

CITY OF NORTH BEND

KING COUNTY

WASHINGTON



PUBLIC WORKS STANDARDS

G&O #18484
JUNE 2018



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PUBLIC WORKS STANDARDS

CITY OF NORTH BEND

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June 2018

NORTH BEND PW STANDARDS

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REFERENCE DOCUMENTS

Performance and Maintenance Bond Agreement
Performance and Maintenance Assignment of Funds Agreement
Utility Easement
Pre-Application Checklist
Plan Review Checklist
Final Inspection Checklist
Submittal Standards
Small Site TESC Plan
Small Site Storm Drainage Handout
Site Development Checklist

SECTION 1

INTRODUCTION

SECTION 1 INTRODUCTION

1.01 Application

These Standards shall apply to all improvements within the public right-of-way and/or public easements, to all improvements required within the proposed public right-of-way of new subdivisions, for all improvements intended for ownership, operation and maintenance by the City and for all other improvements (on or offsite) for which the City of North Bend Municipal Code (NBMC) requires approval from the City Administrator, Public Works Director, City Engineer, Director of Planning and Community Development, and/or the City Council. These standards also apply to new streets, street improvements, or other infrastructure improvements that will remain privately owned. These Standards are intended as guidelines for designers and developers in preparing their plans and for the City in reviewing plans. Where minimum values are stated, greater values should be used whenever practical; where maximum values are stated, lesser values should be used where practical. The developer is, however, cautioned that higher standards, additional studies, and/or environmental mitigation measures may, and will, in all likelihood, be imposed by the City when developing on, in, near, adjacent, or tributary to critical areas to include, but not be limited to, erosion, flood, steep slope, landslide, and seismic hazards; and streams and wetlands.

Alternate designs will be accepted when it can be shown, to the satisfaction of the City, that such alternate designs will provide a design equal to or superior to that specified. In evaluating the alternate design, the City shall consider appearance, operations, durability, maintenance, public safety, and other appropriate factors.

Any improvements not specifically covered herein by these Standards must meet or exceed, as determined by the Public Works Director, the current edition of the Washington State Department of Transportation (WSDOT) Standard Specifications for Road, Bridge & Municipal Construction, revised as to form to make reference to Local Governments. Said specifications shall be referred to hereafter as the "Standard Specifications".

Where improvements are not covered by these Standards nor by the WSDOT Standard Specifications or Standard Plans, the City will establish appropriate standards in its sole reasonable discretion, in a manner consistent with sound engineering practice and judgment. Where these Standards conflict with any existing City code or discrepancies exist within the body of this text, the higher standards shall be utilized as determined by the Public Works Director.

Improvements in the public right-of-way or within public easements, and any other improvements to be dedicated to the City, shall be included as a written condition of application approval or shall otherwise require the advance written approval of the City.

The designer shall submit calculations or other appropriate materials supporting the design of utilities, pavements, and storm drainage facilities. The designer shall submit calculations for structures and other designs when requested by the Public Works Director and/or Building Official.

1.02 Definitions

Definitions: As used herein:

- (a) "ADA" means the Americans with Disabilities Act (ADA) of 1990. 42 USC 12101 et seq with implementing regulations. See ADA Home Page: <http://www.ada.gov>

- (b) “City” means the City of North Bend, Washington, King County, a municipal corporation, existing under and by virtue of the laws of the State of Washington.
- (c) “City Administrator” means the City’s duly appointed City Administrator or his/her authorized representative.
- (d) “Contractor” means the Developer's contractor or subcontractor.
- (e) “Details or Additional Drawings” means all details or drawings prepared to further explain or clarify the plans, or for the revision of the same, all as herein provided.
- (f) “Developer” means any person, firm, partnership, association, joint venture, or corporation or any other entity responsible for a given project, for which an approval is required from the City. The term shall also include the Developer’s contractor employed to do the work or the contractor's employees.
- (g) “Development” means the construction, reconstruction, conversion, structural alteration, relocation, enlargement, or change in use of any structure or property, or any project which will increase vehicle trips per day during peak hour traffic, or any project which negatively impacts the service level, safety, or operational efficiency of serving roads, utilities, and storm drainage systems.
- (h) “Developers Agreement” means any written agreement such as SEPA mitigation conditions, conditions of approval for subdivisions, conditions associated with any permit, approved plans, Developer Extension Agreement, and any other written agreement between the City and a Developer.
- (i) “Director” means the City’s duly appointed Director of Public Works, or his/her authorized representative.
- (j) “Engineer” means the City’s Engineer, whether a staff engineer or consultant.
- (k) “Equipment” means the machinery, accessories, appurtenances and manufactured articles to be furnished and/or installed under the Project.
- (l) “Infrastructure Maintenance Manager” means the City's utilities superintendent, or operations and maintenance supervisor, or Public Works Director.
- (m) “Maintenance Surety,” “Maintenance Bond,” or “Guarantee Bond” means a surety furnished by the Developer and written by a corporate body qualified to write surety in the State of Washington, guaranteeing that the Developer will repair any defects found in the work within the time period as further identified herein.
- (n) “Material or Materials” shall be construed to embrace machinery, manufactured articles, materials of construction (fabricated or otherwise) and any other classes of material to be furnished in connection with the Project.
- (o) “Multiple Use Building” means a building, or set of buildings with multiple tenant spaces, not including residential-only structures, served by a shared domestic water service, example strip malls.

- (p) “Or Equal” means any manufactured article, material, method, or work which, in the opinion of the Engineer, is equally desirable or suitable for the purposes intended in these standards as compared with similar articles specifically mentioned herein.
- (q) “Performance Surety” or “Performance Bond” means a surety furnished by the Developer and written by a corporate body qualified to write surety in the State of Washington, guaranteeing that the work will be completed in accordance with the plans and specifications.
- (r) “Permittee” means any party applying for or having received a permit.
- (s) “Plans” mean drawings, including reproductions thereof, of the work to be done as an extension to the City's public roads and utilities, prepared by an engineer licensed in the State of Washington.
- (t) “Plumbing Code” means the Uniform Plumbing Code as adopted by City of North Bend City Council, together with amendments, additions, and exemptions per NBMC 15.20.
- (u) “Premise Isolation” means a method of protecting the public water system by installation of approved air gaps or approved backflow prevention assemblies at or near the service connection or alternative location acceptable to the purveyor to isolate the consumer’s water system from the purveyor’s distribution system.
- (v) “Project” means the structure or improvement to be constructed in whole or in part.
- (w) “Reference Specifications” means the technical specifications of other agencies incorporated or referred to herein.
- (x) “Reviewing Agency” means the City of North Bend.
- (y) “Special Provisions” means the directions, provisions, and requirements designated by an engineer licensed in the State of Washington for the performance of the work and for the quantity and quality of materials, as contained or referenced herein.
- (z) “Specifications” shall mean the prescribed directions, requirements, explanations, terms and provisions pertaining to the various features of the work to be done, or manner and method of performance. They also include directions, requirements, and explanations as set forth on the plans.
- (aa) “Standard Details” means the City of North Bend standard detail drawings.
- (bb) “Standard Plans” means the current editions of the Standard Plans, Washington State Department of Transportation.
- (cc) “Standard Specifications” means the current edition of the Standard Specifications for Road, Bridge and Municipal Construction”, English edition, Washington State Department of Transportation, including all amendments.
- (dd) “Unapproved Auxiliary Supply” means a water supply (other than the purveyor’s water supply) on or available to the consumer’s premises that is either not approved for human consumption by the health department or is not otherwise acceptable to the purveyor. Sites with unapproved auxiliary supplies require premise isolation.

- (ee) “Words and Phrases.” Whenever the words, “as directed”, “as required”, “as permitted”, or words of like effect are used, it shall be understood that the direction, requirement or permission of the Engineer is intended. The words, “sufficient”, “necessary”, “proper”, and the like shall mean sufficient, necessary or proper in the judgment of the Engineer. The words, “approved”, “acceptable”, “satisfactory”, or words of like import shall mean approved by or acceptable to the Engineer.
- (ff) “Work” means the labor or materials or both, superintendence, equipment, transportation, and other facilities necessary to complete the Project.

1.03 Developer to be Informed

The Developer is deemed to be fully informed regarding the nature, quality, and the extent of the work to be done, and, if in doubt, to seek additional guidance from the City.

1.04 Authority of the City Administrator

The City Administrator or his/her authorized representative shall have the authority to stop work whenever development is being done contrary to the provisions of the Standards, City code, or regulation of the city; and shall have authority to reject work and materials which do not conform and to decide questions which may arise in the execution of the work and have the authority to determine the amount, quality, acceptability and fitness of the several kinds of work, material and equipment and to decide all questions relative to the classification of materials and compliance with the Standards, and to reject or condemn all work or material which does not conform to the provisions herein.

Any material errors or material omissions in the approved plans or information used as a basis for such approvals may constitute grounds for withdrawal of any approvals and/or stoppage of any or all of the permitted work, as determined in the sole reasonable discretion of the City. It shall be the responsibility of the Developer to show cause why such work should continue, and to otherwise make such changes in plans that may be required by the City before the plans are re-approved.

Moreover, the City has not so delegated, and the City Administrator or his/her authorized representative(s) does (do) not purport to be a safety expert, is not so engaged in that capacity under the Contract, and has neither the authority nor the responsibility to enforce construction safety laws, rules, regulations or procedures, or to order the stoppage of work for claimed violations thereof. The furnishing by the City of resident project representation and/or inspection shall not be construed by the Contractor or Developer that the City is responsible for the identification or enforcement of such laws, rules, or regulations.

1.05 Payment for City Services

The Developer shall be responsible for promptly reimbursing the City for all costs and expenses incurred by the City in the pursuit of project submittal, review, approval, and construction. These costs include, but are not limited to, the utilization of staff and other outside consultants as may be necessitated to adequately review and inspect construction of the project. All legal, administrative, and engineering fees for project review, meetings, approvals, site visits, construction inspection, etc., shall be subject to prompt reimbursement. The Developer is cautioned that project approval (City acceptance) and occupancy permits will be denied until all bills are paid in full. The City may, at its sole discretion require that funds be placed in an account at the City by which the City may draw from to reimburse said costs.

SECTION 2

PERMITS

SECTION 2 PERMITS

2.01 Permit Required

No person, firm or corporation shall commence work on the construction, alteration or repair of any facility located either in the public right-of-way, public easement, or private property without any necessary permit(s) first having been obtained from the City, provided the City shall not issue right-of-way permits for City-sponsored projects. Permits or approvals from other agencies may be required for some types of work. In such cases, the developer shall provide the City with copies of those permits or approvals, and the associated plans, when requested.

2.02 Permit Application

Any party requesting such permit shall file written application therefore with the City before construction is proposed to start. Such application shall be made on a standard City form provided for that purpose, and shall include:

- (a) The name, address, phone, and email of the applicant (and the name and address of property owner(s) if different than applicant);
- (b) The name, address, phone, and email of the owner(s) of the property abutting the street where the work is proposed;
- (c) The street location of the proposed work, giving the street address or legal description of the property involved;
- (d) A detailed plan showing the dimensions of the abutting properties and the dimensions and location of all existing and/or proposed facilities and other pertinent features necessary to understand the proposed work;
- (e) The plan shall also show the location of buildings, loading platforms or roof overhangs (if significant), and facilities being served or to be served by the new construction.

The City may require, at their discretion, the filing of any other information when in their opinion such information is necessary to properly enforce the provisions of these Standards or other applicable codes.

2.03 Permit Issued

No permit shall be issued until the proposed work has been approved by the appropriate official. No plan shall be approved nor a permit issued where it appears that the proposed work, or any part thereof, conflicts with the provisions of these Standards or any other applicable codes of the City of North Bend, nor shall issuance of a permit be construed as a waiver of the Zoning code or any other code requirements concerning the plan.

A fee in an amount as designated by the City's fee schedule and/or deposit to cover review time for staff and applicable City consultants shall accompany all applications for permits. Payment in advance of all applicable fees and charges shall be a condition to permit issuance.

2.04 Submittal Requirements

A. General

Detailed plans, prepared and sealed by a licensed engineer, shall be submitted to the City for review and approval prior to the commencement of any construction. Applicant's engineer shall be a professional engineer, registered as such in the State of Washington. The City shall, prior to the issuance of construction permits, approve the final plans. Plans shall include, as applicable all aspects of the project, including, but not limited to those items identified by the City. Specifications shall be required and submitted with the plans if general notes do not adequately cover the project requirements. A submittal checklist is included in the appendices of these standards. Following the standards in accordance with the submittal checklist will help ensure a timely review of the proposed project and keep review costs to a minimum.

Combining Plans - Water, sanitary sewer, and storm drainage designs (complete plan and profile) shall be on separate plan sheets, although alignments of all Utilities shall be shown on each utility plan. Plan sets for all three Utilities can be combined for small projects. Designs for water and sewer can be combined on the same plan sheets if plan scale is 1" = 10', 1" = 20', or 1" = 30'. Contact the Public Works Director for approval to combine plans.

All plan sheets shall include a City approval block, 2 inches high by 4 inches wide:

CITY OF NORTH BEND PERMIT# _____	
THESE PLANS ARE APPROVED FOR CONFORMANCE WITH THE CITY OF NORTH BEND PUBLIC WORKS DEPARTMENT REQUIREMENTS TO THE BEST OF MY KNOWLEDGE.	
CITY ENGINEER OR PUBLIC WORKS DIRECTOR	DATE

All plans are to be submitted to the City for review. Any necessary easements or dedications shall be submitted for review along with the plans. In addition to engineered plans, specific engineering reports shall also be submitted. The following summarizes report requirements.

- B. Traffic Impact Analysis (TIA): A TIA is required for projects that impact traffic volumes, safety, and performance. At a minimum, any project that will increase the PM Peak Hour traffic by more than 10 trips per hour shall submit a TIA. The TIA shall be completed by a licensed engineer in general accordance with the outline provided by the Public Works Department and Section 3.09 of these Standards. The scope of the TIA will be determined by the city engineer, based on the proposed impacts. Intersection Level of Service (LOS) impacts shall be analyzed in the TIA for all intersections wherein the impact is greater than 10 trips per hour, during the PM Peak Hour. A TIA may also be required where requested by the city engineer, based on a project's impacts to vehicle turning movements, parking, sight distance, access location, or other.
- C. Geotechnical Report: Geotechnical engineering reports shall be prepared by a licensed geotechnical engineer and shall cover all portions of the project within his/her expertise including site history; geologic structures; surface conditions; subsurface conditions; geologic hazards per NBMC 14.11; site preparation; structural fill placement and testing; use of onsite materials for

structural fill and backfill; surface and subsurface drainage; dewatering; recommendations for foundation support; excavation conditions and associated hazards; temporary and permanent slopes; design parameters for retaining structures and structure backfill and drainage; and pavement design. The geotechnical engineer shall be retained as the engineer-of-record for the duration of the project.

- D. Technical Information Report (TIR): The TIR, including a downstream and off-site analysis, is required for all projects that impact, improve, modify, or expand the surface water drainage system. The TIR shall be prepared by a licensed engineer and shall be formatted to reflect the TIR outline and content presented in the currently adopted surface water design manual.

- E. Temporary Erosion and Sedimentation Control (TESC) Plan: Prior to issuance of a right-of-way or other necessary construction permits, the developer shall prepare and submit a TESC Plan for review. The plan shall include location and type of temporary and permanent best management practices (BMPs), depicted on plan sheets, including notes and details to provide for minimum measures necessary to prevent erosion on-site and sediment from discharging offsite and fugitive dust generated as a result of construction activities from entering into the public right-of-way, municipal or private storm water systems including roadside ditches or other conveyances, natural waterways not limited to creeks and wetlands, or environmentally sensitive areas and from otherwise being carried away from the construction area by stormwater or air. If the site is required to obtain coverage under the Washington State Stormwater General Permit, the required Stormwater Pollution Prevention Plan (SWPPP) shall be submitted in lieu of a TESC Plan.

SECTION 3

PUBLIC WORKS CONSIDERATIONS

SECTION 3 PUBLIC WORKS CONSIDERATIONS

3.01 Financial Guarantees

Financial guarantees of the work covered under these standards shall be provided in accordance with the applicable City codes and specifically Title 19.01 NBMC. Public works projects are exempt from this section.

3.02 Hold Harmless Clause

The Developer shall indemnify and hold the City, City officers, City employees, City consultants, and their agents and employees harmless from and against all suits, claims, demands, damages, losses, and expenses as specified in Title 19.01 NBMC. Public works projects are exempt from this section.

3.03 Developer's Public Liability and Property Damage Insurance

The Developer shall maintain all required public liability and property damage insurance as specified in Title 19.01 NBMC. Public works projects are exempt from this section.

