in the presence of the Engineer. District must be notified at least 2 working days in advance.
- 7.2 Testing shall not be commenced until all thrust blocking has been in place for not less than 10 days and sufficient backfill has been placed to prevent pipe movement.
- 7.3 Furnish and operate all pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test. Provide certifications of accuracy for gauges from an approved laboratory when requested.
- 7.4 Test Procedure
 - 7.4.1 The test section shall be filled with water and all air expelled from the pipe prior to testing. District will provide water for testing at a time of day when sufficient quantities of water are available for normal system operation.
 - 7.4.2 All valves isolating the test section shall be securely closed and the specified test pressure applied by means of a pump connected near the lower end of the test section.

- 7.4.3 The test pressure shall be 150 psi and the duration shall be at least 2-hours at the test pressure. Provide additional pumping during the test period to continuously maintain pressure within 5 psi of that required. Use a clean container of potable water to supply the pump.
- 7.4.4 Accurately determine the quantity of water required to maintain and restore the required pressure at the end of the test by pumping through an approved positive displacement water meter.
- 7.4.5 The allowable leakage rate for the test section shall be determined from the following formula:
- $$L = \frac{ND\sqrt{p}}{7400}$$
- L = allowable leakage (gph)
N = number of joints in length of pipe tested*
D = nominal diameter of pipe (inches)
p = average test pressure during test (psi)
- (*each service connection equals one joint)
- 7.4.6 If the amount of water added to the section exceeds the allowable leakage, the Contractor shall, determine the source of leakage, repair or replace the defective elements, and repeat the test until the allowable leakage requirements have been satisfied.
- 7.4.7 All visible leaks on new waterlines shall be repaired, regardless of the amount of leakage.
- 7.4.8 Make all tests with hydrant auxiliary gate valves open and pressure against the hydrant valve. After the pipe test is completed, test each gate valve in turn by closing it and relieving the pressure beyond. This test of the gate valve is acceptable if there is no immediate loss of pressure.

Section 8 – Water System Disinfection

- 8.1 All lines installed or modified under this Contract shall be sterilized prior to connection to the existing system, in accordance with the following procedure, AWWA Standards C651 through C654, and current OAR 333-61-050 (Disinfection of Facilities).
- 8.2 Prior to commencing disinfection procedures, all lines shall be flushed thoroughly to remove dirt, construction debris and other potential contaminants.
- 8.3 The Contractor shall have the option of utilizing either a liquid chlorine gas-water mixture, direct fed chlorine gas, sodium hypochlorite solution, or a calcium hypochlorite and water mixture for disinfection.
- 8.4 Disposal of chlorinated water from the reservoir tank or pipelines shall be performed in conformance with the most recent draft or edition of *Best Management Practices for the Disposal of Chlorinated Water* by the Oregon Department of Environmental Quality. Chlorinated water used for disinfection of waterlines and service lines shall not be

- directly disposed of into or impair the waters of the State (i.e. lakes, creeks, streams and wetlands).
- 8.5 The Contractor shall provide all equipment, materials, and workmanship required to complete the flushing and disinfection of waterlines and appurtenances.
- 8.6 Disinfection Procedure
- 8.6.1 The Contractor shall inject chlorine solution into the beginning of the waterline through a corporation stop inserted in the horizontal axis of the pipe. Make no connections between the existing distribution system and the non-disinfected pipelines unless a State Drinking Water Program approved backflow preventer is installed in the connecting line.
- 8.6.2 The solution shall have a free chlorine residual of at least 25 mg/L, but not more than 100 mg/L. All entrapped air shall be discharged from the line and all surfaces wetted. Chlorinated water shall be retained in the pipe for at least 24-hours. A free residual of not less than 10 mg/L shall be found in all parts of the line after the 24-hour period has elapsed.
- 8.6.3 After the 24-hour period, all valves in the mainline shall be operated and all hydrants flushed with a residual of at least 10 mg/L being found. If the residual concentration within any part of the chlorinated section is found to be less than 10 mg/L, the Contractor shall flush, rechlorinate, and retest all sections until a 10 mg/L residual is obtained.
- 8.6.4 Upon obtaining the minimum 10 mg/L residual following the 24-hour disinfection period, the Contractor shall flush the section with potable water until the chlorine residual is equivalent to the residual of the existing system water. A minimum of one sample shall then be taken from the pipe for microbiological analysis.
- 8.7 Microbiological Sampling and Analysis
- 8.7.1 The Contractor is responsible for collecting and submitting samples to a certified independent testing laboratory for microbiological analysis.
- 8.7.2 The Engineer or District representative shall be present to witness the collection of the water samples for testing. Chain of custody procedures shall be utilized during the collection and transport of samples to the laboratory.
- 8.7.3 The Contractor shall bear all costs associated with the required testing, including laboratory fees, materials required, and transportation costs. The Contractor also shall pay for all additional tests required as a result of failing to meet the bacterial limits.
- 8.7.4 If the results of the microbiological analysis indicate that the water is free of coliform organisms, the waterline may be put into service.

- 8.7.5 If the results of the microbiological analysis indicate that coliform organisms are present, then the waterline shall be flushed, rechlorinated, and retested until a coliform-free sample is obtained.
- 8.7.6 A minimum of one sample from each separable structure or pipeline shall be obtained for analysis. The presence of coliform organisms shall be determined using the Colilert 24-hour test, Method MMO-Mug, or other methods approved by the Oregon State Drinking Water Program.
- 8.8 Connections to Existing System
- 8.8.1 New waterlines shall not be connected to the existing system until passing microbiological testing results have been received. An approved double-check backflow device shall be temporarily installed and shall remain until all tests have passed. Device shall be sufficiently large to provide adequate flushing. Merely leaving a valve closed is not acceptable. After disinfection has been completed satisfactorily, the tie-in may be made. Tie-in fittings and small section of pipe shall be disinfected as specified below.
- 8.8.2 Where new waterlines connect to existing lines and the tie-in requires a portion of the new construction to be brought into service immediately upon completion of the tie-in, the new piping and appurtenances shall be disinfected by liberally spraying or brushing on 1% hypochlorite solution (i.e. 1 gallon 5.25% bleach mixed with 4 gallons potable water), waiting 10 minutes, and then thoroughly flushing. This is generally limited to cut-in fittings.
- 8.8.3 The Contractor shall take care not to allow foreign material to enter the pipe and appurtenances during installation.
- 8.8.4 Upon completion of the tie-in, the new piping and appurtenances shall be flushed.

Section 9 – Standards for Private Fire Protection Systems

- 9.1 Fire service backflow prevention assemblies shall be installed at the property line, or edge of the public waterline easement as approved by the District. The fire service line from the public right-of-way or utility easement to the backflow assembly will be privately owned and shall meet all District standards. The delineation between the public and private line shall occur as close to the public main as possible and delineated with an in-line public valve in accordance with District standards. A backflow prevention assembly for a fire service line may be installed inside of a building if it can be done within twenty feet of the tapping valve or tee.
- 9.2 Private fire lines shall include a flowmeter and vault located in the public right-of-way or utility easement. Materials and configuration shall be as approved by the District.
- 9.3 Only approved Double Detector Check Backflow Assemblies are to be used for backflow prevention on fire line services.
- 9.4 Only approved resilient seat indicating valves are allowed on fireline assemblies.

- 9.5 Installation must comply with the Oregon Uniform Fire Code as adopted and amended by the State of Oregon Fire Marshal, and District Standards.

Section 10 – Standards for Special Projects

- 10.1 The design of the following are considered special projects and are not covered in detail in this manual.
- 10.1.1 Water Distribution Pumping Stations
 - 10.1.2 Storage Facilities
 - 10.1.3 Pressure Regulating Stations
- 10.2 Review and approval of special projects will be made on a case by case basis. Developer should coordinate early in the planning stages with the NRWD to determine specific requirements for the site. All aspects of any special project will be designed and constructed as required by the NRWD.
- 10.3 In general, when adequate pressures are not available by gravity through the existing system a suitable pump station is required to serve the development. Pump stations shall be designed and constructed in accordance with District requirements. When possible, pumping stations will convey water to a high level storage tank. When suitable tank elevations are not possible the District may allow hydropneumatic tank type booster pump stations. When a storage tank cannot be provided, a fire pump will be needed in addition to the normal service pumps. Provisions for fire flows during power outages must be accommodated.
- 10.4 Pump buildings and storage tanks will have adequate site sizing and access.
- 10.5 Pumping stations will normally require 480 volt, 3-phase electrical service. Flowmeters, PLC based control systems, flow and level displays, and SCADA system outputs will be required.
- 10.6 Storage tanks will have a volume equal to at least 120,000 gallons plus 600 gallons per lot served. Tanks will be constructed with spiral wound, post tensioned wire reinforcing and concrete (DYK, Inc. or approved equal) unless otherwise approved by the NRWD. Tanks will be designed in conformance with the latest Oregon Structural Specialty Code in effect. Access hatches, interior stainless steel ladders, and other appurtenances will be included. Tank water level will be monitored with a submersible pressure transducer. An exterior mechanical tank level device will also be required.

Neskowin Regional Water District

Test Forms

Neskowin Regional Water District

Neskowin, OR. 97149
 (503) 392-3966 Fax: (503) 392-4553

Waterline Hydrostatic Pressure Test Data Sheet Inspection Report Form

Test Date
Inspector
Witness for Authority
Date Received by Authority

Project Name: _____

Contractor: _____

Test Pressure _____ (psi)

Allowable Leakage Rate (L)

$$L = \frac{ND\sqrt{p}}{7400}$$

Allowable Leakage Rate Calculation

	Pipe Segment Description	Number of Joints in Length of Pipe (N)	Diameter (D) (in)	Allowable Leakage Rate (L) (gal/hr)
1				
2				
3				
4				
5				
Total Allowable Leakage Rate (gal/ hr):				

Hydrostatic Test Data

Time	Elapsed Time (min)	Pressure (psig)	Water Added (gal)	Pressure After Adding Water (psig)
	---		---	---
Total Elapsed Time:			Total Water Added:	

Actual Leakage Rate:

$$L_{\text{actual}} = \frac{\text{Total Water Added (gal)}}{(\text{Total Elapsed Time (min)} / 60)} = \frac{\text{(gal)}}{\text{(min)} / 60} = \text{_____ (gal/hr)}$$

Actual Leakage Rate ≤ Allowable Leakage Rate? _____ Yes _____ No

Inspector's Signature: _____ Date: _____

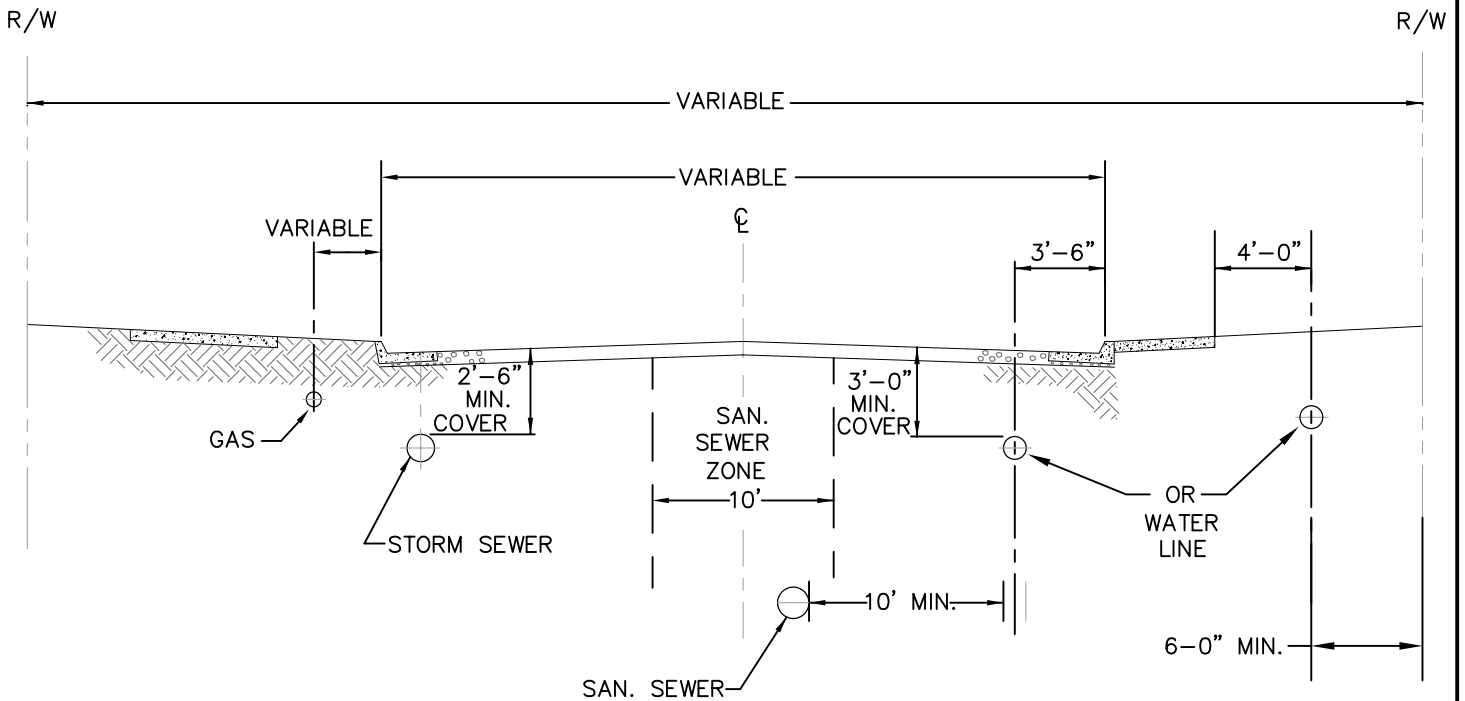
Notes: Standard Test Pressure = 150 psi, Minimum Elapsed Time = 2 hours
 Each service connection counted as one joint