3.04 Compensation & Employer's Liability Insurance

The Developer shall maintain all required employer insurance and employee compensation as specified in Title 19.01 NBMC. Public works projects are exempt from this section.

3.05 Work Standards

All work performed pursuant to a permit issued shall be done in accordance with standards published in the current Standard Specifications for Road, Bridge & Municipal Construction, State of Washington Department of Transportation (WSDOT), revised as to form to make reference to Local Governments.

The following shall be applicable when pertinent, when specifically cited in the standards, or when required by county, state, or federal funding agencies:

- (a) WSDOT, Local Agency Guidelines (LAG Manual), as amended.
- (b) WSDOT, Materials Manual, current edition.
- (c) WSDOT, Construction Manual, current edition.
- (d) American Association of State Highway and Transportation Officials (AASHTO), A Policy on Geometric Design of Highways and Streets, current edition as adopted by WSDOT.
- (e) AASHTO, Standard Specifications for Highway Bridges, current edition.
- (f) U.S. Department of Transportation, Manual on Uniform Traffic Control Devices (MUTCD), as amended and approved by Washington State Department of Transportation, current edition.
- (g) AASHTO, Guide for the Development of Bicycle Facilities, current edition.
- (h) Associated Rockery Contractors (ARC), Standard Rock Wall Construction Guidelines, 1999.
- (i) American Society for Testing and Materials (ASTM).
- (j) WSDOT, Standard Specifications for Road, Bridge, and Municipal Construction, current edition as amended. These will be referred to as the "Standard Specifications".
- (k) WSDOT, Standard Plans for Road and Bridge Construction, current edition as amended. These will be referred to as the "Standard Plans".
- (l) WSDOT, Design Manual, current edition as amended.

- (m) City and County Design Standards for the Construction of Urban and Rural Arterial and Collector Roads, adopted per RCW 35.78.030 and RCW 43.32.020, May 24, 1989, current edition as amended.
- (n) Institute of Transportation Engineers (ITE), Traffic Engineering Handbook, current edition.
- (o) WSDOT, Highway Runoff Manual, current edition.
- (p) WSDOT, Hydraulics Manual, current edition.
- (q) King County, Surface Water Design Manual, or other drainage design manual, as may be adopted.
- (r) North Bend Municipal Code (NBMC).
- (s) North Bend Stormwater Comprehensive Plan, December 2013.
- (t) Low Impact Development (LID) Technical Guidance Manual for Puget Sound.
- (u) American with Disabilities Act (ADA) regulations as required by The United States Department of Justice Civil Rights Division.
- (v) Public Rights-of-Way Accessibility Guidelines (PROWAG) per United States Access Board (USAB).

Precedence: In case of conflicting standards, codes, or other provisions, the first mention below shall have precedence.

- (1) City Approved Changes
- (2) Developers Agreement
- (3) Conditions of Approval
- (4) City of North Bend Public Works Standards
- (5) Other Applicable City Municipal Codes
- (6) Special Provisions
- (7) Plans and Standard Details
- (8) Standard Specifications, including amendments
- (9) Standard Plans

3.06 Administrative Adjustments

- A. Adjustments from these standards may be granted by the Director upon evidence that such adjustments are in the public interest and that requirements for safety, function, fire protection, appearance and maintainability based upon sound engineering judgment are fully met. Adjustment requests for subdivisions should be proposed at preliminary plat stage and prior to any public hearing or land use decision. Adjustments must be approved prior to approval of the engineering plans for construction. Any anticipated adjustments from these standards which do not meet the International Fire Code shall also require concurrence by the fire marshal. Decisions by the Public Works Director are final; no appeals will be allowed.
- B. Application for Adjustment. Application for an adjustment shall be filed with the Director in writing and shall be accompanied by an appropriate fee as established by resolution, to pay for the cost of processing the application. All applications shall describe the adjustment, with specific references to the sections being requested for adjustment, contain a statement as to why the adjustment is necessary, and why it would meet the criteria of this chapter. The application shall also contain scaled drawings of the affected area, abutting roads, and all property within 300 feet thereof.

3.07 Non-Interference

The developer shall be responsible for minimum interference with:

- Traffic, including pedestrians
- Fire Facility Clearance
- Adjoining Property
- Utility Facilities
- Natural Surface Drainage

Prior to construction, these items are to be discussed with the City Public Works Department, and/or City Fire and Police Departments and/or the City Building Official, and special provisions may be included in any applicable City Permit(s).

3.08 Required Frontage Improvements

Except as specified herein, the developer shall construct the required frontage improvements from the center line of the existing right-of-way outward toward the developer's property line. The required improvements shall be designed and constructed per the requirements of these standards unless additional improvements are required by an adopted Comprehensive Plan or other City Council adopted plan or requirement.

If the one-half of the right-of-way opposite the subject property has not been improved to the minimum standards herein, the developer shall install improvements in the right-of-way as follows:

- A. The developer shall improve the half of the right-of-way abutting the subject property in accordance with these standards ("frontage improvements"), and
- B. The developer shall further construct the roadway on the opposite side from the development, at the discretion of the Public Works Director, excluding pedestrian improvements, to provide the minimum width of travel lanes and parking lane as described in the Standards, and to provide a minimum total width of 20 feet for fire access. Improvements include storm drainage construction, which may consist of filling drainage ditches and installing storm drainpipe and catch basins, asphalt tapers, and channelization, as required by the Public Works Director.

3.09 Traffic Impact Analysis

- A. General

To adequately assess a development traffic impact on the transportation system and level of service (LOS), the public works department may require a traffic impact analysis (TIA). The requirement for a TIA will be based on the size of the development proposed, existing street and intersection conditions, traffic volumes, accident history, community concerns, and other pertinent factors relating to traffic impacts attributable to development projects. All projects, regardless if a TIA is required, shall obtain a certificate of concurrency, per Title 20.12 NBMC, prior to project approval.

B. TIA – When Required

For any project that creates 10 or more new p.m. peak hour trips, a developer shall provide a trip generation and trip distribution report for the project for a distance from the project wherein the new trips fall below 10 p.m. peak hour trips. Further, for projects that add 10 or more p.m. peak hour trips to an intersection of a Major or Minor Arterial, or Collector, the developer shall provide a Traffic Impact Analysis (TIA) for those intersections meeting the requirements of this section. This requirement shall be waived if, in the opinion of the city engineer, there exists current information from the City or another project to adequately assess the project's impacts.

For development projects that do not trigger the requirement to prepare a TIA, the developer shall perform a minimum analysis of the existing and proposed transportation infrastructure, including identifying any of the following deficiencies, whether existing, or caused by the development, on proposed or existing roadways:

- (1) Sight distance;
- (2) Illumination;
- (3) Pedestrian and bicycle facilities;
- (4) Parking;
- (5) Bus stops.

C. TIA Scope of Work

The level of detail and scope of work of a TIA may vary with the size, complexity, and location of the development. A TIA shall be a thorough review of the immediate and long-range effects of the development on the transportation system. TIAs shall be prepared by an engineer licensed to practice in the State of Washington with special training and experience in traffic engineering and who is a member of the Institute of Transportation Engineers (ITE). The Traffic Impact Analysis shall follow the following outline:

- (1) **Project Description and Maps.** Provide a copy of the site plan showing the type of development, street system, right-of-way limits, access points, and other features of significance. Also include pertinent nearby off-site information such as locations of adjacent intersections and driveways, land use, etc., and vicinity map showing the transportation system to be impacted by the development. Discuss frontage improvements, dedications, access, etc. Identify horizon years for traffic analysis purposes.
- (2) **Background Information.** Identify and describe any current relevant traffic information that describes the characteristics of the transportation system and volumes. Identify expected increases in background traffic volume or pattern changes.
- (3) **Trip Generation and Distribution.** Provide explanation and maps to document and illustrate the project's estimated trips and distribution. Trip generation shall be estimated using the latest edition of the ITE Trip Generation Manual. The methodology for trip distribution shall be clearly defined and discussed in detail. Break out and describe vehicles, pedestrians, bicycle, transit, and other transportation modes.
- (4) **Existing Conditions.** Discuss affected street characteristics including functional classification, travel lanes, lane width, shoulders, bicycle and pedestrian facilities, and traffic control at study intersections. Identify safety and access problems including

accident history, sight distance restrictions, traffic control, and pedestrian conflicts. Obtain all traffic data from the City and surrounding jurisdictions, if applicable. If unavailable, the individual firm preparing the TIA shall collect the necessary data to supplement discussions and analysis in the TIA.

- (5) Future Traffic. Future traffic conditions Not Including Site Traffic shall be estimated, for the horizon year for project development, including planned transportation improvements and other relevant development projects. Future traffic conditions Including Site Traffic shall be estimated at development completion. These analyses shall address both capacity and safety. A figure will be required showing daily and peak period turning movement volumes for each study intersection. In addition, a figure shall be prepared showing the baseline volumes with site-generated traffic added to the street network. This figure will represent site specific traffic impacts to existing conditions.
- (6) Impacts to Traffic Operations. The level of service (LOS) and capacity analysis shall be conducted for each study intersection. If the development is scheduled to be constructed in phases, the TIA shall conduct a LOS analysis for each separate phase. The individual or firm preparing the TIA shall calculate the intersection LOS for each of the following conditions:
 - (a) Existing peak hour traffic volumes (with figure).
 - (b) Existing peak hour traffic volumes including site-generated traffic (with figure).
 - (c) Future traffic volumes not including site-generated traffic (with figure).
 - (d) Future traffic volumes including site-generated traffic (with figure).
 - (e) Level of Service results for each intersection for each traffic volume scenario, with table. Table shall show LOS results for a.m. and p.m. peak periods, if applicable. The table shall show LOS conditions with corresponding vehicle delays for signalized intersections (all approaches) and LOS conditions for the critical movements at unsignalized intersections.
- (7) Mitigation. The TIA shall include a proposed mitigation plan. The mitigation may be either the construction of necessary transportation improvements, or contributions to the City for the development's fair share of the costs for identified future transportation improvements. Contributions may include King County MPS, Transportation Impact Fees, or fee-in-lieu fees as may be determined through the project's SEPA review. The developer may qualify for a reduction in Transportation Impact Fees, if eligible under the credits described in NBMC 17.38.050.

3.10 Dedication of Right-of-Way

If a right-of-way abutting the subject property is not wide enough to contain the required improvements, then the developer shall dedicate as right-of-way a strip of land adjacent to the existing right-of-way, at a width in accordance with these standards.

3.11 Easements

Where City utilities and/or their conveyance systems cross private lands, a public easement shall be granted to the City. The developer will prepare, process, record, and file all easements at no cost to the City. If the property is platted the easement may be conveyed at the time the short plat or final plat is filed. All easements not shown on the plat must be prepared by a licensed surveyor or engineering firm capable of performing such work.

Drainage easements shall be as specified in the currently adopted surface water design manual, but in no cases shall be less than 15 feet in width for a single utility and 20 feet for dual utilities or otherwise as approved by the City. Construction easements shall be 25 feet minimum in total width, including the permanent easement. Where trench depths or utility size dictate, the City may require a wider easement that considers the proximity of adjacent utilities, structures, slopes, or roadways.

The locations of utilities within easements shall be accurately surveyed and staked to guide the construction. Any deviation from this requirement must be approved by the City to prevent offset installation of utilities to encumber future work.

No permanent structures are allowed to be constructed in the easement area. Access to easements for maintenance and/or repair of the utility by the City shall not be restricted or prohibited by fences, rockeries, plantings and other improvements.

In general, all easements shall be located within single lots rather than being split by a lot line. In special circumstances, easements may be located on two adjacent lots with the approval of the Public Works Director.

Easements are required to be submitted in draft, unsigned for review and approval prior to plan or final plat approval, at the City's discretion. Signed copies are required prior to final approval. Easements will be filed by the developer upon satisfactory completion of the work.

All work on easements shall be performed strictly in accordance with easement provisions. Easements shall be restored equal to or better than original condition. The Developer shall do no work on easement areas until specifically authorized by Engineer.

3.12 Inspection

A. Construction Control

Work performed for the construction or improvement of City roads, commercial sites, residential neighborhoods, and/or utilities whether by a private developer, by City forces, or by a City contractor, shall be done to the satisfaction of the City and in accordance with approved plans. It is emphasized that no work shall start until such plans are approved, permits issued, and preconstruction meeting held, and until financial securities and insurance have been provided per applicable city codes for the various aspects of construction. The City shall approve any revisions to the approved plans before revisions are implemented. Failure to acquire the City's approval for any work can result in removal or modification of construction at the contractor's or developer's expense.

The City requires a developer and/or their contractor to retain an engineer licensed to practice in the specialty of geotechnical engineering and that this engineer be kept on retainer for their representative project during the entire construction process. The geotechnical engineer shall make periodic visits and inspections for, but not limited to, trench and foundation excavation and backfill, preparation of road subgrade, roadway fill and compaction efforts, slope construction and stability, surface and subsurface drainage, erosion control, and any other pertinent issues that arise throughout construction. Sites that are required to obtain coverage under the Washington State Construction General Permit or an Individual Permit shall abide by inspection frequencies, discharge monitoring, and reporting requirements specified in those applicable state permits.

B. General

The City shall exercise full right of inspection of all excavating, construction, and other invasions of City right-of-way or public easements. The City Engineer or designated official shall be notified on the working day prior to commencing any work in the City's right-of-way or public easements. The city engineer and/or his authorized representative is authorized to and may issue immediate Stop Work Orders in the event of noncompliance with this chapter and/or any of the terms and provisions of the permit or permits issued hereunder.

Timely notification by the developer as noted herein is essential for the City to verify thorough inspection that the work meets the standard. Failure to notify in time may oblige the City to arrange appropriate sampling and testing after-the-fact, with certification, by a professional engineer. Costs of such testing and certification shall be borne by the developer. At the time that such action is directed by the city engineer, the city engineer may prohibit or limit further work on the development until all directed tests have been completed and corrections made to the satisfaction of the city engineer. If necessary the City may take further action as set forth in the North Bend Municipal Code (NBMC).

It is the responsibility of the developer or their agents to have an approved set of plans and any necessary permits on the job site whenever work is being performed. All specific inspections, test measurements or actions required of all work and materials are set forth in their respective chapters herein. Tests shall be performed at the developer's expense.

C. Requirements for subdivision, binding site plan, commercial and right-of-way land use inspection.

On all road and drainage facility construction, proposed or in progress, which relates to subdivision, binding site plan, commercial and right-of-way development, inspection will be done by the city engineer. Unless otherwise instructed by the city engineer, construction events which require monitoring or inspection are identified as follows:

- (1) Preconstruction Conference. Three working days' prior notice. Conference must precede the beginning of construction and include contractor, design engineer, utilities, and other parties affected. Plan approvals and permits must be in hand prior to the conference.
- (2) Clearing and Temporary Erosion/Sedimentation Control. One working days' notice prior to initial site work involving drainage and installation of temporary water retention/detention and sedimentation control. Such work to be in accordance with the currently adopted surface water design manual and the approved plans.
- (3) Erosion and Sedimentation Control. Within 48 hours of a significant rain event, defined as greater than 0.25 inches of rain within 24 hours, to ensure proper function of temporary Best Management Practices (BMPs) installed onsite.
- (4) Utility and Storm Drainage Installation. One working days' notice prior to trenching and placing of storm sewers and underground utilities such as sanitary, water, gas, power, telephone, and TV lines.
- (5) Utility and Storm Drainage Backfill and Compaction. One working days' notice before backfill and compaction of storm sewers and underground utilities.

- (6) Subgrade Completion. One working days' notice at stage that underground utilities and roadway grading are complete, to include placement of gravel base if required. Inspection to include compaction tests and certifications described in the WSDOT Standard Specifications.
- (7) Curb and Sidewalk Forming. One working days' notice to verify proper forming and preparation prior to pouring concrete.
- (8) Curb and Sidewalk Placement. One working days' notice to check placement of concrete.
- (9) Crushed Surfacing Placement. One working days' notice to check placement and compaction of crushed surfacing base course and top course.
- (10) Paving. Three working days' notice in advance of paving with hot mix asphalt or Portland cement concrete.
- (11) Structural. Three working days' notice prior to each critical stage such as placing foundation piling or footings, placement and assembly of major components, and completion of structure and approaches. Tests and certification requirements will be as directed by the city engineer.

D. Final Construction Inspection

Fifteen working days' notice prior to overall check of road or drainage project site, to include completion of paving and associated appurtenances and improvements, cleaning of drainage system, and all necessary cleanup and site restoration. Prior to final approval or occupancy, to ensure proper installation of permanent stormwater facilities, the city engineer shall verify that a maintenance plan is completed and responsibility for maintenance is assigned for stormwater treatment and flow control facilities. The City shall, upon completion of a satisfactory final inspection, issue a letter of completion for the project. Final inspection will not take place and the letter of completion will not be issued unless the developer is current with all required fees.

E. Final Maintenance Inspection

Thirty days' notice prior to the end of the maintenance period. Prior to release of the maintenance guarantee, there shall be successful completion of the maintenance period as described in Section 3.01, repair of any failed facilities and the payment of any outstanding fees.

3.13 Utilities

The plans show the approximate locations of various existing utilities known to the engineer, such as gas lines, water mains, storm drainage, power lines, telephone lines, television cables, and other obstructions based on information obtained from various sources. This information is not guaranteed to be accurate, and the Developer is directed to check for interferences and obstructions by inquiry from the different utilities and by underground exploration ahead of his regular excavation. Prior to performing excavation, the developer shall be responsible for having all utilities located in accordance with RCW 19.122. The utilities one-call underground locating center phone number is 1-800-424-5555 or 811.

With the exception of other requirements, agreements, or regulatory stipulations, the City shall have the authority to approve the depth, orientation, height, and location of all utilities located within the public

rights-of-way and public easements. Gravity systems (sewer and storm drainage) shall have precedence for location over other utilities. The location of fire hydrants shall be as directed by the Fire Marshall.

The City does not purport to know the size, type, material, function, or location of existing underground utilities. The developer shall be responsible for having all utilities identified and located during design and plan development, and for providing timely notification of all utilities in advance of any construction in right-of-way, easements, and private property. Further, the developer shall be responsible for contacting the effected utility owners to acquire utility information and procedures for moving, abandoning, relocating, repairing, working around, shutting down, or otherwise impacting the utilities prior to commencing construction. The Developer shall excavate around and under service pipes with special care and shall support and maintain them in service. Where it is necessary to cut, move or reconnect any service lines, arrangements shall be made with the respective utility. Work shall proceed and be coordinated and scheduled to cause the least amount of service disruption as possible.

3.14 Erosion, Sedimentation, and Dust Control

The developer shall be responsible for the implementation of the approved Temporary Erosion and Sedimentation Control (TESC) Plan during the course of the work and for continually updating the TESC Plan to address changing site conditions, BMP effectiveness, and employ all or any additional measures to reduce on-site erosion and prevent off-site sedimentation. Prior to final acceptance of the work, all disturbed areas shall be either fully or stabilized. Removal of temporary erosion and sedimentation controls cannot take place until 70 percent of the seeded area have established, constituting a stabilized site condition.

The developer shall sprinkle water as necessary to keep the dust down. This sprinkling shall be maintained until the project is accepted. Sprinkling shall be kept to a minimum and shall not produce runoff from the site. On paved streets, if dust becomes a nuisance when backfilling is completed, the developer shall vacuum sweep the portions of streets being used for traffic. Flushing of streets shall not be permitted without prior City approval.

3.15 Traffic Control

Public safety is of paramount importance. Primarily, traffic control shall be provided and implemented for the benefit and safety of the traveling public, not for the convenience of the contractor or suppliers. However, timely completion of all work within existing roadways and easements is also important and therefore, a balance must be reached for each individual project. Disruption of traffic shall be held to the minimum necessary to complete the work.

The developer shall be responsible for interim traffic control during construction on or along traveled roadways. The City may, at their discretion, require that the developer submit a detailed traffic control plan for review and approval. Traffic control measures shall follow the guidelines of the WSDOT Standard Specifications and applicable state law. All barricades, signs, and flagging shall conform to the requirements of the MUTCD. Signs must be legible and visible and shall be removed at the end of each workday if not applicable after construction hours.

When road closures and detours cannot be avoided the developer shall notify the City in advance. The City may require a Detour Plan to be prepared, submitted, and approved prior to closing any portion of a City roadway. Advance public notice for those affected by the closure shall be required and carried out by the developer.

3.16 Pedestrian Access

All road improvement and development projects shall include approved pedestrian access as part of the design in full compliance of the ADA regulations and PROWAG guidelines. The City may require the developer to install public pedestrian walkways, other than sidewalks as otherwise required by these standards, where the walkway is reasonably necessary as a result of the development activity.

3.17 Replacement of Damaged or Substandard Existing Improvements

For properties that have existing abutting and/or adjacent street improvements, the developer shall remove and replace any damaged or substandard improvements in conjunction with the development of the property. Replacement shall include, but not be limited to, cracked or buckled curb, gutter, and sidewalk; landscaping; storm drainage; street trees, and curb ramps.

3.18 Pavement Restoration

In order to maintain the pavement surface of existing city streets, projects constructing road widening, frontage improvements, and/or utility installations shall be required to restore the pavement to a continuous mat of asphalt surfacing. All such projects shall provide a full-width 2-inch-thick pavement grind and overlay, plus any necessary prelevel course, for the entire length of the widening, frontage improvements, or longitudinal utility work, or where the number of transverse pavement cuts for utility trenches exceed two.

The requirement for full-width overlay may be waived by the city engineer based on the condition of existing pavement, roadway drainage, and the extent of required changes to channelization.

3.19 Street Signs, Pavement Markings, and Traffic Control Devices

The developer shall pay for design and installation of all street signs, pavement markings, and traffic control devices in the location and manner approved by the City.

3.20 As-Built Drawings

A. General

Developers who install systems within, on, or below the City's public rights-of-way, public easements, or tracts to be dedicated to the City, shall furnish the City with accurate surveyed drawings, plans and profiles, showing the finished location, orientation, and curvature of all aboveground and underground structures installed, including existing facilities where encountered and abandoned installations. Horizontal locations of utilities are to be referenced to street centerlines, as marked by survey monuments, and shall be recorded to within one-tenth (0.1') of a foot. Rim and invert elevations shall be recorded to within one one-hundredth (0.01') of a foot. The depth of buried utilities may be referenced to the elevation of the finished street above said utility, with depths to the nearest one-tenth foot being shown at a minimum 50-foot interval along the location of said utility. Use *Washington Coordinate System NAD-83/91– North Zone* as the basis of bearings for all surveys. Prepare survey according to NAVD 88 vertical datum and state that it was the datum used.

Prior to submittal of the final signed as-built drawings, the developer shall submit preliminary as-built drawings for review. The preliminary drawings shall identify completed work differing from the approved drawings by use of strikethroughs, colored markings, cross-outs, redlines, etc.

Once approved, said markings and items not constructed shall be removed prior to submitting the final signed drawings.

Such as-built drawings shall be submitted to the City within 30 calendar days after completion of the work, and prior to release of performance guarantees. As-built drawings shall be stamped, signed and dated by an engineer or surveyor currently licensed in the State of Washington, who is familiar with the project. Said engineer or surveyor shall attest to the accuracy of the information shown on the drawings, on an approved signature block placed on every sheet. An as-built drawing certification block is as follows:

<p>AS-BUILT CERTIFICATION: I HEREBY DECLARE TO THE BEST OF MY KNOWLEDGE THAT THE INFORMATION SHOWN HEREON REFLECTS THE "AS-CONSTRUCTED CONDITIONS". THIS CERTIFICATION IS BASED UPON WORK PREPARED IN ACCORDANCE WITH GENERALLY ACCEPTED PROFESSIONAL ENGINEERING AND/OR SURVEYING PRACTICES.</p> <p>NAME, P.L.S & P.L.S. NUMBER:</p> <p>DATE:</p>	<p>P.L.S. STAMP AND SIGNATURE HERE</p>
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As-built drawings shall be submitted on permanent, stable reproducible Mylar, as well as electronically per the electronic submittal requirements of NBMC 20.02.006. All data as shown on the drawings shall be "fixed line" or ink. Sticky back (glue) reproductions or "sepia" Mylar shall not be considered acceptable. Electronic files shall also be provided to the City, specifically actual data files, which include files produced using AutoCAD and/or ArcGIS software and an original PDF of the plan set, no scanned images. All file format submittals will be reviewed and approved by the Public Works Director.

B. Requirements

All pipe lengths and dimensions are based on horizontal distances, unless slope is too steep to measure horizontal distance, inspector should note that length is "slope distance".

Reference or dimension location from right-of-way centerline for utility features in the public right-of-way, or from property line for utility features located within easements.

As-built information shall be recorded on plan and profile views of the contract drawings. The profile view shall note any changes from the design finished grade over each pipeline.

As-built plans shall be submitted to the City using the approved plan set as the basis for the redlined as-built plans. An as-built plan set in digital format shall also be submitted. The digital format shall be in the most current AutoCAD Release in use by the City. The ".DWG" files(s) shall be submitted on CD-ROM.

Storm Drainage System:

- (1) Storm Mains: Length (center of catch basin/manhole to center of catch basin/manhole), diameter, material, slope, direction of flow, note “private” if applicable. Show private systems going to apartments, condominiums, commercial sites, and joint-use side sewers. Label private system lines as “PRIVATE SYSTEM”. Other than joint-use systems, do not show single family private systems, other than stub from public main to property line.
- (2) Storm Stubs: Lengths, depth, material, station. List pipe slope and size.
- (3) Catch basin/ Manholes: Structure ID number, rim elevation, invert elevations, and size.
- (4) Existing Structures: Where new pipes connect to existing structures, it shall be indicated on the drawing.

Water System:

- (1) Water Mains: Length (center of fitting to center of fitting), diameter, material, zone, class of pipe, type of joint restraint (if any), depth, note “private” and “fire line”, if applicable.
- (2) Water Fittings: Call-outs in order, # of each, diameter, fitting, joint type (e.g., 2–8" 45° bend, M.J.).
- (3) Water Services: Size, show location on plan.
- (4) Hydrants: Distance from valve to hydrant, depth of bury (e.g., 5' bury).

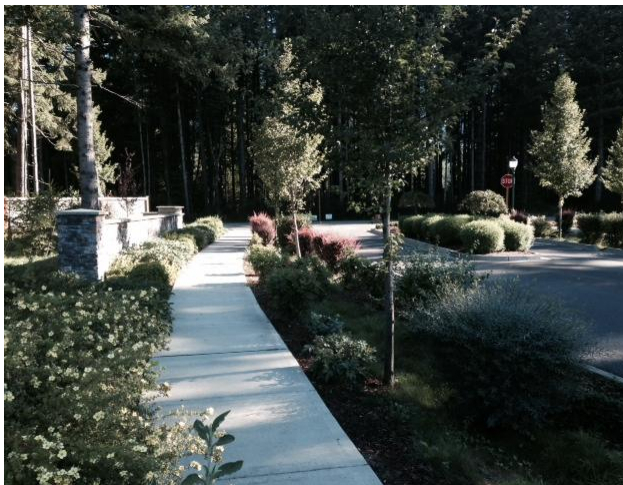
Sewer System:

- (5) Sewer Mains: Length (center of manhole to center of manhole), diameter, material, slope, direction of flow, note “private” if applicable. Show private systems going to apartments, condominiums, commercial sites, and joint-use side sewers. Label private system lines as “PRIVATE SYSTEM”. Other than joint-use systems, do not show single family private systems, other than stub from public main to property line.
- (6) Sewer Stubs: Lengths, depth, material, station (stationing of stubs referenced from downstream manhole), distance from property line. List pipe slope and size.
- (7) Sewer Manholes: Manhole ID number, rim elevation, invert elevations (indicate direction of flow IN or OUT), drop (if applicable), and size.
- (8) Sewer Cleanouts: Station, invert elevation, top elevation.
- (9) Existing Sewer Structures: Where new pipes connect to existing manholes, it shall be indicated on the drawing.

SECTION 4

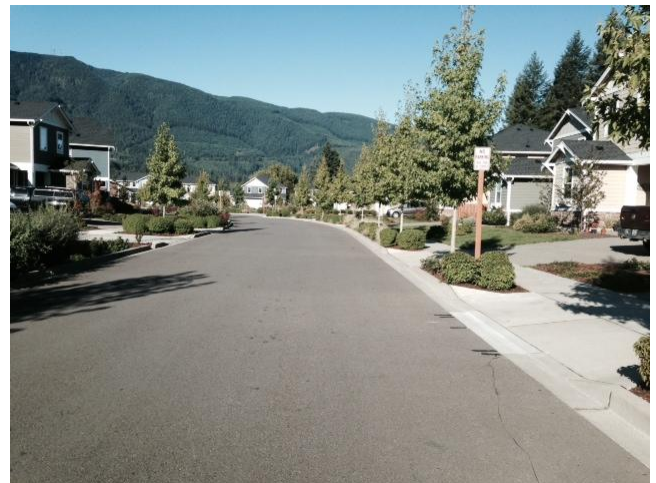
STREETS, PEDESTRIAN PATHS, AND BIKEWAYS

Planning, Designing,
and Constructing



Transportation
Systems for Driving,

Riding, and
Walking...



SECTION 4 STREETS, PEDESTRIAN PATHS, AND BIKEWAYS

4.01 General Considerations

Street improvements are required for short plats, plats, binding site plans, planned neighborhood districts, development agreements, conditional uses and all new construction, as well as substantial construction improvements requiring a building permit when the existing street is not improved to current city standards. “Substantial construction improvements” shall be defined to mean improvements worth more than 50 percent of the assessed value (Member of the Appraisal Institute [MAI] appraised value may be used at owner choice) of the original building. The intent of this chapter includes the following:

- (1) To ensure that street design and street improvements are consistent with, and implement applicable goals and policies of, the comprehensive plan.
- (2) To provide a safe street system that balances vehicular uses with transit, pedestrian, and bicycle uses.
- (3) To promote a traditional street system that maximizes vehicular route options, effectively carries vehicular traffic, and seeks to minimize congestion points.
- (4) To provide a street system that realizes multiple roles and opportunities in addition to carrying vehicles. These include, but are not limited to:
 - (a) Integrating and connecting neighborhoods and areas throughout the community, while not restricting the capacity or natural functions of wetlands, floodways, creeks and natural areas.
 - (b) Recognizing streets as a vital public space, to be completed with streetscape amenities like sidewalks, planter strips, street trees, curbs, and lighting.
 - (c) Positively shaping the form of the community.
 - (d) Promoting pedestrian, bicycle, and non-motorized transportation options, consistent with implementation of the comprehensive plan.
- (5) To provide fundamental street design standards, yet recognize that said standards will need to be complemented with specific street design and/or street construction details.
- (6) To provide the city engineer flexibility in applying street design and street improvement standards to meet existing conditions related to infill development; street repair/rehabilitation; and extensions of existing roadways, including street design, improvement, and construction limitations and opportunities associated therewith.

Development of properties on or tributary to substandard or unsafe (safety issues) roadways may, depending on the size and type of development, be cause for “off-site” improvements to the substandard or unsafe corridors, to include road drainage facilities. The city engineer shall determine when and if such conditions exist. At a minimum “half street improvements” will be required as a condition of development in and along the entire property as it abuts City rights-of-way.

This chapter provides *minimum* street design standards. Higher design and construction standards may be warranted due to localized design and construction parameters.

4.02 Streets

A. General

All plans submitted for channelization, traffic control, and road construction or reconstruction shall be prepared by a professional engineer licensed in the State of Washington. All street design must provide for the maximum traffic loading and capacity conditions anticipated. The width and grade of the pavement must conform to specific standards set forth herein for safety and uniformity.

The Fire Marshall shall approve the number and location of fire hydrants for new development and shall identify areas of new development that may be required to be sprinkled due to access or fire flow constraints.

In areas where the city specifies paving widths or improvement standards different than those listed in this chapter, the below standards shall be followed except where specifically modified elsewhere.

B. Design Standards

The design of streets and roads shall depend upon their type and usage. The design elements of streets shall conform to City standards as set forth herein and current design practice as set forth in Section 3.05. On existing streets, design speed shall be set at 5 miles per hour above the posted speed limit. In locations where the speed limit changes within 500 feet of the property, the higher value shall be used.

Street layout and plat design shall create efficient well-connected streets to integrate and interconnect the community of North Bend. Residential local access streets should provide for connections between neighborhoods and to collector streets whenever feasible. A grid to modified grid pattern of interconnected streets is the required pattern for new residential, commercial, and other development.

A number of geometric shapes should be utilized to enrich the modified grid form, for example: curves, triangles, greens/commons, T-intersections, and wedges. Intermittent curvilinear streets are encouraged to provide variation and interest as part of the modified grid network. Cul-de-sacs will be allowed only when physically constrained by sensitive areas such as wetlands or excessive natural grades, or to efficiently serve difficult-to-access areas due to other natural constraints. See Section 4.03D for the Minimum Street Design Standards.