Neskowin Regional Water District

Standard Detail Drawings

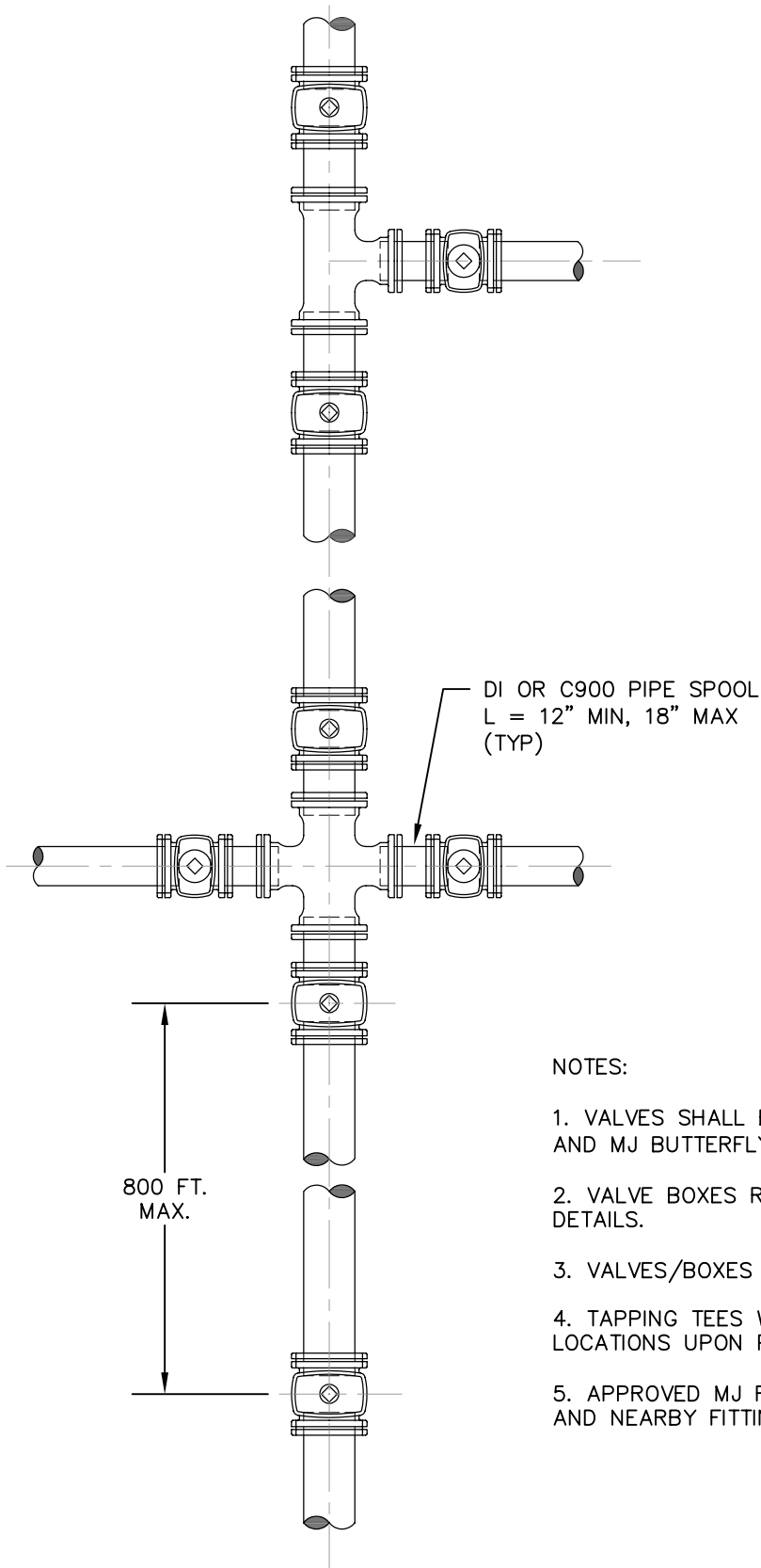
STANDARD DETAIL DRAWINGS INDEX

- W-050: STANDARD UTILITY LOCATIONS
- W-100: TYPICAL WATER VALVE LOCATIONS (MINIMUM)
- W-150: TYPICAL WATERLINE TRENCH DETAILS
- W-151: STREET CUT STANDARD DETAIL
- W-170: PIPE ANCHOR / TRENCH CUT-OFF WALL DETAIL
- W-200: STANDARD WATER VALVE SETTING DETAIL
- W-205: VALVE OPERATOR EXTENSION DETAIL
- W-300: STANDARD FIRE HYDRANT ASSEMBLY DETAIL
- W-400: 2" BLOW-OFF ASSEMBLY
- W-401: 2" BLOW-OFF ASSEMBLY W/ BLOW-OFF HYDRANT
- W-405: 4"+ BLOW-OFF ASSEMBLY
- W-500: 2" COMBINATION AIR VALVE ASSEMBLY
- W-600: STANDARD 3/4" WATER SERVICE CONNECTION
- W-605: STANDARD 1" WATER SERVICE CONNECTION
- W-608: STANDARD 2" WATER SERVICE CONNECTION
- W-700: CONCRETE THRUST BLOCKING DETAILS
- W-800: REDUCED PRESSURE BACKFLOW ASSEMBLY (3/4" - 2")
- W-805: REDUCED PRESSURE BACKFLOW ASSEMBLY (2½" UP)
- W-900: DOUBLE CHECK VALVE ASSEMBLY (3/4" - 2")
- W-905: DOUBLE CHECK DETECTOR ASSEMBLY (2½" UP)



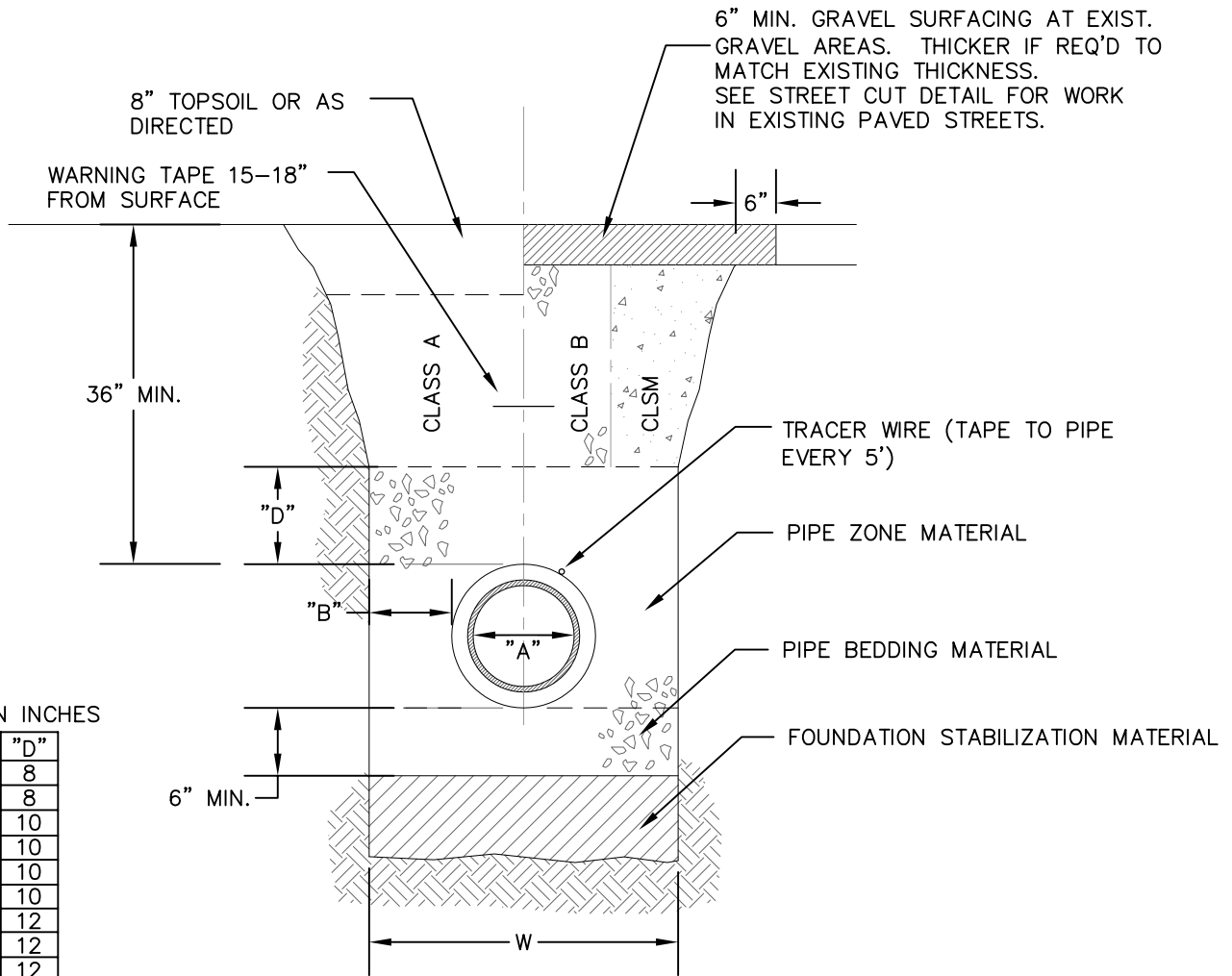
NOTES:

1. WATER LOCATED 4' OUTSIDE EDGE OF PAVEMENT OR BACK OF SIDEWALK WHERE POSSIBLE FOR FUTURE MAINTANANCE WITHOUT DISTURBANCE OF IMPROVEMENTS. OTHERWISE, 3'-6" INSIDE FROM FACE OF CURB OR AS DIRECTED.
2. 10' HORIZONTAL SEPARATION BETWEEN WATER AND SEWER WHERE POSSIBLE. COMPLY WITH SEPARATION REQUIREMENTS OF OAR 333-061-050.
3. WATER MAINS SHALL HAVE 36" MINIMUM COVER.
4. SEWER MAINS SHALL HAVE 5.25' (63") MINIMUM COVER UNLESS OTHERWISE APPROVED TO AVOID CONFLICTS WITH WATER AND OTHER UTILITIES.
5. WATER LOCATED ON NORTH OR EAST SIDE OF STREET WHEN PRACTICAL.
6. ALL LAYOUTS AND LOCATIONS ARE SUBJECT TO NRW D APPROVAL.



NOTES:

1. VALVES SHALL BE MJ GATE VALVES FOR 8" AND SMALLER AND MJ BUTTERFLY VALVES FOR 10" AND LARGER.
2. VALVE BOXES REQ'D AT EACH VALVE. SEE APPROPRIATE DETAILS.
3. VALVES/BOXES SHALL CONFORM TO NRWD STANDARDS.
4. TAPPING TEES WITH VALVE MAY BE USED AT SOME LOCATIONS UPON PRIOR APPROVAL.
5. APPROVED MJ RESTRAINT GLANDS REQ'D AT EACH VALVE AND NEARBY FITTING.