- (1) Street profile grade should conform closely to the natural contour of the land. In some cases, a different grade may be required by the city engineer. Unless otherwise approved by the City, the minimum longitudinal slope shall be 0.50 percent; the maximum longitudinal slope shall be 15.0 percent. For Local Access streets, Maximum grade may be exceeded for short distances of 300 feet or less, upon showing that no practical alternative exists. Grade shall not exceed 20 percent. All roads with grades exceeding 15 percent shall be paved with Portland cement concrete.
- (2) Transverse slope of roadway shall be two percent each way from centerline of roadway.

- (3) The pavement and right-of-way width depend upon the street classification, and the transportation needs of the corridor. Section 4.03D shows the minimum widths allowed. Street widths shall be measured from face of vertical curb to face of vertical curb on streets with cement concrete curb and gutter.
- (4) In areas of questionable soil or ground conditions the public works director and/or city engineer may require the owner or developer to retain a licensed soils engineer to make soils tests and to provide additional recommendations for design of the sub-base and roadway sections. Over-excavation and backfill of roadway sub-base with appropriate material may be required to create a proper roadway base as deemed necessary by the public works director and/or city engineer.
- (5) In special circumstances, as may be specifically approved/required by the city engineer, due to local conditions and/or geometric restrictions, paving widths or improvement standards may be required which are different than those minimums specifically listed herein.
- (6) City policy generally requires connectivity of roadways within plats and throughout the City. To facilitate future development within the City, streets and rights-of-way shall be planned to give access to or permit the future subdivision of adjoining land. Temporary cul-de-sacs may be allowed when future extensions of the streets are anticipated. Streets shall be extended to the plat boundary to accommodate extensions into future subdivisions or adjoining land and the resulting temporary dead end street shall be barricaded pursuant to WSDOT standards, signed as described in Section 4.12, and provided with a temporary cul-de-sac bulb.

Temporary cul-de-sacs shall be designed pursuant to North Bend Standard Plan T-13. The cul-de-sac shall be paved. Removal of the temporary constructed cul-de-sac and construction of the extension of the curbs, gutters, and sidewalks, shall be the responsibility of the developer who extends the road. In designing streets, existing development, proposed development and possible future development shall all be considered in the recommendation of right-of-way widths, street widths, paving sections, sidewalks and other applicable standards.

- (7) Street jogs with centerline offsets less than 125 feet are prohibited.
- (8) Street grids are typically rectangular (“rectilinear”) but may include square patterns, modified rectilinear, or other distinct geometric shapes, and must connect with existing streets to form a cohesive network unless circumstances would prohibit such connections. Street rights-of-way shall be provided to a property edge for future connections.

Grid to modified grid blocks shall generally not exceed approximately 310 feet in width (alley) and 400 feet in length, centerline-to-centerline, except where in the opinion of the city engineer, extraordinary conditions justify a departure from the maximum. City-wide block sizes should allow a variety of lot widths and depths. Where necessary due to environmental constraints or other extenuating circumstances, block sizes may be extended in width or length, but shall not lose a pedestrian orientation and human scale. Street corridors, whether straight or moderately curved, should range in length from 500 to 1,000 feet, and then terminate in a T-intersection or otherwise. “Drag strip,” or continuous straight residential and nonresidential streets, shall be avoided.

- (9) Streets shall conform to all requirements of the latest edition of the International Fire Code as adopted and amended by the City, and all requirements of the Fire Marshal.
- (10) Access onto State Route 202 between milepost 28.28 and 30.17 shall meet or exceed WSDOT access standard requirements.
- (11) In addition to the above requirements, street design shall incorporate the following minimum requirements:
 - (a) All new utility systems such as power, gas, cable TV, fiber optics, and telephone shall be buried, except where topography or site conditions prohibit reasonable installation. See NBMC 19.06.060 for exceptions. Design and installation of the system shall be done by the franchised utility company. Design shall be submitted to the city engineer for review and approval prior to installation. All existing and new utilities, such as manholes, catch basins, valve boxes, and monument cases, shall be adjusted to finished roadway grade;
 - (b) Roads are to be sawcut before permanent patch is made or new AC pavement is installed abutting the existing road;
 - (c) The street system (in residential subdivisions and short subdivisions) shall be laid out with a minimum number of intersections with arterial streets. Arterial streets shall not intersect with other arterial streets at intervals closer than one thousand feet and no streets shall intersect at intervals closer than one hundred twenty-five feet, unless, in the judgment of the city engineer, an exception to this rule would be in the public interest and welfare;
 - (d) All streets, sidewalks, and alleys, both public and private, shall conform as a minimum to one of the herein referenced construction standards and shall be adjusted as necessary to match existing facilities, service the proposed development, and meet the needs of anticipated future development.
 - (e) All topsoil, organic, and structurally unsuitable soils shall be removed from beneath the proposed street and sidewalk section.

C. Submittal of Plans

- (1) All construction plans shall be submitted to the City and shall include the required minimum information, as identified in the City's standard plan submittal checklist.
- (2) The Standard Plan Notes, as shown and further referenced in the appendices, shall be included or referenced on any plans submitted to the City for construction approval dealing with street or drainage design.

4.03 Road Classifications

A. General

City roads are classified functionally as indicated in the Comprehensive Plan and as shown herein in Section 4.03D. Function and location are the controlling element for classification and shall govern right-of-way, road width, and road geometrics. Other given elements are typical.

B. Road Type

Roads are classified, per the GMA Comprehensive Plan, as follows:

- Major Arterials.
- Minor Arterials.
- Collector Streets.
- Local Access Streets.

When soil conditions support Low-Impact Development (LID) approaches, bioswales, rain gardens or similar technologies should be used within the traditional landscape strip area of streets, and specific allowances are shown below in Section 4.03D for Residential Local Access Streets. Other roadway sections may choose LID approaches and modifications to typical standards and shall be approved by the CED director and public works director.

C. Low Impact Development Street

In accordance with NBMC 18.50, developers are encouraged to implement low impact development practices. A suggested cross-section drawing has been included in these standards. Development that proposes such systems shall show consistency with the most current King County Surface Water Design Manual (KCSWDM), and shall meet the requirements of city code. The proposal shall be approved by the CED director and the public works director.

Developers are encouraged to propose street designs that implement the intent of low impact development using the suggested cross-section as a starting point. Requirements for LID stormwater approaches (in addition to or in conjunction with the guidance documents referenced above) are as follows:

- (1) Landscaping shall include native, noninvasive, low-maintenance plants suited to the moisture regime of their location within the LID treatment.
- (2) Street trees shall be provided per the street tree standards in Chapter 18.18 NBMC. Bio-channels of 6 feet or wider shall stagger location of trees in swale area on either side of the swale.
- (3) Proposed LID features and landscape strips shall be comprised of at least 60 percent native vegetation with the remaining as grass, unless otherwise approved by the director due to specific site circumstances.
- (4) Minimum plant spacing (o.c.) for most species shall be as follows:
 - (a) Herbaceous plants – 12 inches;
 - (b) Large shrubs and small trees – 4 feet to 10 feet;
 - (c) Shrubs – 2 feet to 4 feet;
 - (d) Groundcover – 12 inches;
 - (e) Seeding with approved mixture in SWDM Table 6.3.1.C to the prepared seed bed is required at a rate of 80 pounds/acre.

- (5) Construction and plant installation must be completed prior to completion of the project. An 80 percent survival of all grasses and plants immediately and two years following installation is required, consistent with NBMC 18.18.150, Maintenance of Plant Materials.
- (6) Maintenance of vegetation and stormwater function shall be the responsibility of the homeowners' association.
 - (a) The applicant shall develop a long-term maintenance program, to be reviewed and approved by the city prior to final plat approval, with clear and enforceable guidelines to best maintain the LID features of the plat. The applicant shall provide a guide that may be supplemented and distributed by the homeowners' association to lot owners that explains the purpose and maintenance of these areas within the plat.
 - (b) A note(s) shall be placed on the face of each final plat that clearly describes and details the long-term maintenance requirements of the LID features of the plat and provides for guaranteed performance of said features. These requirements shall also be included in the neighborhood's covenants, conditions and restrictions (CC&Rs), requiring proper assessments for maintenance and upkeep of said features. The final plat note shall be clear that in the event the homeowners' association does not properly maintain said features, the city will perform the necessary maintenance and charge the owners' association for time and expense of the maintenance work.
 - (c) An educational packet, to be reviewed and approved by the City of North Bend prior to final plat approval, shall be provided to all new homeowners explaining the hydrologic function and the long-term maintenance needs and requirements of the LID features.
- (7) Sidewalks may be constructed of permeable concrete as approved by the PW Director and CED Director.
- (8) Vertical curbs shall be provided adjacent to parking and planter strip areas. Flush curbs may be used when adjacent to an LID feature. Curbs shall be reviewed and approved based upon adjacent uses by the CED and public works director.
- (9) LID stormwater facilities designed for infiltrating runoff shall be constructed in a manner that minimizes the impact on the underlying soils' ability to infiltrate. In addition, LID projects that rely on the infiltration of stormwater runoff shall include provisions for collecting and conveying overflow runoff (runoff that does not infiltrate quickly enough to prevent localized flooding) away from the streets and homes.

D. Street Design Standards

Specific design criteria for arterial, collector, and local access streets are included in Tables 4.1 through 4.5. Special design criteria have been established for sections of North Bend Way, Cedar Falls Way, 468th Avenue SE, SE 140th Street, and Park Street, dependent upon the location. Table 4.6 identifies AASHTO sight distance criteria, based on design speed. Table 4.7 is a separate table provided for woonerf design criteria.

- (1) Specific sections of North Bend Way and other arterials have unique design criteria, as shown in Tables 4.1 and 4.2:
 - (a) Cedar Falls Way;
 - (b) North Bend Way (Between North Bend Way Bridge and East Park Street);
 - (c) North Bend Way (East Park Street to Cedar Falls Way and at the SE Mount Si road intersection adjacent to properties zoned neighborhood business (NB) to the east and west to cemetery);
 - (d) North Bend Way (Cedar Falls Way to SE 140th Street, excluding SE Mount Si road intersection); and
 - (e) North Bend Way (SE 140th Street to 468th Avenue SE).
- (2) Specific sections of various collector streets have unique design criteria, as shown in Tables 4.3 and 4.4:
 - (a) 468th Avenue SE (North of SE 146th Street to SE 14th Street);
 - (b) 468th Avenue SE (North of SE 144th Street to SE Middle Fork Road;
 - (c) SE 140th Street from North Bend Way to Middle Fork Road intersection;
 - (d) Park Street from Bendigo Boulevard to Main Street;
 - (e) Park Street from Main Street to Healy Avenue S; and
 - (f) Park Street from Healy Avenue S to North Bend Way.
- (3) Also, local access streets have been divided into several specific classifications:
 - (a) Residential Local Access Streets and Cul-de-Sacs for Cottage Housing and Multiple Family;
 - (b) Residential Local Access Streets for Low Density Residential;
 - (c) Residential Local Access Streets – Low-Impact Design, Integrating Stormwater within the Rights-of-Way; and
 - (d) Woonerf Route for Homes Fronting to Open Space.

TABLE 4.1**Arterial/Cedar Falls Way Street Design Standards**

		Arterials (Major and Minor)	Cedar Falls Way (North Bend Way to Maloney Grove SE)	Cedar Falls Way (Maloney Grove Ave SE to 436th Ave SE)
Criteria⁽¹⁾				
A. Minimum Right-of-Way		76'	76'	91'
B. Minimum Pavement Width	2 lanes	32'	-	-
	3 lanes	44' ⁽²⁾	44' ⁽²⁾	44' ⁽²⁾
	5 lanes	66' ⁽²⁾	66' ⁽²⁾	-
C. Bicycle Lanes		5'	5'	5'
D. Parking Lanes		As required	As required	-
E. Concrete Curb & Gutter		Vertical	Vertical	Vertical ⁽⁵⁾
F. Landscape Strips		7' ⁽³⁾⁽⁴⁾	7' ⁽³⁾⁽⁴⁾	7' min. South Side ⁽³⁾ 7' min. North Side ⁽³⁾⁽⁶⁾
G. Sidewalks		8' ⁽³⁾⁽⁴⁾	8' ⁽³⁾⁽⁴⁾	8' South Side ⁽³⁾ 8' Trail North Side ⁽³⁾⁽⁵⁾⁽⁶⁾
H. Curb Radii		35'	35'	35'
I. Lighting		See Section 4.19	See Section 4.19	See Section 4.19
J. Trail		As required	As required	-
K. Design Speed ⁽⁷⁾		40 mph	40 mph	35 mph

Notes:

- (1) Within the above parameters, geometric design requirements shall be determined for specific roads consistent with AASHTO.
- (2) Includes 12-foot-wide left turn lane, or planted median if turn lane is not required.
- (3) If additional right-of-way width is available/provided, the sidewalk and/or landscaping strip widths shall be increased.
- (4) Subject to City approval, when arterial is located adjacent to commercial/retail uses, the sidewalk design shall incorporate street tree and/or tree grate design, minimum of 4 feet by 5 feet to match downtown core.
- (5) Adjacent to the Public Works site, excess forested right-of-way exists and shall be retained. An 8-foot meandering paved trail shall be constructed in lieu of the typical curb/gutter, planting strip and sidewalk.
- (6) Adjacent to parcels zoned Cottage Residential, a minimum 30-foot landscape buffer shall be provided and dedicated to the City. An existing 15-foot sewer easement exists on the northern edge of the right-of-way and this area shall be planted with Type II landscaping per NBMC 18.18, with due regard to the sewer line. The remaining 15-foot buffer shall preserve existing native vegetation, trees, and significant trees to the maximum extent possible. Supplemental plantings in this buffer shall be required to achieve a Type I landscape standard per NBMC 18.18.
- (7) Design speed serves as a basis for determining geometric elements of new roads and does not imply posted or legally permissible speeds. Design speed on existing roads is 5 mph over the posted speed limit or as tabulated above, whichever is less.

TABLE 4.2**North Bend Way Street Design Standards**

	North Bend Way (Bridge to East Park Street)	North Bend Way (East Park Street to Cedar Falls Way and at Mt. Si Road along NB Zone⁽¹²⁾)	North Bend Way (Cedar Falls Way to SE 140th Street)	North Bend Way (SE 140 Street to 468th Avenue)
Criteria⁽¹⁾				
A. Minimum Right-of-Way	76'	70'	76'	70'
B. Minimum Pavement Width	50' ⁽²⁾	50' ⁽¹¹⁾	44' ⁽²⁾	44' ⁽²⁾
C. Bicycle Lanes	Sharrow ⁽⁴⁾	4.5'	5'	5'
D. Parking Lanes	8'	8' North Side Only	As required	⁽⁹⁾
E. Concrete Curb & Gutter	Vertical	Vertical	Vertical North Side Only	Vertical North Side Only
F. Landscape Strips	-	Street Trees South Side	13' Bio-Channel North Side ⁽³⁾ Street Trees South Side	13' Bio-Channel North Side ⁽³⁾
G. Sidewalk	13' ⁽³⁾⁽⁵⁾	13' North Side ⁽³⁾⁽⁵⁾ Tanner Trail South Side ⁽⁸⁾	8' North Side Tanner Trail South Side ⁽⁸⁾	8' North Side
H. Curb Radii	35'	35'	35'	35'
I. Lighting	⁽⁶⁾	⁽⁶⁾	See Section 4.19	See Section 4.19
J. Trail	-	South Side ⁽⁷⁾	South Side ⁽⁷⁾⁽⁸⁾	-
K. Design Speed ⁽¹⁰⁾	35 mph	35 mph	35 mph	35 mph

Notes:

- (1) Within the above parameters, geometric design requirements shall be determined for specific roads consistent with AASHTO.
- (2) Includes 12-foot-wide left turn lane, or planted median if turn lane is not required.
- (3) If additional right-of-way width is available/provided, the sidewalk and/or landscaping strip/bio-channel widths shall be increased.
- (4) Sharrow bike indicator pavement markings shall be provided.
- (5) Street tree species shall be consistent with downtown core, pursuant to Chapter 18.18 NBMC.
- (6) Ornamental street light poles and fixtures on North Bend Way shall match downtown core light fixtures.
- (7) Match existing Tanner Trail section. On south side, street trees shall be of a medium or large species planted in the available swale area.
- (8) Tree species along Tanner Trail shall be Grand Fir, Douglas Fir, Western Red Cedar, or Dogwood. Native evergreen shrubs shall include Snowberry, Thimbleberry, Red Flowering Currant, Tall Oregon Grape, Nootka Rose, and Oceanspray.
- (9) Subject to City approval, additional right-of-way may be obtained or utilized on the south roadway edge, for emergency parking on the event of a pass closure or other.
- (10) Design speed serves as a basis for determining geometric elements of new roads and does not imply posted or legally permissible speeds. Design speed on existing roads is 5 mph over the posted speed limit or as tabulated above, whichever is less.
- (11) Includes 11-foot-wide left turn lane, or planted median if turn lane is not required.
- (12) Includes the SE Mount Si Road Intersection adjacent to properties zoned Neighborhood Business (NB) to the East and West to Cemetery.