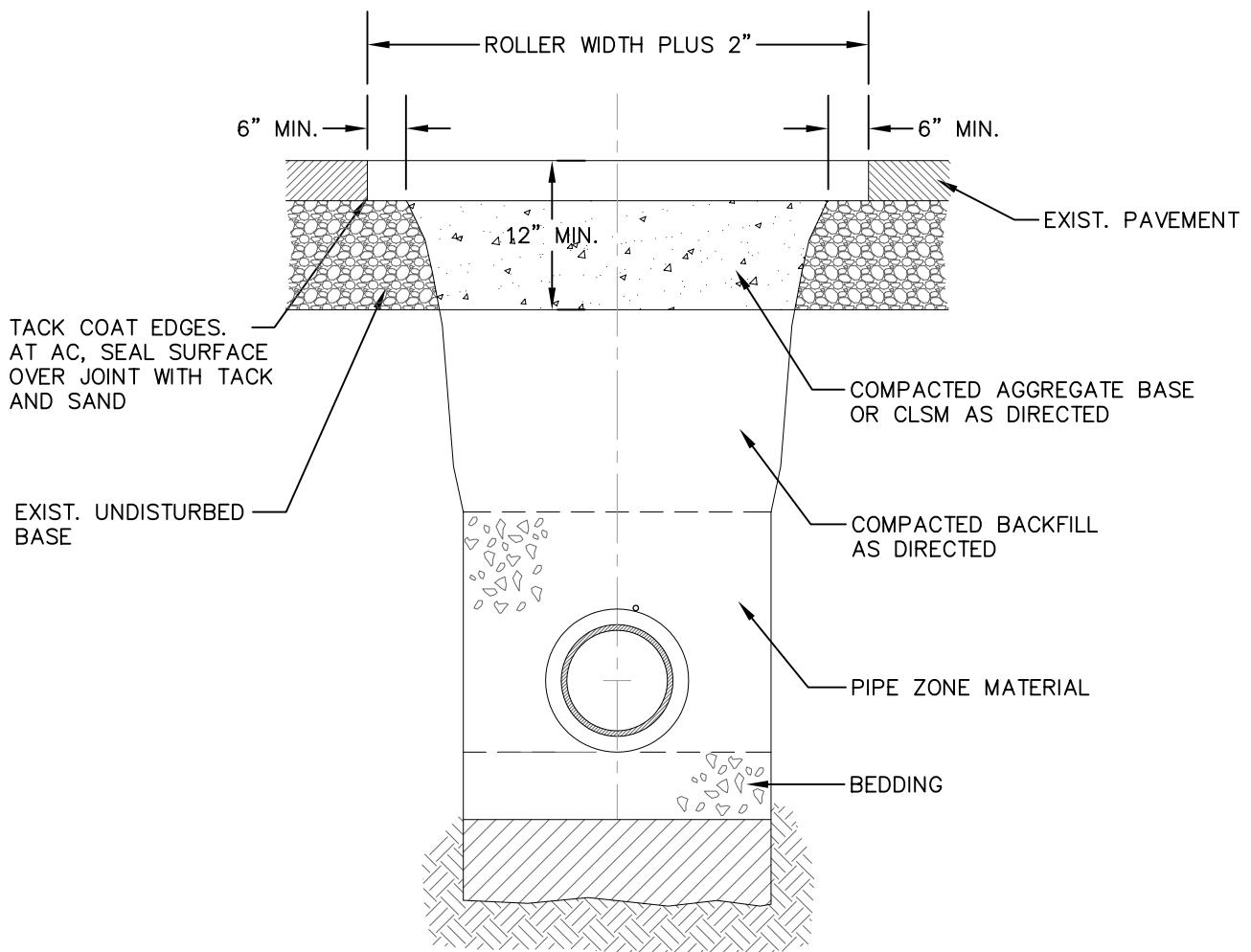


DIMENSIONS IN INCHES

"A"	"B"	"D"
4	10	8
6	10	8
8	10	10
10	10	10
12	12	10
14	12	10
16	16	12
18	16	12
24	18	12
30	18	12
36	24	14

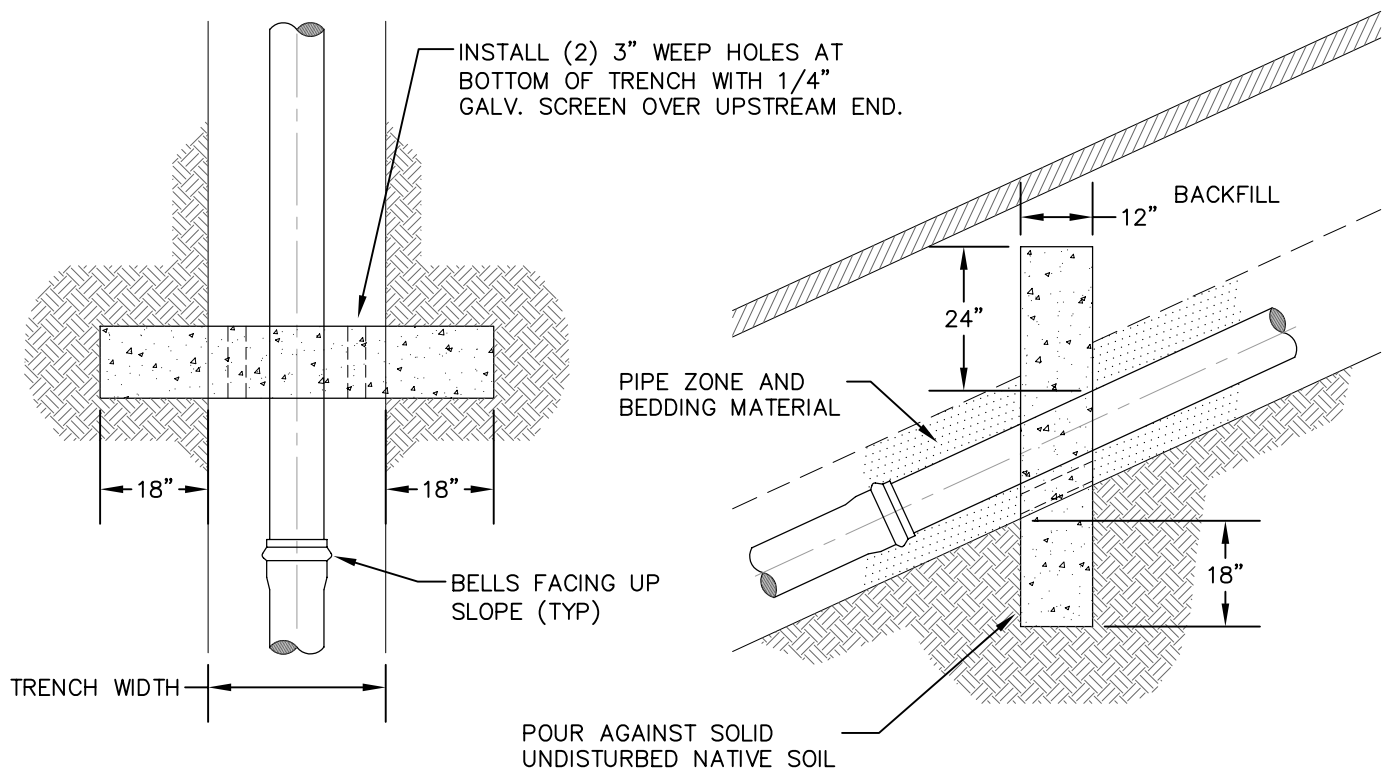
NOTES:

1. TRENCH EXCAVATION SHALL BE CONDUCTED IN A SAFE MANNER WITH ALL NECESSARY BRACING AND SHORING PROVIDED FOR COMPLIANCE WITH OSHA.
2. FOUNDATION STABILIZATION SHALL BE PROVIDED WHEN MATERIAL AT BOTTOM OF TRENCH IS UNSUITABLE IN THE OPINION OF THE NRWD TO PROVIDE A STABLE TRENCH BASE.
3. CONSTRUCTION IN STATE AND COUNTY RIGHT-OF-WAY SHALL COMPLY WITH STATE AND COUNTY STANDARDS AND NRWD STANDARDS.
4. CLASS B BACKFILL REQUIRED IN ALL ROADWAYS AND TRAFFIC PATHS EXCEPT WHERE CDF BACKFILL IS REQUIRED BY COUNTY, STATE, OR NRWD.
5. TRACER WIRE REQUIRED AT ALL NON-METALLIC PIPELINES. WIRE SHALL BE 10 GA. MINIMUM SOLID COPPER WIRE WITH BLUE 30 MIL THICK HDPE INSULATION RATED FOR DIRECT BURY. USE APPROVED WATERPROOF SPLICE AT ALL CONNECTIONS.
6. WARNING TAPE SHALL BE 6" WIDE, 4 MIL THICK, APWA BLUE, READING "CAUTION WATER LINE BURIED BELOW".
7. MATERIALS SHALL BE AS SPECIFIED BY THE NRWD IN THE STANDARDS MANUAL.
8. COMPACT ALL FILL TO 95% MDD PER ASTM D698. SUFFICIENT COMPACTION TESTS WILL BE REQUIRED TO PROVE METHODS AND COMPACTION EFFORT IS SUFFICIENT.



NOTES:

1. ALL EXISTING AC OR PCC PAVEMENT SHALL BE SAWCUT IMMEDIATELY PRIOR TO REPAVING.
2. CONCRETE PAVEMENT SHALL BE REPLACED WITH CONCRETE TO A MINIMUM THICKNESS OF 6 INCHES OR TO THE THICKNESS OF REMOVED PAVEMENT, WHICHEVER IS GREATER.
3. PLACE AC MIX TO A MINIMUM THICKNESS OF 4 INCHES OR THE THICKNESS OF REMOVED PAVEMENT, WHICHEVER IS GREATER. COMPACT AS DIRECTED.
4. COMPLY WITH THE REQUIREMENTS OF THE AGENCY HAVING JURISDICTION OVER THE ROAD IN WHICH THE STREET CUT OCCURS.

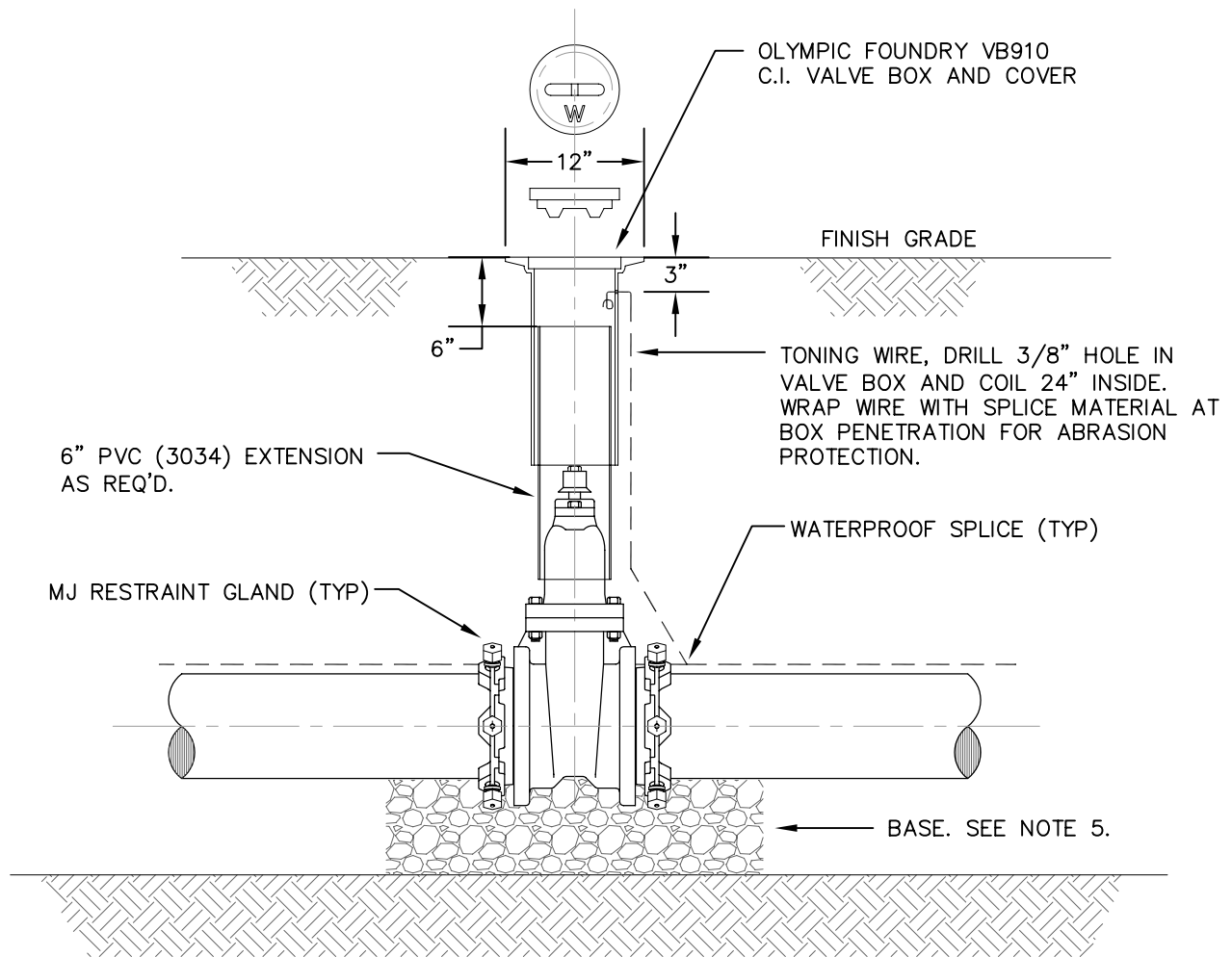


NOTES:

1. CUT-OFF WALLS REQ'D AT ALL PIPELINES WHERE SLOPE EXCEEDS 20%.
2. RESTRAINED JOINT PIPE REQUIRED AT SLOPES BETWEEN 15% AND 20%.
3. WALLS SHALL BE FORMED WITHIN TRENCH. REMOVE FORMS PRIOR TO BACKFILLING.
4. CONCRETE SHALL HAVE 3000 PSI COMPRESSIVE STRENGTH MIN. (CLASS 3000).

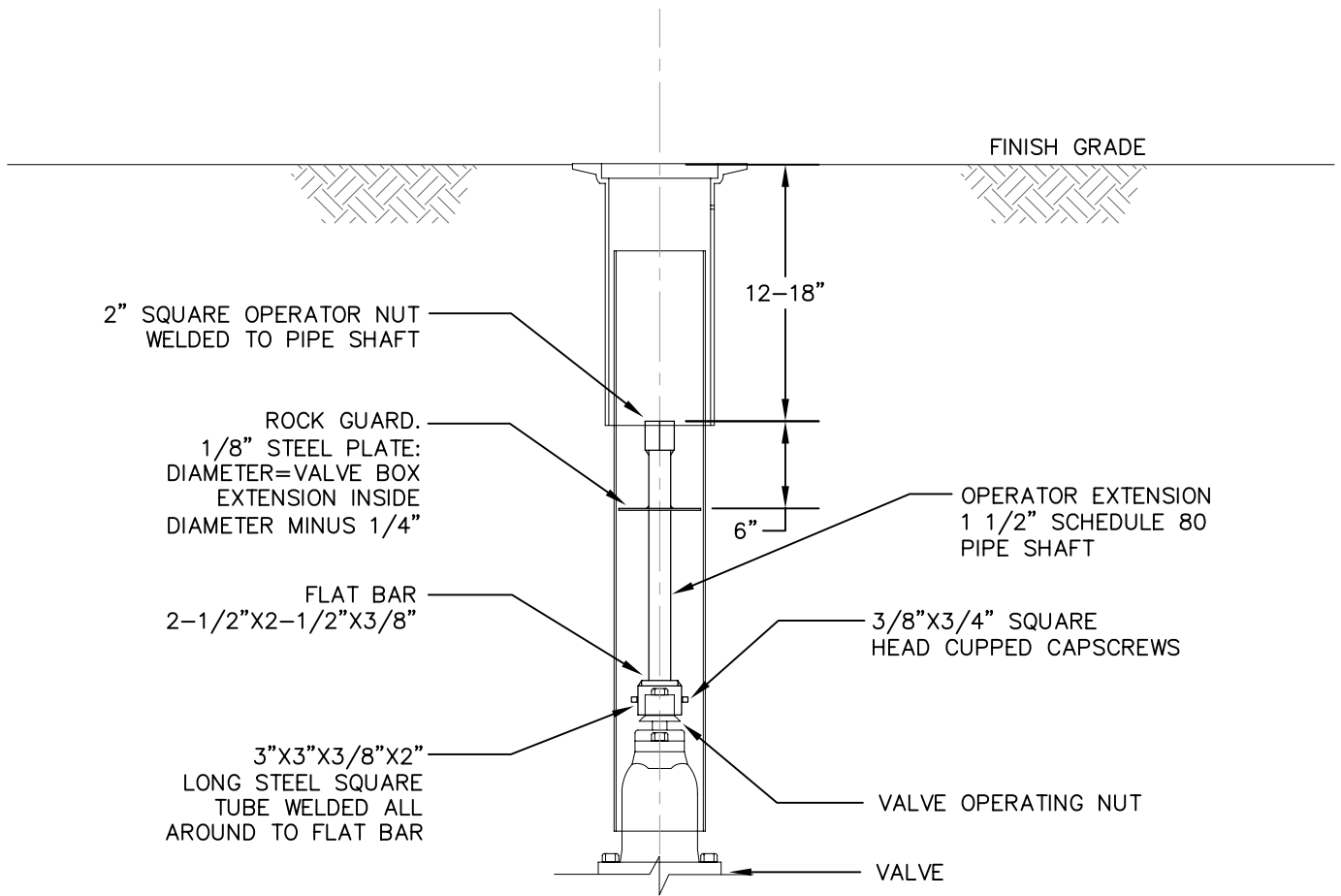
5. SPACING OF WALLS SHALL BE:

SLOPE	SPACING
20-34%	35 FEET
35-50%	25 FEET
51+ %	15 FEET



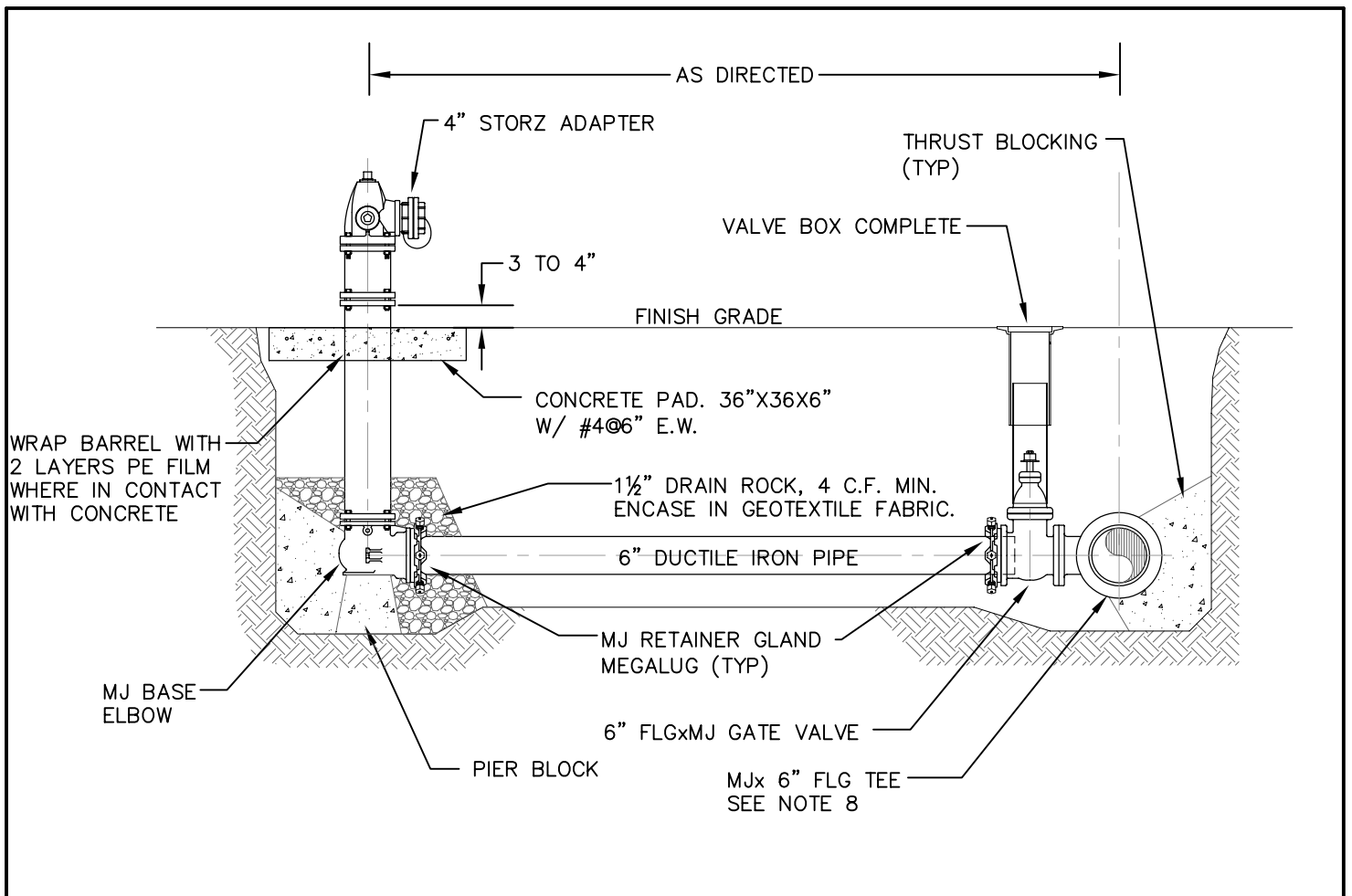
NOTES:

1. VALVE BOX SHALL BE CENTERED OVER VALVE OPERATING NUT.
2. PVC EXTENSION SHALL BEGIN AS CLOSE TO VALVE AS POSSIBLE AND SHALL EXTEND TO WITHIN 6" OF GROUND SURFACE.
3. TOP OF VALVE BOX SHALL BE FLUSH WITH FINISH GRADE.
4. VALVE EQUIPPED WITH 2" SQUARE OPERATING NUT LOCATED WITHIN 24" FROM GROUND SURFACE. SEE VALVE OPERATOR EXTENSION DETAIL WHERE REQUIRED.
5. VALVES 12" AND SMALLER SHALL BE PROVIDED WITH CLASS B BASE. VALVES LARGER THAN 12" SHALL BE INSTALLED ON PRECAST CONCRETE PIER BLOCK.
6. NO PIPE JOINTS ALLOWED WITHIN 10' OF IN-LINE VALVES UNLESS JOINT RESTRAINT DEVICE PROVIDED.



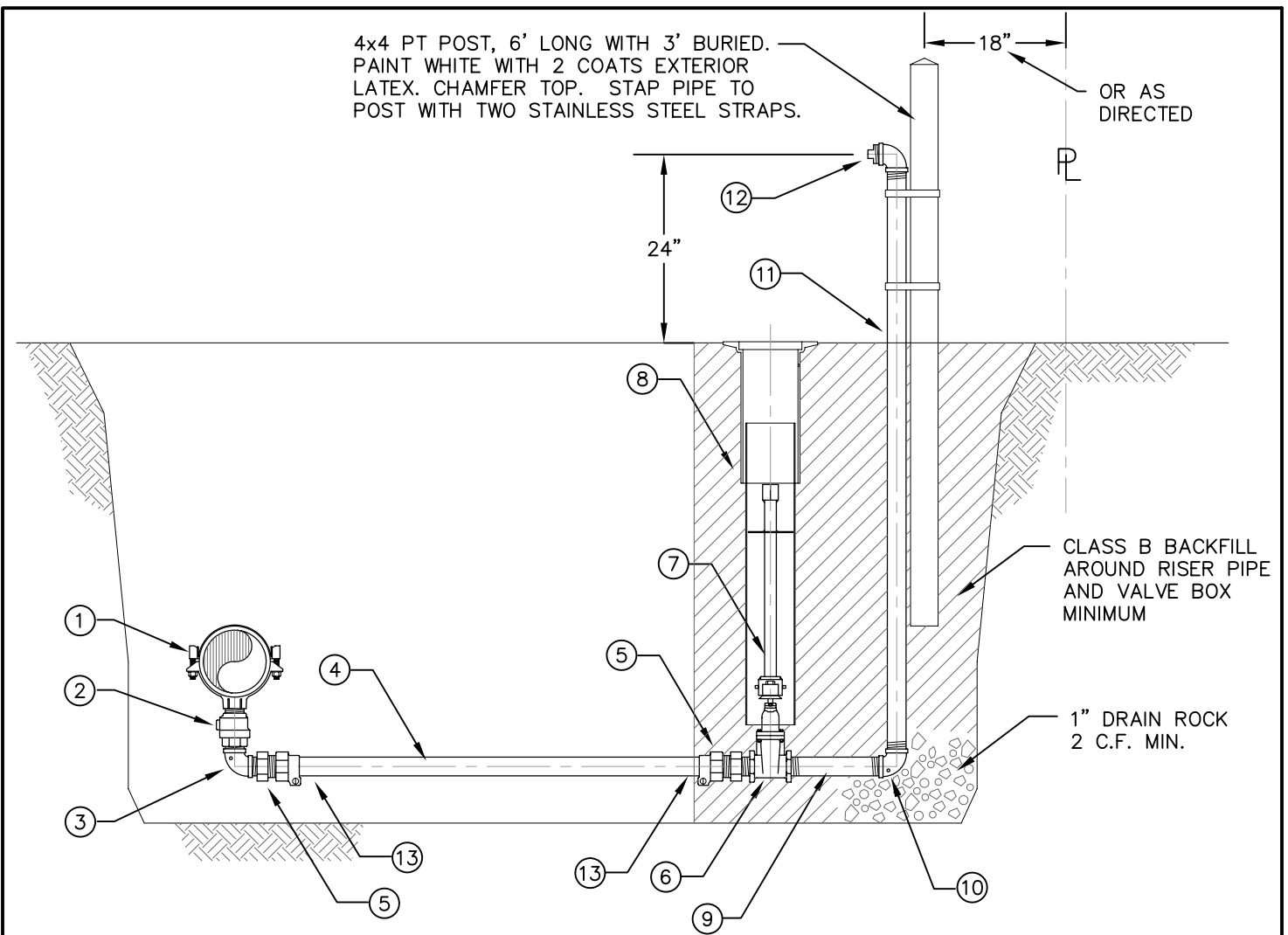
NOTES:

1. WHERE DEPTH IS OVER 6 FEET, A SECOND ROCK GUARD PLATE IS REQUIRED EQUALLY SPACED BETWEEN THE TOP ROCK GUARD AND THE VALVE NUT.
2. EXTENSION IS REQUIRED WHEN VALVE OPERATING NUT IS GREATER THAN 24 INCHES FROM FINISHED GROUND SURFACE.



NOTES:

1. FIELD VERIFY SPOOL LENGTHS AND HYDRANT BARREL LENGTH REQUIRED AT EACH HYDRANT. NO JOINTS ALLOWED WHERE SPOOL LENGTH IS LESS THAN 18 FEET.
2. HYDRANT SHALL BE INSTALLED PLUMB.
3. KEEP DRAIN HOLES CLEAR AND FREE TO DRAIN.
4. SEE DETAILS FOR VALVE SETTING, THRUST BLOCKING, AND TRENCH.
5. HYDRANTS, VALVES AND OTHER MATERIALS SHALL BE AS SPECIFIED IN THE STANDARDS MANUAL.
6. A MINIMUM OF 36" OF CLEAR SPACE AROUND HYDRANTS IS REQUIRED PER UFC (NO POSTS, WALLS, SIGNS, ETC.). 5 FOOT MIN. DESIRED. THERE SHALL BE NO OBSTRUCTIONS DIRECTLY IN LINE WITH ANY OF THE PORTS OF A HYDRANT.
7. HYDRANT PUMPER PORT SHALL FACE DIRECTION OF ACCESS.
8. WHERE WATERMAIN IS LOCATED ON A SIGNIFICANT SLOPE, TEE AND VALVE SHALL BE MJxMJ WITH RESTRAINTS SO THAT VALVE MAY BE INSTALLED PLUMB.



ITEM	SIZE	DESCRIPTION	SPECIFICATION
1	AS REQ'D	SADDLE	FORD 202BS, ROMAC 202BS; 2" FIP TAP
2	2"	BALL CORP. STOP	MIP IN x MIP OUT; FORD FB500-7, MUELLER B-2969, McDONALD 3131B
3	2"	ELBOW	304 SS OR BRASS 90° ELBOW
4	2"	PIPE	HDPE (PE 3408), SIDR 7, 200 PSI, IPS FITTING COMPATIBLE, NSF 61
5	2"	PE PJ COUPLING	PEP PJ x MIP; FORD C86-77-IDR7, MUELLER E-15429, McDONALD 4753-33
6	2"	GATE VALVE	AWWA C509 RESILIENT WEDGE GATE VALVE, THRD. ENDS, 2" NUT
7	AS REQ'D	EXTENSION	VALVE OPERATOR EXTENSION
8	N/A	VALVE BOX	VALVE BOX AND COVER
9	2"	NIPPLE	SCH. 40 304 SS OR BRASS THRD. NIPPLE, 12" LONG
10	2"	ELBOW	304 SS OR BRASS 90° ELBOW, DRILL 1/8" HOLE FOR DRAIN
11	2"	PIPE	SCH. 40 304 SS OR BRASS PIPE AS REQ'D
12	2"	ELBOW/PLUG	304 SS OR BRASS ELBOW WITH MIP THRD. PLUG
13	2"	STIFFENER	304 STAINLESS STEEL INSERT STIFFENER

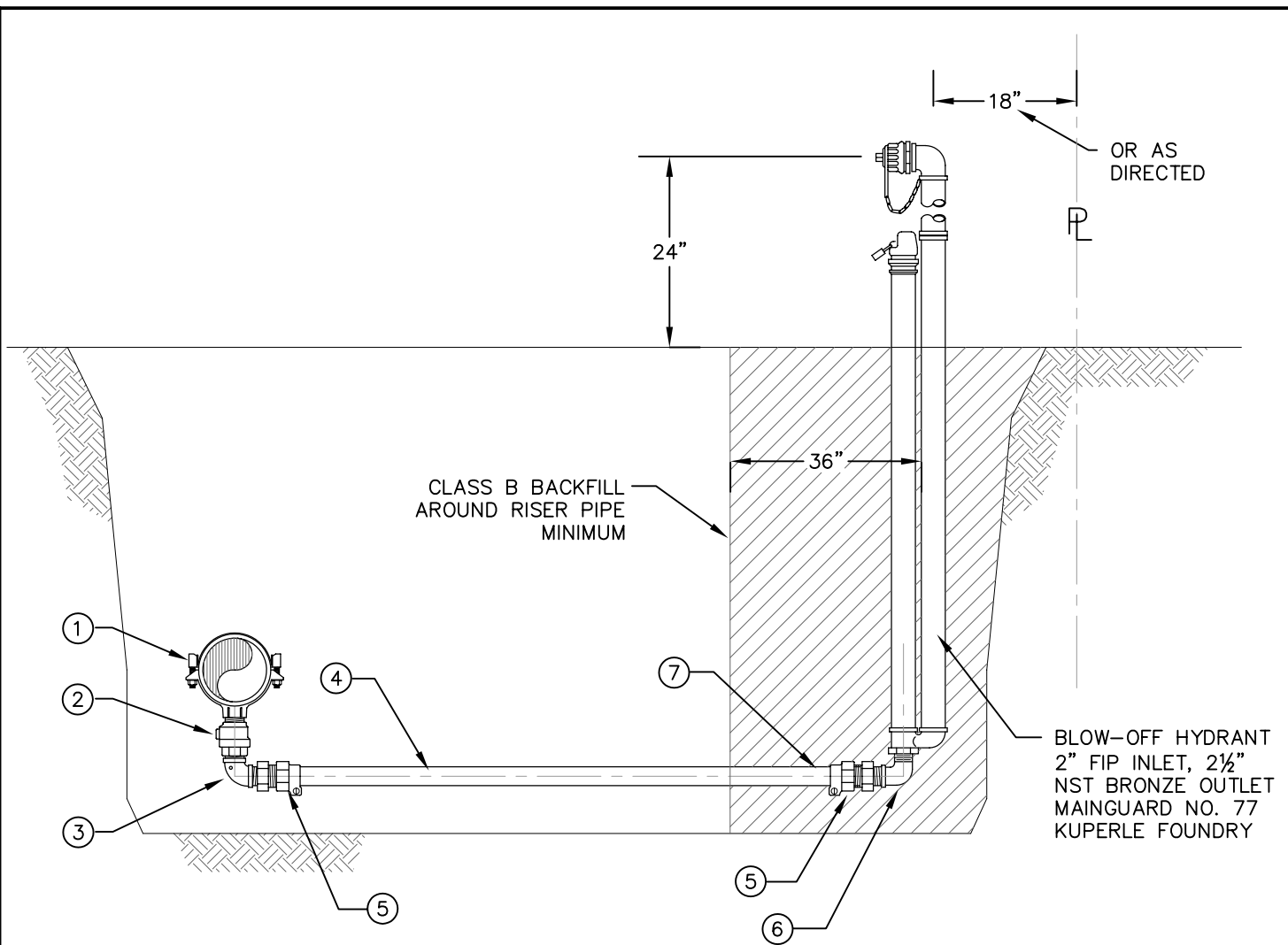
NOTES:

USE ONLY WHERE APPROVED. GENERALLY LOCATED AT LOCAL LOW POINTS IN THE PIPING SYSTEM WHERE HYDRANT IS NOT PRACTICAL. HYDRANTS OR LARGER BLOW-OFF MUST ALSO BE LOCATED NEARBY TO ALLOW PROPER FLUSHING. MAY BE ALLOWED ON 6" AND SMALLER MAINS WHERE LINE PRESSURE EXCEEDS 75 PSI.