TABLE 4.3**Collector/468th Avenue SE Street Design Standards**

	Collectors	468th Ave SE – North of SE 146th Street to SE 144th Street	468th Ave SE – North of SE 144th Street to SE Middle Fork Road
Criteria⁽¹⁾			
A1. Minimum Right-of-Way	68'	50'	50'
A2. Landscape Easements	-	25' East Side 30'-40' West Side	-
B. Landscape Buffers	-	10' Type 1 West Side – Between R-O-W and Landscape Easement	20' Type 1 East Side 40' Type 2 West Side
C. Minimum Pavement Width	38'	30' ⁽⁴⁾	30' ⁽⁶⁾
D. Parking Lanes	8'	-	-
E. Concrete Curb & Gutter	Vertical ⁽²⁾	Traffic Curb	-
F. Landscape Strips	6'	8' East Side 17' West Side	36' West Side ⁽⁷⁾
G. Sidewalks	8'	6' East Side 12' Shared Use Path West Side	12' Shared Use Path West Side
H. Curb Radii	35'	35'	35'
I. Lighting	See Section 4.19	See Section 4.19	See Section 4.19
J. Native Plants & Storm Treatment	-	Areas Beyond Sidewalks ⁽⁵⁾	20' East Side 10' Beyond Sidewalk West Side
K. Design Speed ⁽³⁾ mph	30	30	30

Notes:

- (1) Within the above parameters, geometric design requirements shall be determined for specific roads consistent with AASHTO.
- (2) Vertical curb and gutter unless low-impact development techniques are approved.
- (3) Design speed serves as a basis for determining geometric elements of new roads and does not imply posted or legally permissible speeds. Design speed on existing roads is 5 mph over the posted speed limit or as tabulated above, whichever is less.
- (4) Two 15-foot travel lanes separated by 12-foot landscaped median, inclusive of curbs.
- (5) Areas between sidewalks and private site improvements (parking and buildings) shall be landscaped with native plants and used for stormwater treatment.
- (6) Includes two 11-foot travel lanes plus 4-foot paved shoulders.
- (7) Landscaping with native plants and for stormwater treatment located between roadway and sidewalk.

TABLE 4.4

SE 140th Street & Park Street Design Standards

	SE 140 th Street from North Bend Way to Middle Fork Road	Park Street from Bendigo Blvd to Main Street	Park Street from Main Street to Healy Avenue	Park Street from Healy Avenue S to North Bend Way
Criteria⁽¹⁾				
A. Minimum Right-of-Way	64'	61'	60'	63'
B. Minimum Pavement Width	32'	41.5' ⁽⁴⁾	43' ⁽⁴⁾	46'
C. Parking Lanes	-	7.5' One Side Only	-	7.5'
D. Bike Lanes	5'	-	4.5'	4.5'
E. Concrete Curb & Gutter	Vertical	Vertical ⁽⁷⁾	Vertical ⁽⁷⁾	Vertical ⁽⁷⁾
F. Landscape Strip	8' North Side 8-10' Biochannel South Side	-	-	-
G. Sidewalk	6' North Side 8' HMA Trail South Side	6.5' North Side ⁽⁶⁾ 13' South Side ⁽⁶⁾	8' ⁽²⁾	8' ⁽²⁾
H. Curb Radii	35'	35'	35'	35'
I. Lighting	See Section 4.19	See Section 4.19	See Section 4.19	See Section 4.19
J. Native Plants & Storm Treatment	-	Street Tree ⁽⁵⁾ - <i>Parrotia Persica cv</i>	Street Tree ⁽⁵⁾ - <i>Parrotia Persica cv</i>	Street Tree ⁽⁵⁾ - <i>Parrotia Persica cv</i>
K. Design Speed ⁽³⁾ mph	30	30	30	30

Notes:

- (1) Within the above parameters, geometric design requirements shall be determined for specific roads consistent with AASHTO.
- (2) If additional right-of-way width is provided, the sidewalk widths shall be increased to a maximum of 15 feet.
- (3) Design speed serves as a basis for determining geometric elements of new roads and does not imply posted or legally permissible speeds. Design speed on existing roads is 5 mph over the posted speed limit or as tabulated above, whichever is less.
- (4) Includes 12-foot-wide left turn lane.
- (5) Street tree species shall be as indicated above or as otherwise approved by the CED Director, pursuant to Chapter 18.18 NBMC. Tree pits shall be a minimum of 4' by 5' (larger when space is available) and should use flexipave for fill or other approved material.
- (6) Sidewalk dimension includes curb.
- (7) Vertical curb and gutter unless low-impact development techniques are approved.

TABLE 4.5

Local Access Street Design Standards

	Residential Local Streets and Cul-De-Sacs For Cottage Housing and Multi-Family ⁽⁶⁾	Local Streets - Low Density Residential ⁽⁶⁾	Residential Local Streets - Low-Impact Design ⁽⁴⁾⁽⁶⁾
Criteria⁽¹⁾			
A. Minimum Right-of-Way	58'	54'	62' ⁽³⁾
B. Minimum Pavement Width	34'	34'	34'
C. Parking Lanes	8'	8'	8'
D. Concrete Curb & Gutter	Vertical ⁽²⁾	Vertical ⁽²⁾	Vertical ⁽²⁾
E. Landscape Strips	5'	4'	5' One Side Only
F. Sidewalks	6'	5'	5' ⁽⁵⁾
G. Curb Radii	25'	25'	25'
H. Lighting	See Section 4.19	See Section 4.19	See Section 4.19
I. Minimum Biochannel	-	-	11' ⁽⁴⁾
J. Design Speed ⁽⁷⁾ mph	25	25	25

Notes:

- (1) Within the above parameters, geometric design requirements shall be determined for specific roads consistent with AASHTO.
- (2) Vertical curb and gutter unless low-impact development techniques are approved.
- (3) Right-of-Way width as necessary to accommodate LID features.
- (4) LID features shall meet the requirements of Section 4.03C. Biochannel shall be utilized on one or both sides of roadway, and placed between sidewalk and roadway and shall be sized as necessary to accommodate the required treatment. Side slopes shall not exceed 3H:1V and the channel bottom shall be no less than 18 inches wide. Such LID features shall be placed between the roadway and sidewalk, but may be placed behind the sidewalk to retain a significant tree or other critical area.
- (5) Sidewalk shall meander with the contour of the biochannel/rain garden.
- (6) Cul-de-sacs will be allowed only when there are physical constraints, such as wetlands or excessive natural grade, or to efficiently serve difficult-to-access areas due to natural constraints.
- (7) Design speed serves as a basis for determining geometric elements of new roads and does not imply posted or legally permissible speeds. Design speed on existing roads is 5 mph over the posted speed limit or as tabulated above, whichever is less.

TABLE 4.6**AASHTO Sight Distance Criteria**

Design Speed (mph)	25	30	35	40	45
Horizontal Curvature, Radius, (Feet)	(1)	300	460	(1)	(1)
Stopping Sight Distance (Feet) ⁽³⁾	155	200	250	305	360
Entering Sight Distance (Feet) ⁽⁴⁾	280	335	390	445	500
Residential Driveway ESD	150	200	250	325	-

Notes:

- (1) Local access streets that terminate in a permanent cul-de-sac or form shot loops off an adjacent local access street may use the following minimum centerline radii:
- Up to 75 degree curve delta – 100 feet
 - 75 degree curve delta and over – 55 feet
- (2) Horizontal curvature to be designed by Engineer.
- (3) Driver eye height = 3.5 feet, object height = 2.0 feet, distances require adjustment per AASHTO for grades greater than 3 percent.
- (4) Driver eye height = 3.5 feet, measured 10 feet back from face of curb or edge of traveled land. Object height = 4.25 feet, distances require adjustment per AASHTO for approach grades greater than 3 percent. Entering sight distance for right turns may be reduced per AASHTO.

TABLE 4.7**Woonerf Design Criteria**

Right-of-Way Width	<p>With optional parking lane – 27 feet: vertical curb & gutter on residential side only for parking barrier, at-grade 12-inch cement concrete border on open space side of woonerf, multi-use woonerf for remainder of open space including space for one 7.5-foot parking lane and two 9-foot travel lanes (shared with pedestrians).</p> <p>Without optional parking lane – 20 feet: no curbs, two at-grade 12-inch cement concrete borders, two 9-foot travel lanes.</p> <p>Open space side of woonerf is signed with No Parking – Fire Lane. Width narrows to 15 feet (without parking lane) at driveway apron to the primary street.</p> <p>Park or common open space adjacent to woonerfs shall only accommodate the stormwater runoff originating from the woonerf area.</p>
Paved Roadway Width Inside Curbs/Borders	25.5 feet with optional parking lane, 18 feet without parking lane. Signed “No Parking – Fire Lane” on open-space side of roadway.
Cement Concrete Traffic Curb and Gutter or Border	<p>With optional parking lane: vertical curb & gutter on residential side, except as when best available low-impact development techniques used as approved by the City. At-grade 12-inch-wide by 8-inch-deep cement concrete border on park side.</p> <p>Without optional parking lane: at-grade 12-inch wide by 8-inch deep cement concrete border on both sides.</p>
Sidewalk and ADA Ramps	Not applicable. Sidewalk and drive area are shared. Area shall be signed “Caution. Pedestrians Share Roadway.” ADA ramp is provided at driveway apron into Woonerf.
Curb Radii	25 feet.
Maximum Dwelling Units Accessed	Limited to serving access to approximately 16 homes.

4.04 Street Frontage Improvements

- A. All industrial, commercial, and residential development shall install street frontage improvements at the time of construction. Such improvements shall include vertical concrete curb and gutter, concrete sidewalk, street storm drainage, street lighting system, utility relocation, landscaping and irrigation, undergrounding aerial utilities and street pavement widening all per these Standards. Plans shall be prepared and signed by a licensed engineer currently registered in the State of Washington.
- B. All frontage improvements shall be made across the full frontage of the property.
- C. Exceptions. The following shall be exempt from constructing frontage improvements:

- (1) Projects wherein the cost of the street improvements along the property frontage is greater than 20 percent of the cost of the cumulative building alterations (including impact fees) in any 5-year period according to the following:

- a. Street improvement costs shall include, but not be limited to, roadway asphalt, storm drainage, curb and gutter, landscape strip, street trees, and sidewalk.
 - b. For properties with multiple street frontages, the average length of the combined multiple street frontages will be used for the purposes of determining whether street improvements are required. If street improvements are required, the cost of the improvements along any of the multiple street frontages shall not exceed 20 percent of the cost of the cumulative building alterations (including impact fees) in any 5-year period.

- (2) When improvements cannot be reasonably accomplished in a timely manner a recorded agreement (performance surety or equal) on forms provided by the City shall be completed which provide for these improvements to be installed at a later date by the proponent.

New or improved homes on existing single-family lots may be exempt from providing “urban” type street improvements, but may be subject to “rural” type improvements provided these are consistent with the surrounding roads.

- D. Right-of-way shall be conveyed to the City on a recorded plat or by a right-of-way dedication deed, even if the project is exempt from street frontage improvements under C. above. All costs of same to be borne by the property owner/developer.

4.05 Private Streets

A. General

While community street requirements are usually best served by public streets, owned and maintained by the City, private streets may be appropriate for some local access streets.

B. Conditions

Private streets shall be allowed to serve existing recorded lots when the following conditions exist:

- (1) The existing lot does not abut a public street right-of-way; and
- (2) The only access to the lot is by an easement across an adjacent lot or lots not under the ownership of the lot or lots to which the private street is to provide service; or across property under the same ownership when there is insufficient right-of-way width; and
- (3) The private street will not serve more than four single-family dwelling units when the property to be served has been developed to its fullest extent.

Private streets shall be allowed to serve new lots created under the short plat or subdivision ordinances of the city if the following conditions exist:

- (4) There is insufficient width (less than 50 feet) under single ownership to construct a standard public street in accordance with the city's standards for that zoning district; and
- (5) The ultimate number of lots to be served by the private street is four or less dwelling units or dwelling unit equivalents; and
- (6) That in the judgment of the Public Works Director or his designee, there is not a need for a through connection to collector streets beyond the border of the property to be served.

C. Approval

Private streets may be approved by the Director only when they are:

- (1) Permanently established by right-of-way, tract or easement providing legal access to each affected lot, dwelling unit, or business and sufficient to accommodate required improvements, to include provision for future use by adjacent property owners when applicable; and
- (2) Built to these standards, as set forth herein, or secured under the provisions of the subdivision regulations; and

- (3) Accessible at all times for emergency and public service vehicle use (this precludes to use of gates on private streets); and
- (4) Not obstructing, or part of, the present or future public neighborhood circulation plan developed in processes such as the City of North Bend comprehensive plan, or capital improvement program; and
- (5) Not going to result in land locking of present or future parcels; and
- (6) Not needed as public roads to meet the minimum road spacing requirements of these standards; and
- (7) Maintained by a capable and legally responsible owner or homeowners' association or other legal entity made up of all benefited property owners, under the provisions of the applicable codes. The City of North Bend will not maintain (including snow & ice removal) or repair private streets; and
- (8) Clearly described on the face of the plat, short plat, or other development authorization and clearly signed at street location as a private street, for the maintenance of which the City of North Bend is not responsible.

D. Acceptance of Private Streets

The City will not accept private streets for maintenance as public streets until such streets are brought into conformance with current City standards including Section 4.03. This requirement will include the hard surface paving of any streets originally surfaced with gravel.

The City will not accept private streets within short plats when the roads providing access to the plat are private and already have the potential to serve more than the number of lots specified in subsection 4.06 B. Short plats proposed on properties to which the access is over private streets that do not meet the standards in this section shall be denied.

E. All private streets shall be constructed in accordance with the standards set forth in this Chapter, except as modified herein:

- (1) The streets shall have an unobstructed driving width of not less than 20 feet;
- (2) The roadway grade shall not exceed ten percent; provided, however, the City's Public Works Director may allow a steeper grade if, in his/her professional opinion
 - a. The structural integrity of the road is not jeopardized by the steeper grades; and
 - b. The public safety is adequately protected and in no way compromised by the steeper road grade. The engineer may require over-stringent construction standards including the paving of the street if he deems it

necessary in order to protect the structural integrity of the driving surface and protect the public safety as a result of the steeper grade;

- (3) The private street shall have an overhead clearance of not less than 14 feet, 6 inches;
- (4) If the private street is to exceed 150 feet in length, then it shall be provided with a cul-de-sac or other suitable turnaround;
- (5) A road maintenance agreement on forms provided by the city shall be executed and recorded at the time of street approval and shall be covenants running with the lands;
- (6) Building setbacks, where applicable, shall be measured from the private street right-of-way;
- (7) The minimum right-of-way width shall be 20 feet. Additional right-of-way may be required to allow for storm drainage or other public utilities. Utilities shall be located outside of the 20-foot surface of the roadway. Utility easements shall be provided to the city as needed;
- (8) Front yard setbacks, measured from the right-of-way line shall apply to buildings fronting on a private street. For corner lots that will be adjacent to a private street, the front yard setbacks shall be observed along the private and public street unless the property owner constructs a four-foot-high fence, or its equivalent, along the full length of the former lot on the private street side. The building setback from the private street shall then be the same as the side yard setback;
- (9) The private street shall be paved from the paved portion of the public street to a distance 25 feet from the edge of the public street right-of-way;
- (10) The standards set forth herein shall be minimum requirements as to slope and materials. Greater slope and materials may be required if in the opinion of the city engineer they are necessary in order to maintain the structural integrity of the private street.

4.06 Cul-de-Sacs, Hammer-Heads and Eyebrows

- A. Whenever a street serves more than six lots or extends more than 150 feet from centerline of accessing street to farthest extent of surfaced traveled way a widened “bulb” or hammerhead shall be constructed as shown in the drawings.
- B. Any permanent cul-de-sac shall not serve more than 13 potential single-family dwelling units. Cul-de-sac distances should not exceed 450 feet except where topographic or other physical constraints prevent an interconnected street pattern. Cul-de-sacs shall not exceed 600 feet.