Neskowin Regional
Water District
Tillamook County, Oregon

2" BLOW-OFF ASSEMBLY

DETAIL NO.
W-400
7/10/06

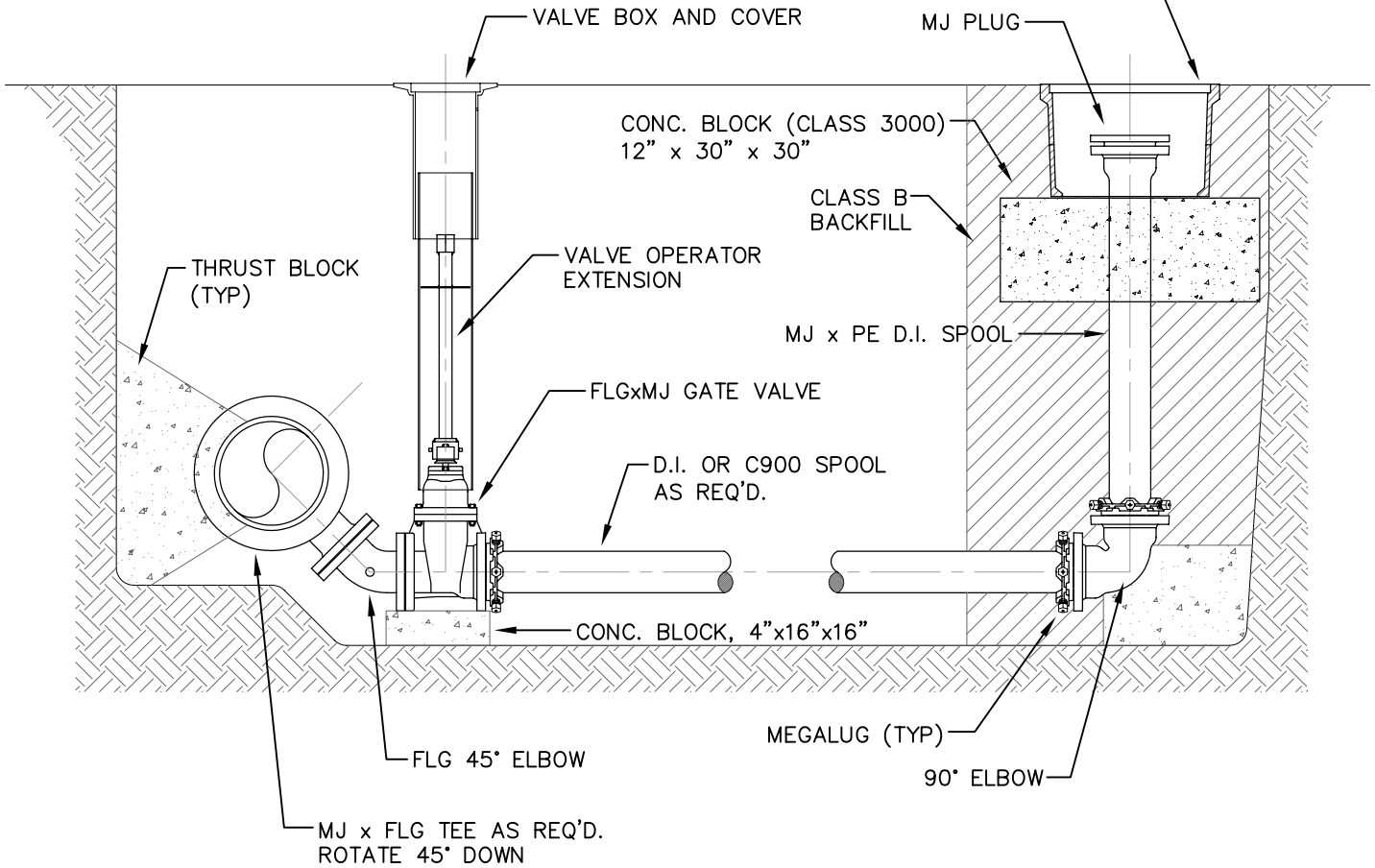


ITEM	SIZE	DESCRIPTION	SPECIFICATION
1	AS REQ'D	SADDLE	FORD/ROMAC 202BS; 2" FIP TAP
2	2"	BALL CORP. STOP	MIP IN x MIP OUT; FORD FB500-7, MUELLER B-2969, McDONALD 3131B
3	2"	ELBOW	304 SS OR BRASS ELBOW
4	2"	PIPE	HDPE (PE 3408), SIDR 7, 200 PSI, IPS FITTING COMPATIBLE, NSF 61
5	2"	PJ COUPLING	PEP PJ x MIP; FORD C86-77-IDR7, MUELLER E-15429, McDONALD 4753-33
6	2"	STREET ELBOW	304 SS OR BRASS STREET ELBOW
7	2"	STIFFENER	304 STAINLESS STEEL INSERT STIFFENER

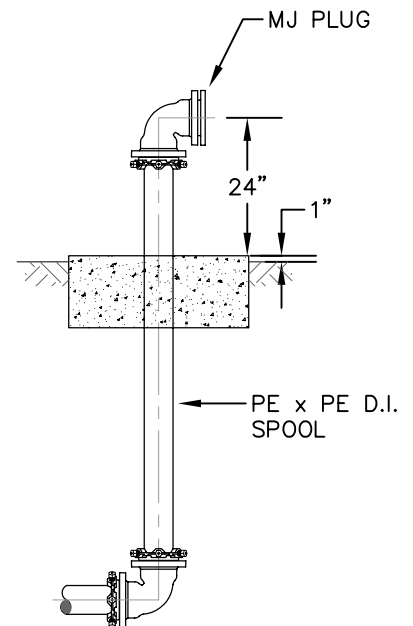
NOTES:

USE ONLY WHERE APPROVED. GENERALLY LOCATED AT LOCAL LOW POINTS IN THE PIPING SYSTEM WHERE HYDRANT IS NOT PRACTICAL. HYDRANTS OR LARGER BLOW-OFF MUST ALSO BE LOCATED NEARBY TO ALLOW PROPER FLUSHING. MAY BE ALLOWED ON 6" MAINS WHERE LINE PRESSURE EXCEEDS 75 PSI.

METER BOX (12X18X12): ARMORCAST A6001425
 COVER: ARMORCAST A6001426T
 LOCATE AS DIRECTED.

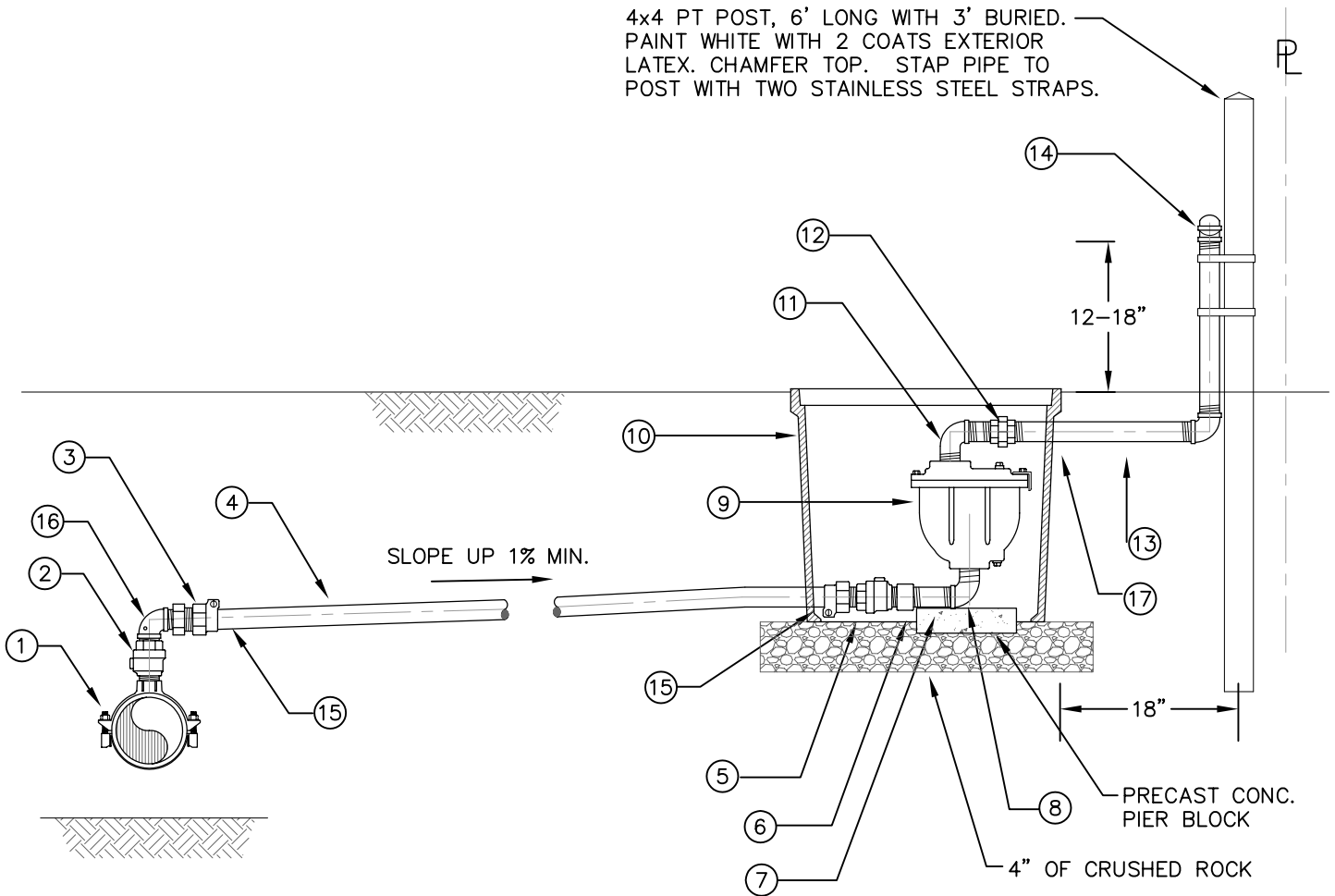


MAIN SIZE	BLOW-OFF SIZE
6"	4"
8"	4"
10"	6"
12"	6"
14"	8"
16"	8"
18"	10"
20"	10"
24"	12"



ALTERNATE EXPOSED END
 DISCHARGE AS DIRECTED

4x4 PT POST, 6' LONG WITH 3' BURIED.
 PAINT WHITE WITH 2 COATS EXTERIOR
 LATEX. CHAMFER TOP. STAP PIPE TO
 POST WITH TWO STAINLESS STEEL STRAPS.



ITEM	SIZE	DESCRIPTION	SPECIFICATION
1	AS REQ'D	SADDLE	FORD/ROMAC 202BS; 2" FIP TAP
2	2"	BALL CORP. STOP	MIP IN x MIP OUT; FORD FB500-7, MUELLER B-2969, McDONALD 3131B
3	2"	PJ COUPLING	MIP x PEP PJ; FORD C86-77-IDR7, MUELLER E-15429, McDONALD 4753-33
4	2"	PIPE	HDPE (PE 3408), SIDR 7, 200 PSI, IPS FITTING COMPATIBLE, NSF 61
5	2"	BALL CORP. STOP	PEP PACK JOINT x MIP; FORD FB1101-7, MUELLER E-25029, McDONALD 4704B-33
6	2"	COUPLING	THREADED 304 SS OR BRASS COUPLING, SHORT
7	2"	NIPPLE	THREADED 304 SCH. 40 SS OR BRASS NIPPLE, 6" LONG
8	2"	STREET ELBOW	304 SS OR BRASS 90° STREET ELBOW
9	2"	CAV	COMBINATION AIR VALVE; VAL-MATIC 202C, APCO 145C
10	17"X30"X28"	VAULT	ARMORCAST A6001640TAPCX28 WITH COVER A6001947T
11	2"	STREET ELBOW	304 SS OR BRASS 90° STREET ELBOW AND SHORT SS OR BRASS NIPPLE
12	2"	UNION	STAINLESS STEEL OR BRASS UNION
13	2"	VENT PIPE	SS OR BRASS PIPE AND FITTINGS AS SHOWN
14	2"	TEE VENT	ALUMINUM T-VENT, 20 MESH SS SCREEN, MORRISON BROS. FIG 155
15	2"	STIFFENER	304 STAINLESS STEEL INSERT STIFFENER
16	2"	ELBOW	304 STAINLESS STEEL OR BRASS ELBOW
17	2"	HOLE	CORE DRILL HOLE IN BOX FOR TIGHT FIT AT PIPE USE LINK-SEAL IF NECESSARY TO PREVENT MOVEMENT AND DIRT

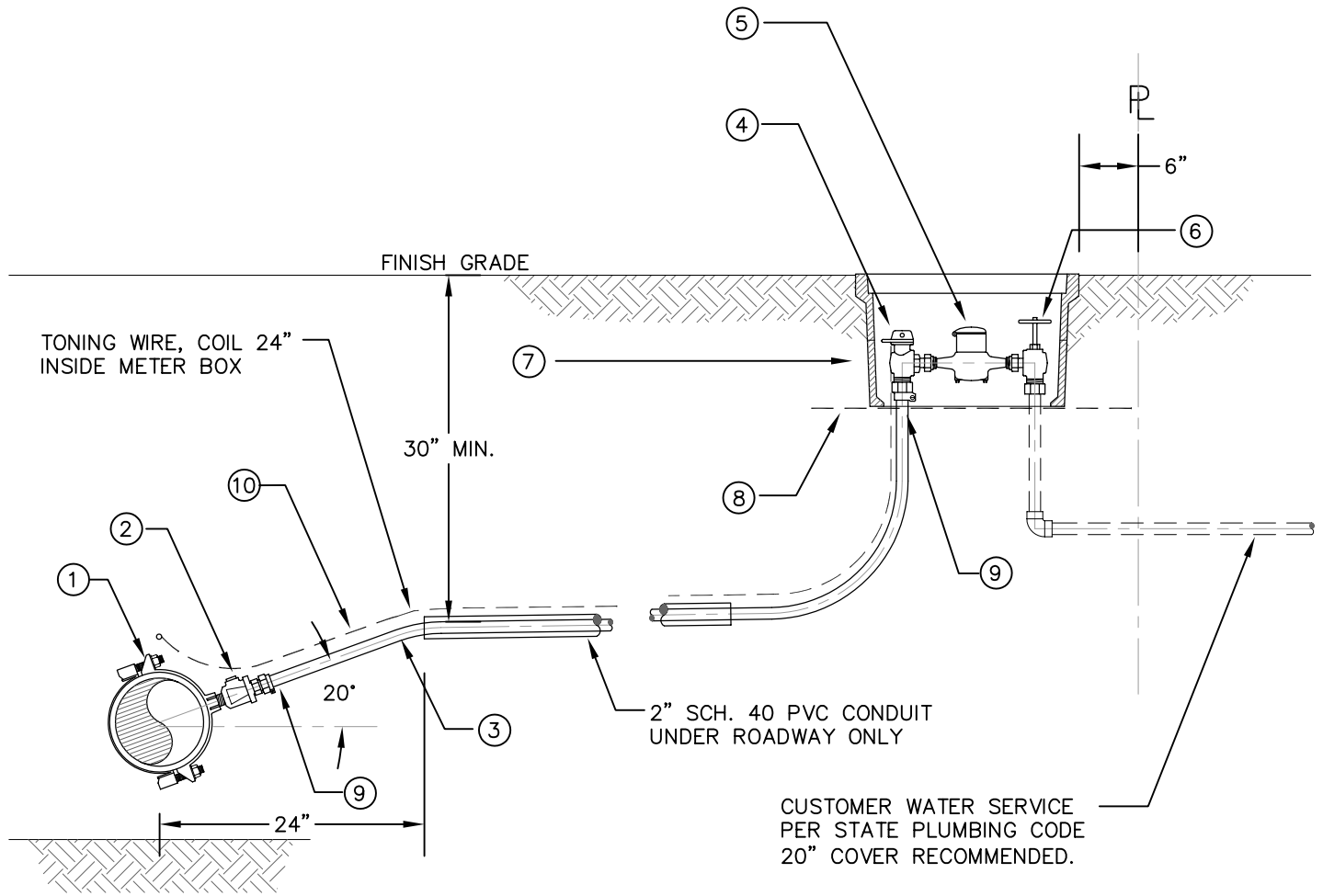
Neskowin Regional
 Water District
 Tillamook County, Oregon

2" COMBINATION AIR
 VALVE ASSEMBLY

DETAIL NO.

W-500

7/10/06



ITEM	SIZE	DESCRIPTION	SPECIFICATION
1	AS REQ'D	SADDLE	FORD/ROMAC 202BS; 3/4" FIP TAP
2	3/4"	BALL CORP. STOP	MIP x PEP PJ; FORD FB1101-3, MUELLER E-25029, McDONALD 4704B-33
3	3/4"	SERVICE PIPE	HDPE (PE 3408), SIDR 7, 200 PSI, IPS FITTING COMPATIBLE, NSF 61
4	3/4"	ANGLE BALL METER VALVE	3/4" PEP PACK JOINT INLET x METER SWIVEL NUT OUTLET FORD BA63-332W, MUELLER E-24259, McDONALD 4602B-33
5	5/8" x 3/4"	WATER METER	SENSUS SR-II, GALLON READ (NRWD SUPPLIES)
6	3/4"	SERVICE VALVE ANGLE GLOBE	METER SWIVEL NUT INLET X 3/4" FIP OUTLET FORD GA13-332 (NRWD SUPPLIES)
7	12"x20"x12"	METER BOX	ARMORCAST A6000485, A6000484TDQ (COVER), A6000487T (DROP-IN)
8	16" x 24"	FELT PAPER	90-LB FELT PAPER, ASPHALT SATURATED
9	3/4"	STIFFENER	304 STAINLESS STEEL INSERT STIFFENER
10	10 GA.	TRACER WIRE	10 GA. COPPER WIRE WITH BLUE 30 MIL THICK HDPE INSULATION
			METER BOX/COVER: POLYMER CONCRETE, DROP-IN LID: DUCTILE IRON
			SEE W-150 FOR TRENCH DETAILS

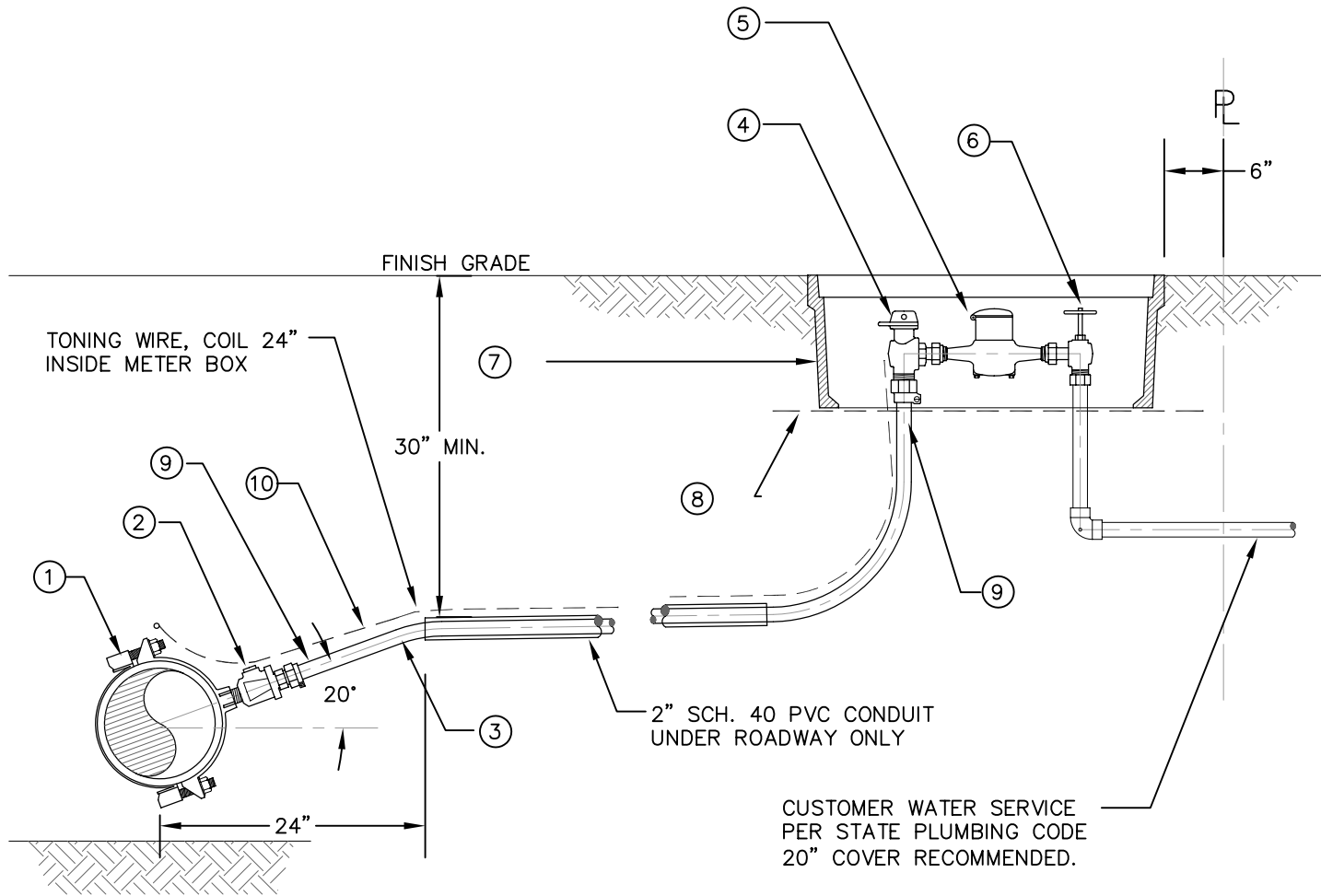
Neskowin Regional
Water District
Tillamook County, Oregon

**STANDARD 3/4" WATER
SERVICE CONNECTION**

DETAIL NO.

W-600

8/02/06



ITEM	SIZE	DESCRIPTION	SPECIFICATION
1	AS REQ'D	SADDLE	FORD/ROMAC 202BS; 1" FIP TAP
2	1"	BALL CORP. STOP	MIP x PEP PJ; FORD FB1101-4, MUELLER E-25029, McDONALD 4704B-33
3	1"	SERVICE PIPE	HDPE (PE 3408), SIDR 7, 200 PSI, IPS FITTING COMPATIBLE, NSF 61
4	1"	ANGLE BALL METER VALVE	PEP PACK JOINT INLET x METER SWIVEL NUT OUTLET FORD BA63-444W, MUELLER E-24259, McDONALD 4602B-33
5	1"	WATER METER	SENSUS SR-II, GALLON READ (NRWD SUPPLIES)
6	1"	SERVICE VALVE ANGLE GLOBE	METER SWIVEL NUT INLET X FIP OUTLET FORD GA13-444 (NRWD SUPPLIES)
7	17"x30"x12"	METER BOX	ARMORCAST A6001640PCX12, A6001947TDZ (COVER), A6000482T (DROP-IN)
8	24" x 36"	FELT PAPER	90-LB FELT PAPER, ASPHALT SATURATED
9	1"	STIFFENER	304 STAINLESS STEEL INSERT STIFFENER
10	10 GA.	TRACER WIRE	10 GA. COPPER WIRE WITH BLUE 30 MIL THICK HDPE INSULATION
			METER BOX/COVER: POLYMER CONCRETE, DROP-IN LID: DUCTILE IRON
			SEE W-150 FOR TRENCH DETAILS

Neskowin Regional
Water District
Tillamook County, Oregon

STANDARD 1" WATER SERVICE CONNECTION

DETAIL NO.

W-605

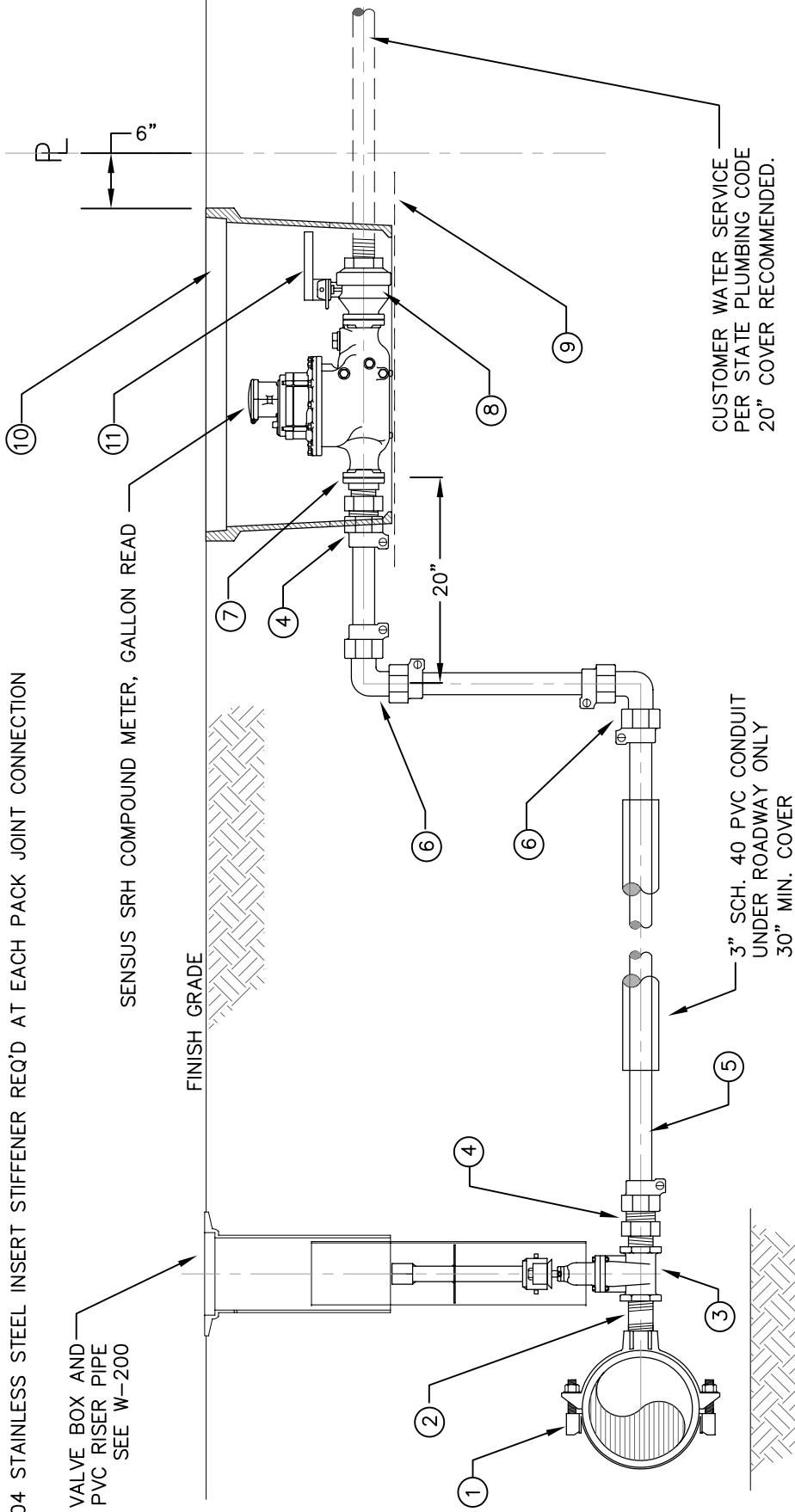
8/02/06

SEE W-150 FOR TRENCH DETAILS
304 STAINLESS STEEL INSERT STIFFENER REQ'D AT EACH PACK JOINT CONNECTION

VALVE BOX AND
PVC RISER PIPE
SEE W-200

SENSUS SRH COMPOUND METER, GALLON READ

FINISH GRADE



CUSTOMER WATER SERVICE
PER STATE PLUMBING CODE
20" COVER RECOMMENDED.

ITEM	SIZE	DESCRIPTION	SPECIFICATION
1	AS REQ'D	SADDLE	FORD/ROMAC 202BS; 2" FIP TAP
2	2"	NIPPLE	BRASS OR 304 SS NIPPLE, MIPxMIP, 4" LONG
3	2"	GATE VALVE	AWWA C509 RESILIENT WEDGE GATE VALVE, THRD. ENDS, 2" NUT
4	2"	PJ COUPLING	MIP x PEP PJ; FORD C86-77-IDR7, MUELLER E-15429, McDONALD 4753B-33
5	2"	SERVICE PIPE	HDPE (PE 3408), SIDR 7, 200 PSI, IPS FITTING COMPATIBLE, NSF 61
6	2"	PJ ELBOW	PEP PACK JOINT ELBOW; FORD L66-77-IDR7, McDONALD 4761-33
7	2"	ADAPTER	METER FLANGE x 2" FIP OUTLET; FORD CF31-77, McDONALD 610F
8	2"	BALL METER VALVE	METER FLG x FIP; FORD BF13-77W; MUELLER B-24337, McDONALD 6101M
9	24" x 36"	FELT PAPER	90-LB FELT PAPER, ASPHALT SATURATED
10	17" x 30" x 18"	METER BOX	ARMORCAST A6001640PCX18; A6001947TDZ (COVER), A6000482T (DROP-IN)
11	N/A	HANDLE	BALL VALVE HANDLE; FORD HB-67S, McDONALD 6120BS

Neskowin Regional
Water District
Tillamook County, Oregon

STANDARD 2" WATER
SERVICE CONNECTION

DETAIL NO.