- C. Cul-de-sacs, T-shaped, and Y-shaped turnarounds shall include pedestrian and/or bicycle connections to adjoining properties whenever possible. The city engineer may require an off-street walk or an emergency vehicle access to connect a cul-de-sac at its terminus with other streets, parks, schools, bus stops, or other pedestrian traffic generators, if the need exists.
- D. Temporary cul-de-sacs may be allowed when future extensions of the streets are anticipated. Temporary cul-de-sacs shall be designed pursuant to North Bend Standard Plan T-13. If a street temporarily terminated at a property boundary serves more than six lots or is longer than 150 feet, a temporary cul-de-sac shall be constructed near the plat boundary. The paved cul-de-sac shall be 90 feet in diameter. Removal of the temporary cul-de-sac and reconstruction of the street shall be the responsibility of the developer who extends the road. Reconstruction shall include demolition and wastehaul of all temporary improvements, grading and subgrade preparation, extension and installation of storm drainage (if required), curbs, gutters, sidewalks, and other improvements to make for a complete and whole street section.
- E. The maximum cross slope in a bulb shall not exceed six percent.
- F. A “hammer head” turnaround shall only be approved by variance, and shall not be used to serve more than 9 lots. Hammerheads shall only be used in place of a bulb when site constraints (critical areas, slope, etc.) preclude the practical use of a bulb.

4.07 Intersections

- A. Traffic control devices will be as specified in the Manual on Uniform Traffic Control Devices (MUTCD) or as may be specifically modified by the City Public Works Director as a result of appropriate traffic engineering studies.
- B. Street intersections shall be laid out so as to intersect as nearly as possible at right angles, and in any event, no street shall intersect with any other street at an angle of less than 85, or more than 95 degrees. Sharp angled intersections shall be avoided. For safe design, the following types of intersection features should be avoided:
 - (1) Intersections with more than four intersecting streets;
 - (2) “Y” type intersections where streets meet at acute angles;
- C. On sloping approaches at an intersection, landings shall be provided with grade not to exceed one foot difference in elevation for a distance of 30 feet approaching any arterial or collector or 20 feet approaching an local access street, measured from nearest right-of-way line (extended) of intersected street.

- D. Spacing between adjacent intersecting streets, whether crossing or T-connecting, shall be as follows:

When Highest Classification involved is:	Minimum centerline offset shall be:
Principal arterial	1,000 feet
Minor arterial	500 feet
Collector	240 feet
Local Access	125 feet

- E. Curb radii at intersections shall be 35 feet for any street connecting to a Arterial or Collector and 25 feet at all other intersections. Minimum right-of-way radius shall be 25 feet.
- F. Where alleys or woonerfs intersect with streets, curbs on intersecting street will be painted for a distance of 20 feet in both directions from alley or woonerf intersection with high-visibility industrial enamel safety yellow and sight obstructions will be limited at discretion of city for safety of drivers and pedestrians negotiating the alley or woonerf.

4.08 Half Streets

A “half-street” improvement is typically constructed as a partial street along the common side property line of a developing parcel, when the adjacent parcel is undeveloped or underdeveloped. The intent is to have the first developing parcel establish the location of the street that will eventually serve both parcels. In this situation, the first developing parcel shall construct a full-width street in accordance with its associated classification, including drainage and curb-and-gutter on both sides. However, the sidewalks and planter strip on the side opposite the development shall not be required. The adjacent parcel will complete the remaining improvements at a later date, when it is developed.

No requirements in this section shall force the developer to obtain or acquire a dedication of additional right-of-way or easements from another property owner.

4.09 One-Way Streets

Local access streets, including loops, may be designated one-way upon a finding by the city engineer that topography or other site features make two-way traffic impractical.

4.10 Woonerfs

- A. Woonerfs are shared access routes for use by pedestrians, bicyclists and vehicles at a very low speed, with pedestrians having the dominant role. Woonerfs may be incorporated in new single-family and multi-family residential projects to provide driveway access to the front of homes when such homes front to a park or common open space under the following conditions:
- (1) The woonerf may be used as an alternative to a cul-de-sac for providing access to a maximum of 16 homes in locations where providing standard streets would create excessive paving.

- (2) Woonerfs must connect to a street at both ends, and must be adjacent to a park or common open space area on one side, and shall only accommodate the stormwater runoff originating from the woonerf area.

4.11 Bus Zones and Turn-Outs

During the design of arterials and collectors, the designer shall contact the service provider, and the local school district to determine bus zone (stop) locations and other bus operation needs. The road project shall provide accessible landing pads at designated bus zones as per Americans with Disabilities Act (ADA) and where required shall include turn-outs and shelter pads. Pedestrian and wheelchair access improvements within the right-of-way to and from the bus loading zone or turn-out from nearby businesses or residences shall also be provided as part of the road improvement. Surfacing requirements may also be affected, particularly on shoulders.

4.12 Access and Circulation Requirements

- A. A future street plan shall:
 - (1) Be filed by the applicant in conjunction with an application for a subdivision or development, when required by the city engineer. The plan shall show the pattern of existing and proposed land division and shall include other parcels within 1-quarter mile surrounding and adjacent to the proposed land division. A street proposal may be modified when subsequent subdivision proposals are submitted.
 - (2) Identify existing or proposed bus routes, pullouts or other transit facilities, bicycle routes and pedestrian facilities on or within 500 feet of the site.
- B. All local access and collector streets which abut a development site shall be extended within the site to provide through circulation when not precluded by environmental or topographical constraints, existing development patterns or strict adherence to other portions of the City standards. Residential local access streets should provide for multiple vehicle connections/access to collector streets, whenever feasible. A street connection or extension is considered precluded when it is not possible to redesign or reconfigure the street pattern to provide required extensions. In the case of environmental or topographical constraints, the mere presence of a constraint is not sufficient to show that a street connection is not possible. The applicant must show why the constraint precludes some reasonable street connection.
- C. The location, width and grade of all streets shall conform to the approved street plan and shall be considered in their relation to existing and planned streets, to topographic conditions, to public convenience and safety, and in their appropriate relation to the proposed use of the land to be served by such streets. Such a plan shall be based on the type of land use to be serviced, the volume of traffic, the capacity of adjoining streets and the need for public convenience and safety.

- D. Where the location of a street is not shown in an approved street plan, the arrangement of streets in a development shall either:
- (1) Provide for the continuation or appropriate projection of existing streets in the surrounding areas, or;
 - (2) Conform to a plan adopted by the City Council if it is impractical to conform to existing street patterns because of topographical or other existing conditions of the land.
- E. All development shall provide an internal network of connecting streets that minimize travel distances within the development.
- F. To give access or permit a satisfactory future division of adjoining land, streets shall be extended to the boundary lines of adjacent vacant or underdeveloped properties, and
- (1) These extended streets or street stubs to adjoining properties are not considered to be permanent cul-de-sacs since they are intended to continue as through streets at such time as the adjoining property is developed. A temporary cul-de-sac shall be constructed in accordance with Section 4.06.
 - (2) A Type III barricade shall be constructed at the end of the street by the developer which shall not be removed until authorized by the city engineer, the cost of which is to be included in the street construction cost. The sign shall read:

**THIS STREET TO BE EXTENDED WITH FUTURE
DEVELOPMENT BEYOND THIS POINT.**

4.13 Access Requirements

- A. In order to provide for increased traffic movement on arterial and collector streets and to eliminate turning movement conflicts, the city engineer may restrict the location of driveways on streets and require the location of driveways be placed on adjacent streets upon the finding that the proposed access would:
- (1) Cause or increase existing hazardous traffic conditions; or
 - (2) Provide inadequate access for emergency vehicles; or
 - (3) Cause hazardous conditions to exist which would constitute a clear and present danger to the public health, safety, and general welfare.
- B. In order to eliminate the need to use public streets for movements between commercial or industrial properties, parking areas shall be designed to connect with parking areas on adjacent properties unless not feasible. The city engineer shall require access easements between properties where necessary to provide for parking area connections.

- C. In order to facilitate pedestrian and bicycle traffic, access and parking area plans shall provide efficient sidewalk and/or pathway connection between neighboring developments or land uses.
- D. Proposed street or street extensions shall be located to provide direct access to existing or planned transit stops or other neighborhood activity centers, such as schools, shopping areas, and parks.

4.14 Street Names

The developer must check with the City regarding the naming of streets. This should be done at the time the preliminary plat is submitted and again upon approval of the final plat. The city engineer will insure that the name assigned to a new street is consistent with policies of the City and in accordance with NBMC 12.12.050.

An address number will be assigned by the city building official or designee to all new buildings at the time the building permit is issued in accordance with NBMC 12.12.040. It is then the owner's responsibility to see that the house numbers are placed clearly and visibly at the main entrance to the property or at the principal place of ingress.

4.15 Signing

All street signs shall be designed by the developer and submitted for review to the city engineer. Upon approval and at the appropriate time, the City shall direct the developer to install the signs, as approved. Traffic control signing shall comply with the provisions as established by the U.S. Department of Transportation Manual on Uniform Traffic Control devices (MUTCD).

4.16 Slope, Wall and Drainage Easements

Either the functional classification or particular design features of a road may necessitate slope, sight distance, wall or drainage easements beyond the right-of-way line. Such easements may be required by the city engineer in conjunction with dedication or acquisition of right-of-way.

4.17 Pavement Markings

Pavement markings, markers or striping shall be used to delineate channelization, lane endings, crosswalks and longitudinal lines to control or guide traffic per MUTCD. All pavement markings shall be designed by the developer and submitted for review to the city engineer. Upon approval and at the appropriate time, the City shall direct the developer to install the markings, as approved. Channelization plans or crosswalk locations shall be approved by the city engineer.

All long line markings (centerline, edge line, lane line, etc.) shall be reflective hot- or cold-applied, sprayed or extruded paint. All other pavement markings (crosswalk, stop line, arrows, railroad markings, bicycle lane symbols, etc.) shall be reflective Type-A liquid hot-applied adhesive thermoplastic. All markings shall include glass beads. See Division 8 of WSDOT Standard Specifications for marking application procedures.

Crosswalks, where required by the city engineer, shall be stenciled with a piano key pattern and infilled with white thermoplastic as provided by Integrated Paving Concepts, Inc., PMB 48, 936

Peace Portal Drive, Blaine, WA 98230, or approved equal. Treatment for the crosswalk shall be as selected by the City's Public Works Director.

Where solid double yellow striping is required (e.g., to delineate no passing zone), a pair of Type 2YY Raised Pavement Markers (RPMs) shall be installed to supplement the lines. The RPMs shall be installed immediately outside the painted lines at a spacing not greater than 40 feet.

4.18 Sight Obstruction

All new development shall design and construct streets, driveways, and street intersections in accordance with the sight distance criteria for entering sight distance (ESD) and stopping sight distance (SSD) as specified in Table 4.3.

In addition, per this section, the triangular area identified by the required sight line (as described in Table 4.3) for all existing and proposed street intersections shall be kept clear of obstructions between 42 inches and ten feet above the existing surface of the street.

Exclusions. Sight obstructions that may be excluded from these requirements include: utility poles, regulatory signs, trees trimmed from the base to a height of 10 feet above the street, and saplings or plant species of open growth habits and not in the form of a hedge which are so planted and trimmed as to leave at all seasons a clear and unobstructed cross view, buildings constructed in conformance with the provisions of appropriate zoning regulations and preexisting buildings.

4.19 Electrical and Street Illumination

Illumination shall be provided at all intersections within and abutting the development, at the end of dead-end streets containing more than three homes, at the apex of sharp curves, and any additional areas where determined for safety by the public works director, and as specified in NBMC 19.06.110. All illumination shall be designed and constructed using materials as specified by the local electrical utility, except as otherwise designated by the City.

- A. All new wiring for any utilities shall be buried with pad-mounted transformers. Design and installation of the system shall be done by the franchise utility company, or qualified engineer. Design shall be submitted to the city engineer for review prior to installation.
- B. Continuous illumination will be required for channelization accommodating additional lanes including the tapers. Illumination will also be required as identifiers where roads intersect arterials or for frequently used pedestrian areas on arterials.
- C. Widening of arterials with existing continuous illumination will require maintaining the continuous illumination. Widening to the ultimate roadway width will require illumination designed to current standards.
- D. The standard luminaire shall utilize full cutoff fixtures and a flat glass refractor. The standard luminaire shall be as specified by the local electrical utility. As an alternative, illumination may be provided from existing utility poles, with permission from the city engineer. The city engineer may require that analysis of light and glare be provided to show that any extra illumination beyond these standards will not have a significant

adverse impact on existing land uses in the area. Energy efficient fixtures shall be required and shall provide a corrected light color temperature not to exceed 3,000 Kelvin.

E. Illumination shall be provided as follows:

Street Classification	Average Lighting Foot-Candles ⁽¹⁾
Arterial	0.6
Collector	0.4
Local Access/Half-Street	0.4

(1) In areas where lighting is required.

Some areas are classified as high or medium pedestrian areas, as determined by the city engineer. Higher levels of illumination will be required in those areas classified as high or medium pedestrian use.

4.20 Traffic Signals

Signalization will be required if warranted as determined by an existing study and/or transportation study performed by the Developer at the request of the City. All traffic signal components shall be designed by the developer and submitted for review to the city engineer. Upon approval and at the appropriate time, the City shall direct the developer to install, test, and commission the traffic signal, as approved. All components of the signals shall become property of the City.

4.21 Parking Lots

Parking lot surfacing materials shall satisfy the requirement for a permanent all-weather surface. Asphalt concrete pavement and cement concrete pavement satisfy this requirement and are approved materials. Gravel surfaces are not acceptable for approved surface material types. Porous asphalt, permeable concrete, permeable interlocking concrete pavers, and grid pavements may also be utilized in parking lot surfacing as allowed by adopted LID standards.

4.22 Survey Staking

All surveying and staking shall be performed by an engineering or surveying firm employed by the Developer and capable of performing such work. The engineer or surveyor performing and directing such work shall be currently licensed by the State of Washington to perform said task.

General construction inspection by the City shall not be considered approval of the staking nor relieve the contractor's responsibility to install infrastructure improvements in accordance with approved plans.

4.23 Driveways

Driveways are used to provide vehicle access from the public right-of-way to a building or interior portion of a parcel. Within the right-of-way, a driveway "entrance" provides a transition from the street to the driveway. The entrances are typically constructed of cement concrete or

asphalt/gravel. The driveway from the entrance into the parcel is constructed of cement concrete, asphalt, gravel, or pavers.

A. General

- (1) Driveway entrance details are located at the end of these Standards. Driveway entrances shall be constructed in accordance with Section 8-06 of the Standard Specifications.
- (2) All abandoned driveway entrance areas on the same frontage shall be removed and the curbing and sidewalk or shoulder and ditch section shall be properly restored, at the Property Owner's expense.
- (3) Maintenance of driveway entrances and culverts shall be the responsibility of the owners whose property they serve.
- (4) A right-of-way use permit shall be required for any work within the public right-of-way or otherwise involving a driveway entrance, and may require the entrance to be upgraded for ADA. No person shall begin work on the construction, alteration, or removal of any driveway or the paving of any parking strip on and/or adjacent to any street, alley or other public place in the City without first obtaining a permit from the City.
- (5) Existing driveways may be reconstructed or repaired as they exist provided such reconstruction is compatible with the adjacent road. A right-of-way use permit shall not be required for driveway reconstruction or repair.
- (6) Notwithstanding any other provisions, driveways will not be allowed where they are prohibited by separate City Council action or where they are determined by the city engineer to create a hazard or impede the operation of traffic on the roadway.

B. Location and Width of New Driveways

- (1) A residential driveway shall typically serve only one parcel. Street frontage affected by driveways may be reduced by sharing driveways and reducing driveway width; a driveway addressing more than one parcel shall be classed as a commercial driveway, or joint use driveway, except as provided in subsections (2)(a) and (2)(b) of this section.
- (2) No portion of driveway entrance shall be allowed within five feet of side property lines where it intersects with the street right-of-way line in residential areas or nine feet in commercial areas except as follows:
 - (a) A joint use driveway tract may be used to serve a maximum of four parcels:
 - (i.) Minimum tract width shall be 20 feet with an 18-foot paved surface, cross slope in one direction and curb or thickened edge

on one side, or designed as an inverted crown. Minimum tract length shall be 20 feet from right-of-way line.

- (ii.) Driving surface shall be paved, with a paved entrance from the edge of pavement (or curb) of intersecting street to right-of-way line.
 - (iii.) The city engineer may allow use of an easement if the only access to a serving roadway is through an adjacent parcel not owned by the applicant.
- (b) Driveways may utilize full width of narrow “pipe-stem” parcels or easements if approved by the city engineer.
- (3) Grade transitions, excluding the tie to the roadway, shall be constructed as smooth vertical curves. The maximum change in driveway grade, shall be eight percent within any 10 feet of distance on a crest and 12 percent within any 10 feet of distance in a sag vertical curve. Driveway shall be graded to match into possible future widened road section without encroachment into graded shoulder or sidewalk. The design engineer for proposed developments shall consider the access driveway profile when designing the serving road to ensure that required grade transitions can be complied with considering building setback and lot terrain conditions. A drawing showing the grade transitions shall be required to be submitted to the City at the time of building permit approval.
- (4) No driveway entrances shall extend into the street further than the face of the curb.
- (5) Every driveway must provide access to a garage, carport, parking area or other structure on private or public property requiring the entrance of vehicles. No public curb shall be cut unless a driveway is installed.
- (6) Driveway locations should also be reviewed for sight distance and general operations. No driveway entrance shall be located as to create a hazard to pedestrians, bicyclists or motorists or to invite or compel illegal or unsafe traffic movements.
- (7) No driveway entrance or driveway shall be constructed in such a manner as to be a hazard to any existing street lighting standard, utility pole, traffic regulating device or fire hydrant. At a minimum all portions of the driveway entrance shall be located 5 feet from these and similar appurtenances. The cost of relocating any such street structure when necessary to do so shall be paid by the abutting property owner. The relocation of any street structure shall be allowed with the specific written approval of the Owner of the structure involved.
- (8) Driveways for corner lots shall be located on the minor street side.

C. Dimensions, Slope, Details

- (1) Residential driveway widths are based on the number and orientation of garage bays. Driveway widths at the street or single-double-, and triple-bay garages that are side loaded and for garages at the rear of the lot may be up to 10-feet wide.
- (2) For front-loaded garages, residential driveways may be up to 10-feet wide for a single-bay garage, and up to 16-feet wide for double- and triple-bay garages. To minimize disruption of the sidewalk, these maximum widths should be reduced where, due to lot width, lot depth, house location, building type, and/or topography, a reduced driveway width would allow vehicles to easily and safely maneuver from the garage to the street.
- (3) The length of any driveway shall not exceed 150 feet, without approval of the city engineer.
- (4) Driveways and off-street parking for single-family residences need not be paved; provided, however, where said residence abuts upon a paved street, the driveway access and any parking must be paved from the paved street to the building setback line or a distance of 25 feet, whichever is greater. The subsurface and paving surface shall be of such materials and constructed in such a manner as the city engineer deems appropriate and pursuant to any applicable city design and construction standards.
- (5) Driveway slopes or grades shall not exceed fifteen percent unless otherwise authorized/approved by the city engineer in writing. A drawing shall be provided showing the driveway slopes on both edges. The city engineer will consider authorizing driveway slopes up to a maximum of twenty percent, if it is determined that:
 - (a) The driveway location is the only economically and environmentally reasonable alternative.
 - (b) The driveway will not present a traffic, pedestrian, bicycle or safety hazard.
 - (c) The Fire Marshal concurs in allowing the increased driveway slope.
 - (d) The public health, safety and general welfare will not be adversely affected.
 - (e) Driveways giving direct access onto arterials may be denied if alternate access is available.
 - (f) A wider road approach or driveway entrance may be approved by the city engineer where a substantial percentage of oversized vehicle traffic exists, where divisional islands are required/desired, or where multiple exit or entrance lanes are needed.

- (g) Parking lot circulation and signing needs shall be met on site. The public right-of-way shall not be utilized as part of a parking lot flow.
 - (h) Road approaches and/or ingress and egress tapers may be required in industrial and commercially zoned areas as directed by the city engineer.
 - (i) For driveways crossing an open ditch section, culverts shall be adequately sized to carry anticipated stormwater flows and in no case be less than 12 inches in diameter. The property owner making the installation shall be responsible for determining proper pipe size. The city engineer may require the owner to verify the adequacy of pipe size. Concrete pipe shall have a minimum cover of 6 inches to finish grade. All other pipes shall have a minimum cover of 12 inches.
- (6) The angle between any driveway and the street shall be not less than 60°.
 - (7) Generally, the two edges of each driveway shall be parallel.
 - (8) All driveway entrances shall be constructed over a 4-inch crushed surfacing (5/8 inch minus) top course. Driveway entrances shall be subject to the same testing and inspection requirements as curb, gutter, and sidewalk construction. Portland cement concrete driveways shall be 6-inches thick, including the portion from the gutter to the back edge of sidewalk.
 - (9) Driveway entrance to City streets shall be paved, unless otherwise approved by the city engineer.

D. Commercial Driveways

The maximum width for any commercial driveway shall be 35 feet. Traffic flow through a commercial site will be reviewed to determine minimum width needed. Commercial driveways shall be constructed with 8-inch-thick air-entrained Class 4000 cement concrete with reinforcing steel bars or mesh.

For commercial or industrial driveways with heavy traffic volumes or significant numbers of trucks, the city engineer may require construction of the access as a road intersection. This requirement will be based on traffic engineering analysis submitted by the applicant that considers, among other factors, intersection spacing, sight distance and traffic volumes. No commercial or industrial type driveway shall be constructed, if reasonably possible, where backing onto the sidewalk or street is required.

4.24 Sidewalks, Curbs and Gutters

A. General

All properties within commercial zones of the City, or abutting arterial streets, collectors or local access streets shall, in conjunction with new construction, alterations, reconstruction, or improvements of such properties, where the total cost of construction, reconstruction or remodeling in the opinion of the City warrants frontage improvements,

provide sidewalks, curbs and gutters along abutting streets, in accordance with the details provided herein. Single-family residences, not associated with short plats or long plats, may be exempt from this requirement, if approved by the City Engineer and CED Director. See Section 4.04.

B. Design Standards

Plans for the construction of sidewalks, curbs and gutters are to be submitted as part of the street plans when applicable.

The City has set forth minimum standards as shown in the details which must be met in the design and construction of sidewalks, curbs and gutters. Because these are minimum standards, they may be modified by the City should the city engineer feel circumstances require variances to minimum design standards.

C. Sidewalks

- (1) Major and Minor Arterial Streets. Sidewalks, curbs and gutters shall be required on both sides of all arterial streets interior to the development, and also be required on the development side of streets abutting the exterior of said development. Special design criteria, according to the location of the development, is identified for Cedar Falls Way and North Bend Way, as shown in Tables 4.1 and 4.2, respectively.
- (2) Collector Streets. Sidewalks, curbs and gutters shall be required on both sides of all collector streets interior to the development, and shall also be required on the development side of streets abutting the exterior of said development. Special design criteria, according to the location of the development, is identified for 468th Avenue SE, SE 140th Street, and Park Street as shown in Tables 4.3 and 4.4.
- (4) Local Access Streets. Sidewalks, curbs and gutters shall be required on both sides of all local access streets interior to the development, and shall also be required on the development side of streets abutting the exterior of said development.
 - (a) Residential Local Access Streets and Cul-de-Sacs for Cottage Housing and Multiple Family. Sidewalks shall be separated from the curb by a landscape buffer of a minimum of 5 feet. Sidewalks shall be a minimum of 6-feet wide.
 - (b) Residential Local Access Streets for Low Density Residential. Sidewalks shall be separated from the curb by a landscape buffer of a minimum of 4-feet wide. Sidewalks shall be a minimum of 5-feet wide.
 - (c) Residential Local Access Streets with Low Impact Development. Sidewalks shall be separated from the curb on one side of the roadway by a landscape buffer a minimum of 5-feet wide, or on the other side of the roadway by a minimum of 11 feet, as a biochannel. Sidewalks shall be a minimum of 5-feet wide.

- (7) All Landscape buffers adjacent to sidewalks shall be landscaped consistent with NBMC 18.18.125 or as otherwise approved by the city engineer and maintained by the abutting property owner(s). The adjacent landowner shall keep sidewalks free of all obstructions, snow, ice, and other substances that may be a hazard to the walking public.
- (8) The design of all sidewalks shall provide for a gradual taper rather than an abrupt transition between sidewalks of different widths or alignments.
- (9) Form and subgrade inspection by the City, are required before sidewalk is placed. Monolithic placement of curb, gutter and sidewalk will not be allowed.
- (10) Sidewalks shall be constructed of Class 3000 or Class 4000 air-entrained Portland Cement Concrete, 4 inches thick (6-inches thick at driveway entrances or along access points for public facilities).
- (11) Sidewalks shall be constructed on compacted crushed surfacing top or base course, of suitable thickness, but no less than 2 inches, to provide a firm and unyielding base. Sidewalks will be constructed of Portland Cement Concrete as described in Section 8-14 of the Standard Specifications and be designed and constructed in compliance with those details as shown herein. Typically, in commercially zoned areas the sidewalks shall abut the curb. The city engineer shall be at liberty to vary sidewalk dimensional characteristics and location to meet localized or existing conditions.

D. Curb and Gutter

Cement concrete curb and gutter shall be used for all street edges unless otherwise approved by the city engineer. All curbs and gutters shall be constructed in accordance with Section 8-04 of the Standard Specifications. Curbs shall be of the vertical face type. No rolled curb and gutter profile will be allowed without specific approval of the city engineer. When rolled curbs are approved, all sidewalks abutting the rolled curb shall be a minimum 6-inches thick.

No extruded curb options will be accepted by the city during construction.

Form and subgrade inspection by the City are required before curb and gutter are placed.

Forms, wood or steel, shall be staked securely in place, true to line and grade.

Sufficient support shall be given to the form to prevent movement in any direction, resulting from the weight of the concrete or the concrete placement. Forms shall not be set until the subgrade has been compacted within one inch of the established grade. Forms shall be clean and well-oiled prior to setting in place. Immediately prior to placing the concrete, forms shall be carefully inspected for proper grading, alignment and rigid construction. Adjustments and repairs as needed shall be completed before placing concrete.

The subgrade shall be properly compacted and brought to specified grade before placing concrete. The subgrade shall be thoroughly dampened immediately prior to the placement of the concrete. Concrete shall be spaded and tamped thoroughly into the forms to provide a dense, compacted concrete free of rock pockets. The exposed surfaces shall be floated, finished and brushed longitudinally with a fiber hair brush approved by the City's inspector and/or city engineer.

Joints shall be constructed in the manner and at the locations shown in the drawings. They shall be cleaned and edged as shown on the drawings. All expansion joints shall extend entirely through the curb section above the pavement surface. Joint filler in the curb shall be normal to the pavement and in full but contact with pavement joint filler.

E. Curb Ramps

All sidewalks must be constructed to provide for curb ramps in accordance with ADA, PROWAG, and the current requirements as determined by WSDOT. Details provided herein are minimum and subject to change. It is the Developer's responsibility to verify current requirements and install same per current standards even if City has approved of construction drawings with non-compliant requirements.

Compliant curb ramps shall be installed whenever other improvements are required adjacent to or abutting an existing ramp or location that would otherwise require a curb ramp, as determined by the City. Pavement overlays shall require installation of compliant curb ramps in all areas wherein a legal crosswalk is affected by the pavement work.

Curb Ramps shall be constructed of Portland Cement Concrete. Form and subgrade inspection by the City are required before a curb ramp is placed.

4.25 Separated Walkways, Bikeways, and Trails

Separated pedestrian, bicycle, and equestrian facilities shall be provided where designated in the Comprehensive Plan or where required by the city engineer because of anticipated significant public usage. Separated facilities are typically located on an easement, tract, or within the right-of-way when separated from the roadway by a drainage ditch or barrier. Where separated walkways, bikeways, or equestrian facilities intersect with motorized traffic, sight distance, marking and signalization (if warranted) shall be as provided in MUTCD.

Asphalt walkways and/or Combination Walkways/Bikeways shall conform to the following standards:

Right-of-Way Width	As required.
Pathway Width	8 feet.
Crushed Surfacing Base Course	2-inch minimum.
Crushed Surfacing Top Course	2-inch minimum.
Paving Course	2-inch HMA minimum.

4.26 School Access

School access required as part of development approval shall be provided by an asphalt walkway or concrete sidewalk unless another alternative is available and approved by the city engineer through a road variance request.

4.27 Bikeways

Bicycle facilities shall be required in accordance with the North Bend Comprehensive Plan – Parks and Open Space Element and Transportation Element and where required by separate Council action or as described in the Standards.

A. Categories

The following provisions apply to bikeways associated with roads. Bikeways are categorized as described below based on degree of separation from motor vehicles and other transportation modes. This classification does not denote preference of one type over another. The planning and design of bikeways in any category shall be in accordance with the WSDOT Design Manual as modified herein, and the AASHTO Guide for the Development of Bicycle Facilities, current edition. Bikeways are categorized as follows:

- (1) **Shared Roadway:** A roadway that accommodates bicyclists without special markings or designations. Shared roadways accommodate bicycles by either providing a wide paved shoulder or a wide curb lane. A paved shoulder should be at least 4-feet wide to accommodate bicycle travel. A wide curb lane should have a total width of 14 feet without parking.
- (2) **Signed Shared Roadway:** Shared roadways that are identified by signing as preferred bicycle routes.
- (3) **Bike Lanes:** A portion of the road that is designated by pavement striping for exclusive bicycle use. Bicycle lanes may be signed as part of a directional route system. Bicycle lanes are typically 5-feet wide on a curbed road and a minimum of 4-feet wide as a shoulder bike lane. Bike lanes shall be provided on all arterials and where designated in the Comprehensive Plan.
- (4) **Shared Use Path:** Shared use paved tread trails, double track, are typically designated for bicycle and pedestrian use and in general follow a right-of-way independent of any road.

B. Striping and signing shall be implemented as follows:

- (1) Pavement markings shall be used on bike lanes and paths according to MUTCD and AASHTO Guide for the Development of Bicycle Facilities, current edition.
- (2) The design of all signalized intersections shall consider bicycle usage and the need for bicyclists to actuate the signal.

4.28 Equestrian Facilities

Equestrian facilities shall be provided where designated by the City of North Bend Parks and Open Space element of the Comprehensive Plan or as required by the city engineer and shall not be shared with bicycles.

4.29 Alleys and Rear Yard Access

Alleys may be incorporated in new Single Family and Multifamily residential projects to optimize development on small lots without deviation from maximum building cover and impervious surface requirements. Alleys shall be retained and utilized for nonresidential projects where alleys are existent, for example, in the DC and NB zoning district. Otherwise, alleys are encouraged where appropriate for nonresidential uses.

Alleys shall conform to the following standards:

Right-of-Way Width	20 feet minimum.
Paved Width	18 feet.
Crushed Surfacing Base Course	Based on engineering and geotechnical recommendations, 4 inch minimum.
Crushed Surfacing Top Course	Based on engineering and geotechnical recommendations, 2 inch minimum.
Paving Course	Based on engineering and geotechnical recommendations, 3-inch HMA minimum.

4.30 Side Slopes

Side slopes shall generally be constructed no steeper than 2.5:1 on both fill slopes and cut slopes. Steeper slopes may be approved by the public works director and/or city engineer upon showing that the steeper slopes, based on soils analysis, will be stable.

Side slopes shall be stabilized by grass sod or seeding, or by other plantings or surfacing materials acceptable to the city.

Handrails shall be required where slopes adjacent to sidewalks, asphalt walkways, and walkways/bikeways exceed a 2:1 cut slope. Handrails shall be in accordance with North Bend Standard Plan T-11.

4.31 Roadside Features

Miscellaneous features included herein shall be developed and constructed to encourage the uniform development and use of roadside features wherever possible. The design and placement of roadside features included herein shall adhere to the specific requirements as listed for each feature.

A. Survey Monuments

- (1) All existing (or new) survey control monuments and/or markers which are disturbed, lost, or destroyed during surveying or building shall be replaced with

the proper monument as outlined below by a professional land surveyor currently registered (licensed) in the State of Washington at the expense of the responsible contractor, builder or developer.

(2) All Streets:

Survey monuments, case, and cover located in roadway areas shall be in accordance with North Bend Standard Plan T-25.

(3) Monument Locations

Monuments shall be placed:

- (a) At all street intersections;
- (b) At the PC and PT's of all horizontal curves;
- (c) At PI of all horizontal curves of streets where the PI lies within the limits of the traveled roadway;
- (d) At all corners, control points and angle points around the perimeter of subdivisions as determined by the City;
- (e) At all section corners, quarter corners, and sixteenth corners that fall within the right-of-way.

B. Mailboxes

(1) Mailboxes shall be in accordance with the Postmaster.

(2) During construction, existing mailboxes shall be accessible for the delivery of mail or, if necessary, moved to a temporary location. Temporary relocation shall be coordinated with the local U.S. Postal Service. The mailboxes shall be reinstalled at the original location or to a new location as may be required by the local Postmaster, as further outlined below and approved by the U.S. Postal Service.