W-608

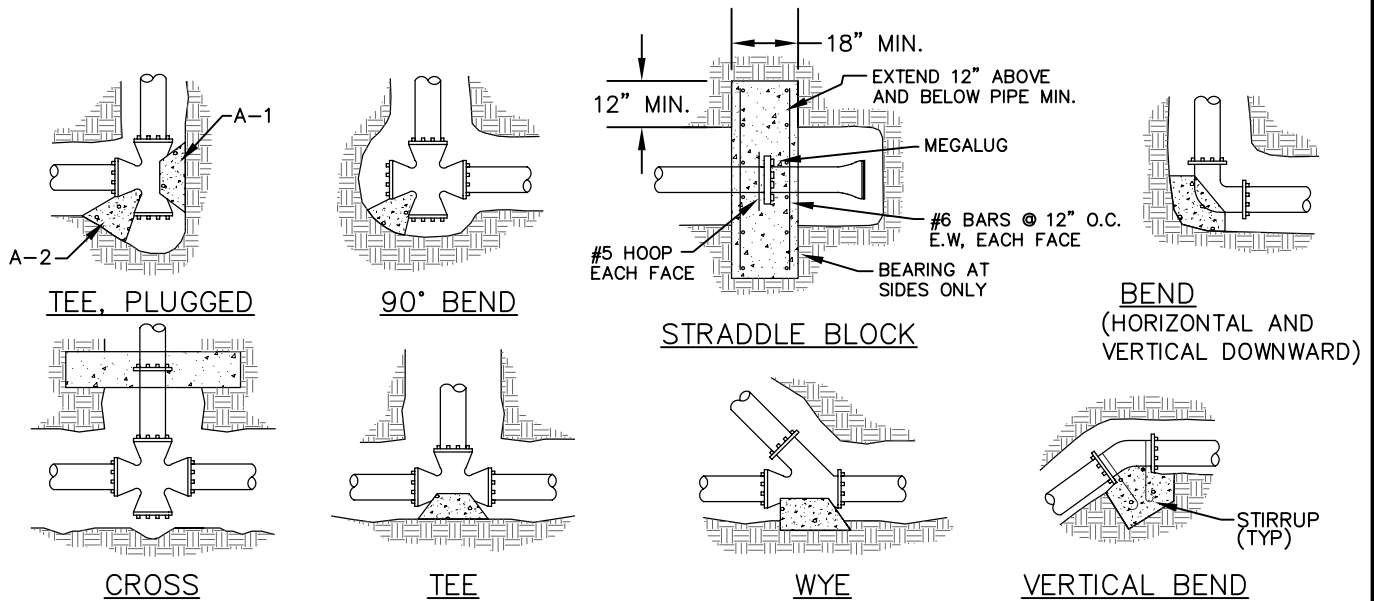
7/14/06

(HORIZONTAL)
BEARING AREA OF THRUST BLOCKS
IN SQUARE FEET

(VERTICAL UP)
VOLUME OF THRUST
BLOCK IN CUBIC YARDS

FITTING SIZE	TEE, WYE, DEAD END, AND HYDRANT	STRADDLE BLOCK	90° BEND	TEE PLUGGED ON RUN		45° BEND	22-1/2° BEND	11-1/4° BEND	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND
				A-1	A-2							
4	1.0	1.0	1.4	1.0	1.4	0.8	0.4	0.2	0.82	0.45	0.23	0.11
6	2.1	2.1	3.0	2.1	3.0	1.6	0.9	0.5	1.85	1.00	0.51	0.26
8	3.8	3.8	5.4	3.8	5.4	2.9	1.5	0.8	3.29	1.78	0.91	0.46
10	5.9	5.9	8.4	5.9	8.4	4.5	2.3	1.2	5.14	2.78	1.42	0.71
12	8.5	8.5	12.0	8.5	12.0	6.5	3.3	1.7	7.40	4.01	2.04	1.03
14	11.6	11.6	16.4	11.6	16.3	8.9	4.5	2.3	10.08	5.45	2.78	1.40
16	15.1	15.1	21.4	15.1	21.3	11.6	5.9	3.0	13.16	7.12	3.63	1.82
18	19.1	19.1	27.0	19.1	27.0	14.6	7.5	3.8	16.66	9.02	4.60	2.31
20	23.6	23.6	33.3	23.6	33.3	18.1	9.2	4.7	20.57	11.13	5.67	2.85
24	34.0	34.0	48.0	34.0	48.0	26.0	13.3	6.7	29.62	16.03	8.17	4.11

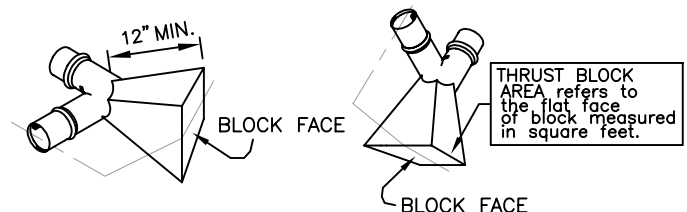
ABOVE BEARING AREAS BASED ON TEST PRESSURE OF 150 PSI AND AN ALLOWABLE SOIL BEARING STRESS OF 2000 POUNDS PER SQUARE FOOT. DESIGNER IS CAUTIONED TO ENSURE THAT 2000 PSF BEARING IS AVAILABLE.

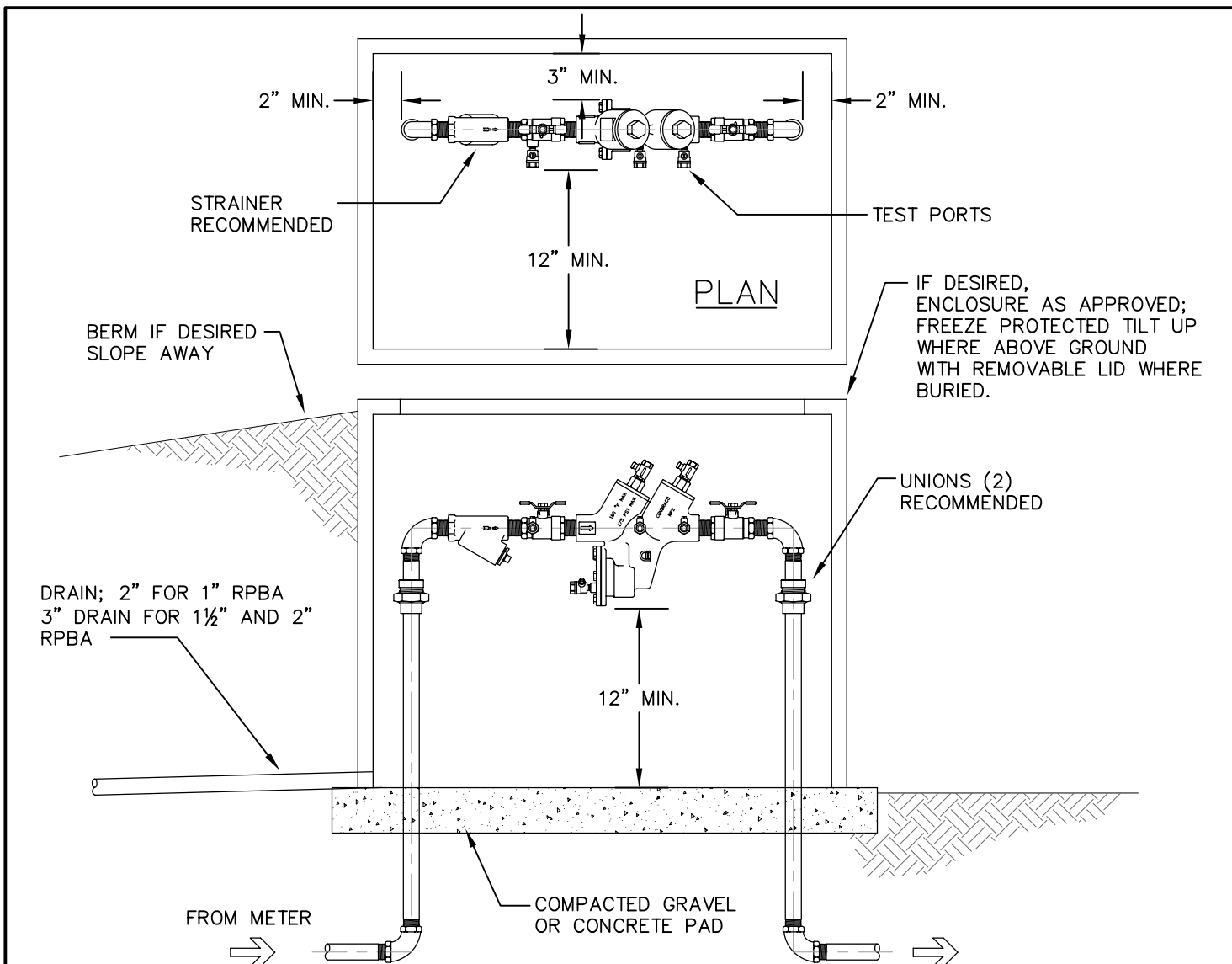


NOTES:

1. CONCRETE BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.
2. ALL CONCRETE TO BE CLASS 3000 MINIMUM.
3. INSTALL 6 MIL PLASTIC BETWEEN PIPE AND/OR FITTINGS BEFORE POURING CONCRETE BLOCKING.
4. CONCRETE SHALL BE KEPT CLEAR OF ALL JOINTS AND ACCESSORIES.
5. TIE RODS SHALL BE DEFORMED GALVANIZED COLD ROLLED STEEL, 40000 PSI TENSILE STRENGTH (ASTM A615) COAT WITH COAL TAR EPOXY AFTER INSTALLATION.
6. BEARING AREA REQ'D AT REDUCERS IS THE DIFFERENCE BETWEEN VALUES FOR DEAD END FOR EACH END SIZE (IE 6x8 = 3.8-2.1 = 1.7 S.F.)

RODS FOR VERTICAL BENDS		
FITTING SIZE	ROD SIZE	EMBEDMENT
10" AND LESS	#5	17"
12"-16" (11.25')	#5	17"
12"-16" (22.5')	#7	24"
12" (45')	#7	24"
14"-16" (45')	#9	30"





1. RPBA MUST BE INSTALLED ABOVE NATURAL GROUND, BUT MAY HAVE A BERM AROUND ENCLOSURE.
2. BOTTOM AND SIDE CLEARANCES ALSO APPLY WHEN ASSEMBLIES ARE INSTALLED INSIDE BUILDING.
3. RPBA's SHALL ALWAYS BE INSTALLED IN HORIZONTAL ORIENTATION UNLESS DEVICE SPECIFICALLY APPROVED FOR VERTICAL INSTALLATION.
4. RPBA's SHALL ALWAYS BE INSTALLED ABOVE THE 100 YEAR FLOOD LEVEL UNLESS OTHERWISE APPROVED.
5. RELIEF VALVES SHALL NOT BE PLUGGED OR EXTENDED.
6. PROVIDE PROTECTION FROM FREEZING.
7. RPBA's SHALL NOT BE INSTALLED IN AN ENCLOSURE UNLESS AN AIR-GAPPED DRAIN TO DAYLIGHT IS PROVIDED AND BRASS OR PLASTIC PLUGS ARE PROVIDED IN ALL TEST PORTS. DRAIN SHALL BE BORE SIGHTED SLOPING 1/8" PER FOOT MIN.
8. MAXIMUM HEIGHT OF INSTALLATION SHALL NOT EXCEED 5 FEET FOR ASSEMBLY UNLESS THERE IS A PERMANENT PLATFORM INSTALLED IN ACCORDANCE WITH OCCUPATIONAL SAFETY AND HEALTH (OSHA) STANDARDS TO FACILITATE SERVICING THE ASSEMBLY.
9. LOCATION OF DEVICE SHALL BE AS DIRECTED BY NRWD. GENERALLY LOCATED AS CLOSE TO MAIN CONNECTION AS POSSIBLE, IMMEDIATELY AFTER WATER METER.
10. INSTALLATION MAY CREATE CLOSED SYSTEM. CONSULT LOCAL PLUMBING CODES.

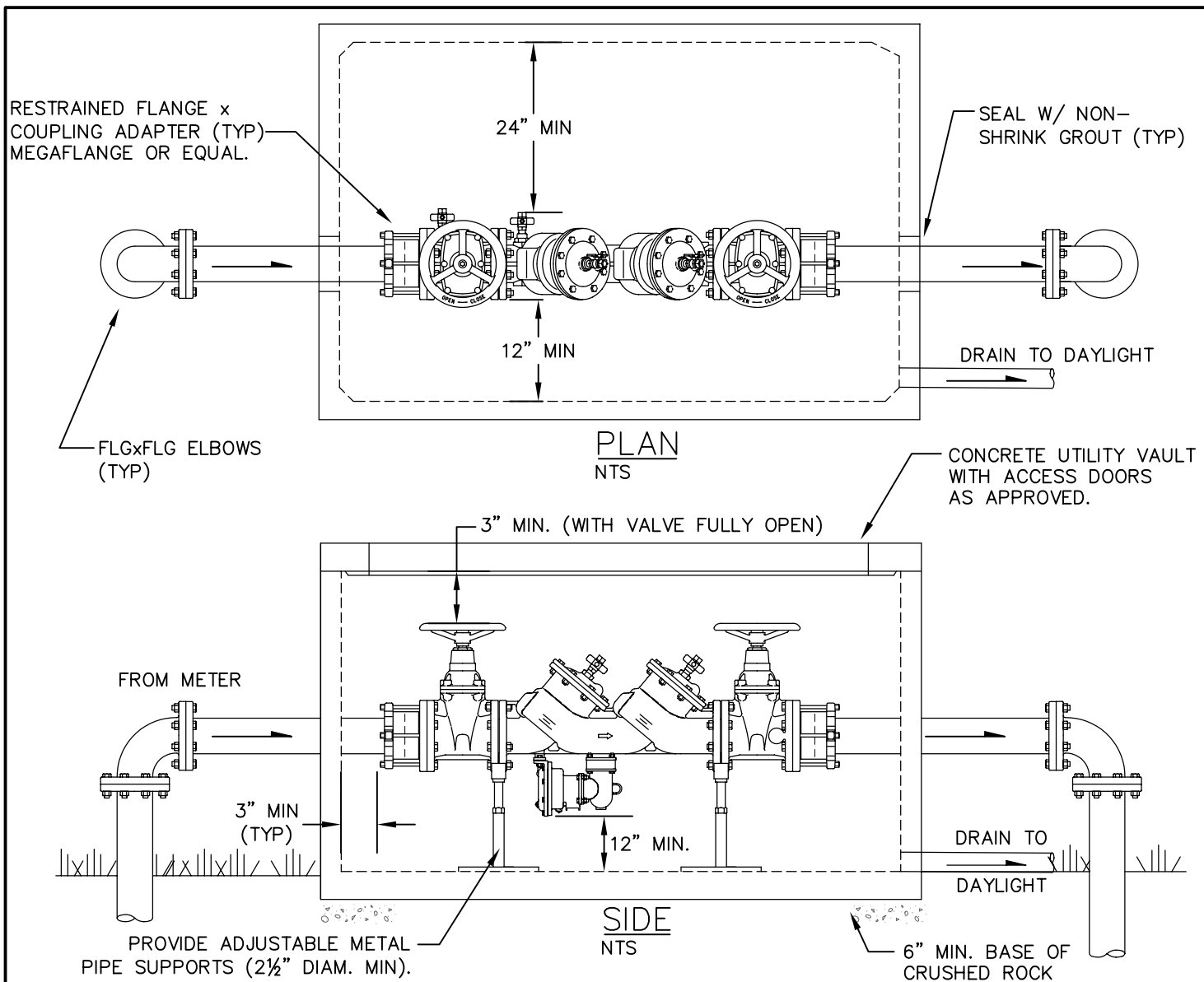
Neskowin Regional
Water District
Tillamook County, Oregon

REDUCED PRESSURE BACKFLOW ASSEMBLY (3/4" - 2")

DETAIL NO.

W-800

7/11/06



1. ASSEMBLY SHALL NOT BE SUBJECT TO FLOODING.
2. RPBA SHALL BE INSTALLED ABOVE THE 100 YEAR FLOOD LEVEL, UNLESS OTHERWISE APPROVED.
3. RPBA's ARE TYPICALLY INSTALLED ABOVE-GRADE IN WELL-DRAINED AREAS, BUT MAY BE INSTALLED BELOW-GRADE IN VAULT IF AN ADEQUATE AIR-GAPPED, BORE-SIGHTED DRAIN (SLOPE 1/8"/FT.) TO DAYLIGHT IS PROVIDED.
4. DRAIN LINES SHALL BE SIZED TO ACCOMODATE FULL RELIEF VALVE DISCHARGE FLOW.
5. CLEARANCES ALSO APPLY WHEN ASSEMBLIES ARE INSTALLED INSIDE BUILDING.
6. BRASS OR PLASTIC TEST PORT PLUGS ARE REQUIRED FOR ALL VAULT INSTALLATIONS.
7. ALL EXPOSED PIPE AND FITTINGS SHALL BE DUCTILE IRON.
8. RPBA SHALL BE INSTALLED HORIZONTALLY UNLESS DEVICE IS SPECIFICALLY APPROVED FOR VERTICAL INSTALLATION.
9. PROVIDE PROTECTION FROM FREEZING.
10. DO NOT PLUG OR EXTEND RELIEF VALVES.
11. MAXIMUM HEIGHT OF INSTALLATION SHALL NOT EXCEED 5 FEET UNLESS THERE IS A PERMANENTLY INSTALLED PLATFORM MEETING OSHA STANDARDS TO FACILITE SERVICING THE ASSEMBLY.
12. LOCATION OF DEVICE SHALL BE AS DIRECTED BY NRWD. GENERALLY LOCATED AS CLOSE TO MAIN CONNECTION AS POSSIBLE, IMMEDIATELY AFTER WATER METER.

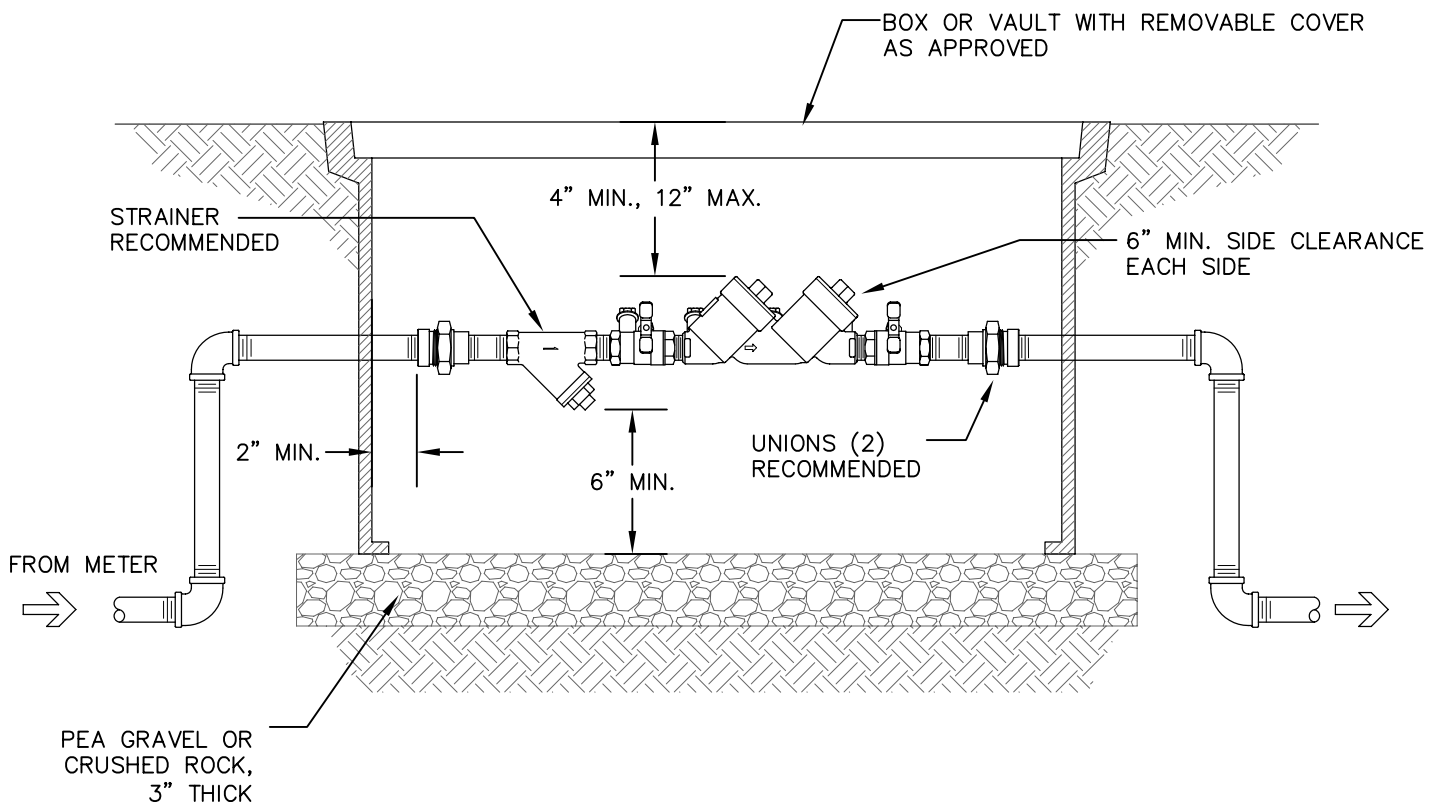
Neskowin Regional
Water District
Tillamook County, Oregon

REDUCED PRESSURE
BACKFLOW ASSEMBLY (2 1/2" UP)

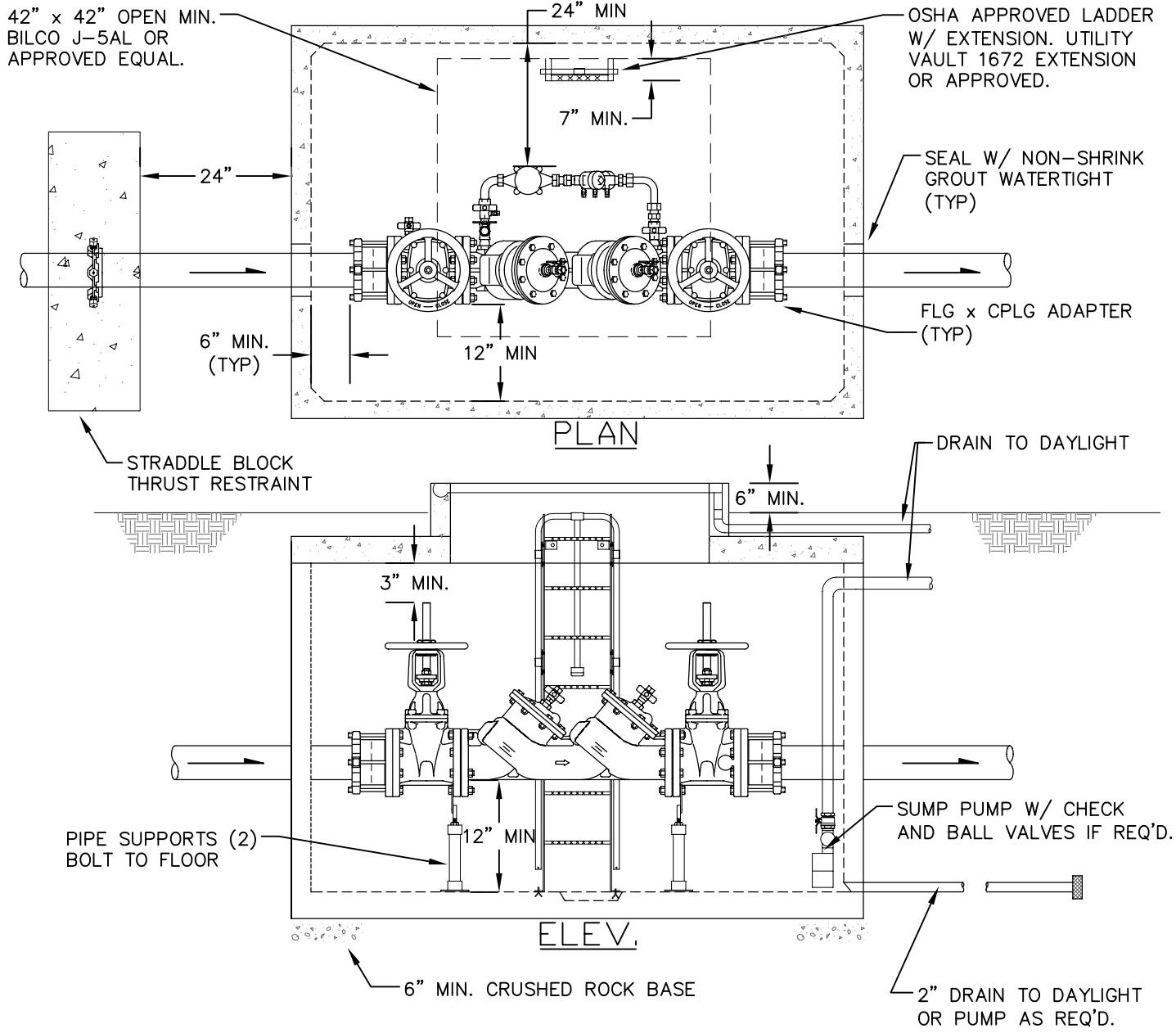
DETAIL NO.

W-805

7/11/06



1. PROTECTION FROM FREEZING SHALL BE PROVIDED.
2. DCVAs MAY BE INSTALLED BELOW GRADE IN A BOX OR VAULT WITH BRASS OR PLASTIC PLUGS PROVIDED IN ALL TEST PORTS AND ASSEMBLY IS NOT TO BE SUBJECT TO CONTINUOUS IMMERSION.
3. DCVAs SHALL BE PROVIDED WITH ADEQUATE AIR-GAPPED DRAINAGE. DRAIN SHALL NOT BE CONNECTED TO SANITARY OR STORM DRAIN SYSTEMS.
4. LOCATE AS DIRECTED AS CLOSE TO MAINLINE CONNECTION AS POSSIBLE. GENERALLY LOCATED IMMEDIATELY AFTER WATER METER.
5. MAY BE INSTALLED VERTICALLY IF INTERNALLY SPRING LOADED, HAS NORMAL FLOW UPWARD, AND IS RECOMMENDED BY MANUFACTURER FOR VERTICAL INSTALLATION.
6. CLEARANCES SHALL ALSO APPLY WHEN INSTALLED INSIDE BUILDING.
7. SHALL NOT BE INSTALLED AT A HEIGHT GREATER THAN 5 FEET UNLESS THERE IS A PERMANENTLY INSTALLED PLATFORM MEETING OSHA STANDARDS TO FACILITATE SERVICING THE ASSEMBLY.
8. INSTALLATION OF A BACKFLOW ASSEMBLY MAY CREATE A CLOSED SYSTEM. CONSULT LOCAL PLUMBING CODES FOR PRESSURE RELIEF VALVE AND THERMAL EXPANSION REQUIREMENTS.
9. USE ONLY DEVICES LISTED ON CURRENT LIST OF STATE APPROVED DEVICES.



NOTE:

1. FOR FIRE LINE INSTALLATIONS. SUBMIT DETAIL DRAWING AND SPECS FOR APPROVAL.
2. ASSEMBLY SHALL NOT BE SUBJECT TO FLOODING.
3. DCDAs ARE TYPICALLY INSTALLED BELOW-GRADE. DRAIN TO DAYLIGHT OR PUMP AS REQUIRED.
4. PUMP SHALL HAVE MIN. CAPACITY OF 5 GPM. DRAIN SHALL HAVE BACKWATER VALVE AND RODENT SCREEN.
5. BRASS OR PLASTIC PLUGS ARE REQUIRED FOR ALL TESTING PORTS.
6. DOMESTIC SERVICE SHALL NOT BE INSTALLED OFF THE FIRE SERVICE UNLESS APPROVED.
7. VAULTS SHALL BE PRECAST CONCRETE AS REQUIRED.
8. ALL EXPOSED PIPE AND FITTINGS SHALL BE DUCTILE IRON.
9. LOCATE AS DIRECTED BY NRWD. GENERALLY LOCATED AS CLOSE TO MAIN CONNECTION AS POSSIBLE, IMMEDIATELY AFTER WATER METER.

Neskowin Regional
Water District
Tillamook County, Oregon

**DOUBLE CHECK DETECTOR
ASSEMBLY (2 1/2" UP)**

DETAIL NO.

W-905

7/11/06