(3) Location

- (a) Bottom or base of box shall be 36 inches to 42 inches above the finished street grade.
- (b) Face of mailbox shall be 12 inches behind the face of the curb or edge of pavement.
- (c) Mailboxes shall be placed on the same side of the street as "No Parking" signs wherever possible.
- (d) Mailboxes shall be clustered for all subdivisions.

- (e) Where no landscape strip exists and a sidewalk abuts the curb, the sidewalk shall be widened around mailbox locations to provide a minimum 5 feet of walking clearance.

C. Guard Rails

For purposes of design and location, all guard rails along roadways shall conform to the criteria of the “Washington State Department of Transportation Design Manual,” current edition. Guard rails shall only be used when necessary to protect errant vehicles from exiting the roadway and striking a fixed object, entering a water body, or rolling over.

D. Rock Walls

- (1) Rock walls may be used for erosion protection of cut or fill embankments up to a maximum height of 8 feet, measured from keyway to top of wall, in stable soil conditions which will result in no significant foundation settlement or outward thrust upon the walls.
- (2) For walls of any height supporting an outward thrust (surcharge), or when soil is unstable, a structural wall of acceptable design stamped by an engineer currently licensed in the State of Washington shall be used.
- (3) A building permit shall be required for any wall over 4 feet in height, measured from keyway to top of wall, or any wall supporting a surcharge, regardless of height. Materials, design and construction shall be per applicable engineering recommendations, Standard Specifications Section 8-24, and these standards.
- (4) All walls shall be subject to inspection by the City. Rock walls requiring design by an engineer, or walls over 4 feet in height, measured from keyway to top of wall, shall be subject to inspection by the owner’s engineer. The owner’s engineer shall continuously inspect the installation of the wall as it progresses and shall submit inspection reports, including compaction test results and photographs taken during the construction, documenting the techniques used and the degree of conformance to the engineer’s design.
- (5) The rock material shall be as nearly rectangular as possible. No stone shall be used which does not extend through the wall.
- (6) The rocks shall be placed in a manner such that the longitudinal axis of the rock shall be at right angles or perpendicular to the rockery face.
- (7) Walls will not be allowed where deemed unsafe or where, in the opinion of the city engineer, the location will result in a hazard, nuisance, or require significant maintenance.

E. Street Trees and Landscaping Items

- (1) Street trees and landscaping shall be incorporated into the design of road improvements for all classifications of roads. If no trees exist in the landscape strip, the landowner may plant trees that meet requirements of the city. Such landscaping in the right-of-way shall be coordinated with off-street landscaping required on developer's property under the provisions of Chapter 18.18 NBMC, Landscaping Regulations. Only plant species listed on the City's approved plant list shall be used.
- (2) Planting buffer strips are required along all streets. The design of planting strips must be approved by the city engineer and must include a landscaping plan in which plant maintenance, utilities and traffic safety requirements are discussed. Where grass is approved, sod shall be installed in lieu of seeding. Prior to planting the existing soil shall be amended, or removed and replaced with suitable soil. Said landscaping plan must be approved by the city engineer.
- (3) Existing trees and landscaping shall be preserved where desirable and placement of new trees shall be compatible with other features of the environment. In particular, maximum heights and spacing shall not conflict unduly with overhead utilities, or root development with underground utilities.
- (4) Street trees shall be selected from the list of street trees in NBMC 18.18, or as otherwise approved by the Community and Economic Development Director as suitable for the available planting area and any obstructions. New trees shall not include poplar, cottonwood, soft maples, gum, any fruit bearing trees or any other tree or shrub whose roots are likely to obstruct sanitary or storm sewers.
- (5) Landscape strips and sidewalks in the right-of-way shall be maintained by the adjacent landowner, or homeowners' association in the case of low-impact development (LID) residential streets designed per the provisions under Section 4.03C of the Public Works Standards. The adjacent landowner shall not allow landscaping to obstruct the sidewalk or parking area along the curb, shall keep grass mowed, and shall not create an obstruction to visibility for drivers negotiating a driveway, alley, or intersection. The landowner or homeowners' association may modify the landscaping strip with city approval.

F. Roadside Obstacles

Lateral clearance between face of curb or edge of pavement and any fixed object (excluding traffic control signs and breakaway supports) shall be 3 feet except for residential local access streets and cul-de-sacs where the clearance shall be 2 feet. Such an object shall not be placed in a sidewalk or with the object edge nearest the roadway less than 8-1/2 feet from the face of the curb in business areas or 5-1/2 feet from face of curb in residential areas. Placement of any utility structures shall be in accordance with requirements of Section 4.32, to include constraints on placement of poles on the outside of curves.

G. Roadway Barricades

Temporary and permanent barricades shall conform to the standards described in Section 6C-8 of MUTCD.

4.32 Utilities

Utilities shall be furnished and installed within the right-of-way beneath new roads, or in existing roadways and rights-of-way so as to provide minimal interference with existing utilities and shall be located as generally shown in Drawings listed herein. Where existing utilities are in place, new utilities shall conform to these Standards as nearly as practical and yet be compatible with the existing installations. Exceptions may be approved by the City when necessary to meet special or localized requirements. Utilities shall be sized and designed to serve adjacent and tributary areas. Typically, utilities shall be required to be extended to “far” property lines. Easements shall be procured and provided by the developer to facilitate same. Utilities shall not be “land locked.”

A. Waterlines

Waterlines shall be located as required and approved by the city engineer or 5 feet north and east of centerline; depth 36 inches minimum from finished grade. Mains and service connections to all lots should be completed prior to placing of surface materials.

B. Sanitary Sewers

Sanitary sewers shall be located as required and approved by the city engineer or 5 feet south and west of centerline; depth 36 inches minimum from finished grade.

Sanitary and water lines shall be horizontally and vertically separated per Washington State Department of Ecology and Department of Health minimum requirements unless otherwise approved by the city engineer.

Gravity systems, whether sanitary or storm drainage, shall have precedence over other systems in planning and installation.

C. Other Utilities

Other utilities (gas, power, telephone, fiber optic, and cable TV) shall be located as follows:

Utilities shall be placed underground, either side of road, at plan location and depth compatible with other utilities and storm drains, unless determined to not be practical by the city engineer. Minimum cover over such utilities shall be 36 inches.

Otherwise: On existing poles (as applicable) set back of ditch line or sidewalk, at locations compatible with driveways, intersections, and other essential road features. To extent practical, utilities should share facilities so that a minimum of poles are needed, and preferably on only one side of road.

Notwithstanding other provisions, underground systems shall be located at least 5 feet away from road centerline and where they will not otherwise disturb existing survey monumentation.

D. Utility Crossings in Existing Streets

For smaller diameter pipes and wires the crossing shall be made without surface cut of the traveled portion where the street is paved. The crossing shall be made by pushing or boring a pipe under the road. Where rock is known or expected in the area of the crossing, the attempt need not be first, open cutting will be permitted, but prior approval of the City is required.

4.33 Trench Backfill and Surface Restoration

Trench restoration shall be either by a patch or patch plus overlay as required by the City, and as shown in the Drawings.

- A. All trench and pavement cuts shall be made by sawcuts. The cuts shall be a minimum of 1 foot outside the trench width.
- B. All trenching shall be backfilled with gravel base, bank run gravel for trench backfill, suitable native excavated material, or crushed surfacing materials conforming to the WSDOT Standard Specifications. The trench shall be compacted to 95 percent maximum density, as described in Section 2-03 of the WSDOT Standard Specifications. The City will be the sole judge of approving materials to be utilized for backfill. Typically, crushed rock (5/8-inch minus) or control density fill (CDF) shall be placed and compacted in the trench sections for all right angle (\pm) street crossings.

If the existing native excavated material is determined by the City to be suitable for backfill, the contractor may use the native material except that the top 12 inches of the trench section shall be 5/8-inch minus crushed rock or other structurally suitable material as approved by the city engineer. Exceptions may be granted by the City based on site evaluation of excavated materials. All trench backfill materials shall be compacted to 95 percent maximum density.

Backfill compaction shall be performed in 6-inch lifts, unless otherwise approved by the City.

Replacement of the asphalt or cement concrete surfacing shall match existing asphalt or cement concrete depth, except hot mix asphalt shall be a minimum compacted thickness of 3 inches and cement concrete shall be a minimum thickness of 6 inches.

- C. Tack shall be applied to the existing pavement and edge of cut and shall be emulsified asphalt grade CSS-1 as specified in Section 9-02.1(6) of the WSDOT Standard Specifications. Tack coat shall be applied as specified in Section 5-04 of the WSDOT Standard Specifications.
- D. Hot mix asphalt shall be placed on the prepared surface by an approved paving machine and shall be in accordance with the applicable requirements of Section 5-04 of the

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

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

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

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

4.34 Temporary Street Patching

Temporary restoration of trenches shall be accomplished by using 2-inch commercial hot mix asphalt (HMA) when available or 4-inch medium-curing (MC-250) liquid asphalt (cold mix), 3-inch asphalt treated base (ATB), or steel plates suitable for H-20 traffic loading conditions. Steel plates shall be provided with a cold mix "lip" to accommodate a smooth transition from pavement to steel plate.

All temporary patches shall be maintained by the contractor until such time as the permanent pavement patch is in place. All temporary patch materials shall be loaded and hauled to waste by the Contractor, in compliance with applicable government regulations.

If the contractor is unable to maintain a patch for whatever reason, the City will patch it at actual cost plus overhead and materials. The property owner/developer/permittee shall be invoiced for any City expenses incurred to comply with this Contractor requirement.

4.35 Material and Construction Testing

Materials shall meet requirements of Division 9 of the materials section of the WSDOT Standard Specifications for Road, Bridge, and Municipal Construction, except as specifically noted in this chapter.

Use of WSDOT Qualified Product List (QPL) and Aggregate Source Approval (ASA) databases is recommended for Approval of Materials. Use of Record of Material (ROM) and Request for Approval of Material (RAM) forms is required and needs to be approved by city prior to construction.

Testing shall be required at the developer's or contractor's expense. The testing shall be ordered by the developer or contractor and the chosen testing lab shall be preapproved by the City. Testing shall be done on all materials and construction as specified in the WSDOT Standard Specifications and with frequency as specified herein.

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

CITY OF NORTH BEND
TESTING AND SAMPLING FREQUENCY GUIDE

<u>ITEM</u>	<u>TYPE OF TESTS</u>	<u>MIN. NO.</u>	<u>FREQUENCY</u>
GRAVEL BORROW	GRADING & SE	1 EACH	1-4000 TON
SAND DRAINAGE BLANKET	GRADING	1 EACH	1-4000 TON
CSTC & CSBC	GRADING, SE & FRACTURE	1 EACH	1-2000 TON
BALLAST	GRADING, SE & DUST RATIO	1 EACH	1-2000 TON
BACKFILL/SAND DRAINS	GRADING	1 EACH	1-2000 TON
GRAVEL BACKFILL FOR:			
FOUNDATIONS	GRADING, SE & DUST RATIO	1 EACH	1-1000 TON
WALLS	GRADING, SE & DUST RATIO	1 EACH	1-1000 TON
PIPE BEDDING	GRADING, SE & DUST RATIO	1 EACH	1-1000 TON
DRAINS	GRADING	1 EACH	1-100 TON
PCC STRUCTURES: (Sidewalk, Curb and Gutter, Foundations)			
COARSE AGGREGATE	GRADING	1 EACH	1-1000 TON
FINE AGGREGATE	GRADING	1 EACH	1-500 TON
CONSISTENCY	SLUMP	1 EACH	1-100 CY
AIR CONTENT	AIR	1 EACH	1-100 CY
CYLINDERS (28 DAY)	COMPRESSIVE STRENGTH	2 EACH	1-100 CY
CEMENT:	CHEMICAL & PHYSICAL CERT.	1	1-JOB
HOT MIX ASPHALT:			
BLEND SAND	SE	1 EACH	1-1000 TON
MINERAL FILLER	S.G. & PI, CERTIFICATION	1	1-JOB
COMPLETED MIX	FRACTURE, SE, GRADING, ASPHALT CONTENT	1 EACH	1-1000 TON
	COMPACTION	2 EACH	5-400 TON
ASPHALT TREATED BASE:			
COMPLETED MIX	SE, GRADING, ASPHALT CONTENT	1 EACH	1-1000 TON
	COMPACTION	1 EACH	5-Control Lot*
ASPHALT MATERIALS	CERTIFICATION	1	1-JOB
RUBBERIZED ASPHALT:	CERTIFICATION	1	1-JOB
COMPACTION TESTING:			
EMBANKMENT	COMPACTION	1 EACH	1-500 LF
CUT SECTION	COMPACTION	1 EACH	1-500 LF
CSTC & CSBC	COMPACTION	1 EACH	1-500 LF
BALLAST	COMPACTION	1 EACH	1-500 LF
TRENCH BACKFILL	COMPACTION	1 EACH	1-500 LF

SE = Sand Equivalency

* A control lot shall be a normal day's production. For minor quantities 200 tons or less per day, a minimum of 2 gauge readings shall be taken.

4.36 Subgrade Preparation

The subgrade area of the street right-of-way shall be prepared per Section 2-06 of the WSDOT Standard Specifications. All cleared and grubbed material shall be satisfactorily removed and disposed of properly. All depressions, or ruts, which contain water will be drained. At a minimum, the subgrade of the road shall consist of free-draining materials to a depth of 12 inches below finish grade.

The existing subgrade will be compacted to a minimum density as defined in the WSDOT Standard Specifications and as witnessed by the City Inspector. Compaction tests may be required to be conducted at the discretion of the City to verify same. All subgrade areas shall be firm and unyielding prior to placing surfacing or base course materials, and shall be confirmed by proof-rolling with a fully-loaded truck and observed by a City representative. Any soft and yielding spots shall be repaired to the satisfaction of the City prior to placement of surfacing material.

4.37 Crushed Surfacing (Top and Base Course)

Surfacing shall consist of the construction of two or more courses of crushed stone upon an existing roadway surface, or upon a subgrade properly prepared as outlined above. Crushed surfacing material shall be uniform in quality and substantially free from wood, roots, bark and other extraneous material. It will compact into a dense and unyielding mass which will be true to line, grade and cross-section. Minimum compaction of crushed materials shall be 95 percent maximum density. The crushed materials shall meet the specifications of WSDOT Section 9-03.9(3).

4.38 Surfacing Requirements

All streets in the City of North Bend will be paved with either Hot Mix Asphalt (HMA) or Portland Cement Concrete, in strict compliance with these standards. All pavement sections shall be designed by an engineer licensed in the State of Washington. The pavement design shall meet the requirements in the latest publication of the AASHTO Guide for Design of Pavement Structures. Any pavement shall be designed using currently accepted methodology that considers the load bearing capacity of the soils and the traffic carrying capacity requirements of the roadway. Plans shall be accompanied by a pavement thickness design based on soil strength parameters reflecting actual field tests and traffic loading analyses. The analysis shall include the traffic volume and axle loading, the type and thickness of roadway materials and the recommended method of placement.

When an existing asphalt paved street is to be widened, the edge of pavement shall be sawcut to provide a clean, vertical edge for joining to the new asphalt. After placement of the new asphalt section, the joint shall be sealed and the street overlaid, 2 inches, plus a prelevel course, full width throughout the effected area.

One soil sample per each 500 LF of centerline with three minimum per project representative of the roadway subgrade shall be taken by the Developer and delivered to a City approved soils lab in order to determine a statistical representation of the existing soil conditions.

Soil tests shall be performed by an engineering firm specializing in soils analysis and currently licensed in the State of Washington.

The soils report, signed and stamped by a soils engineer licensed by the State of Washington, shall be based on actual soils tests and submitted with the plans. All depths indicated are a minimum compacted depth.

Construction of streets paved with Hot Mix Asphalt shall conform to Section 5-04 of the Standard Specifications. Pavement material will be Hot Mix Asphalt Class 1/2" PG 64-22 and be constructed at least 3-inches thick (minimum compacted thickness) over the prepared crushed surface, top course, or asphalt treated base. Mechanical spreading and finishing will be as described in Section 5-04.3(9) of the Standard Specifications. Compaction will be performed by the equipment and methods presented in Section 5-04.3(10) of the Standard Specifications, and Surface Smoothness shall satisfy the requirement of Section 5-04.3(13) of the Standard Specifications.

Cement concrete streets will be designed and constructed as specified in Section 5-05 of the Standard Specifications. Cement concrete shall be placed over a minimum of 4 inches of compacted crushed surfacing.

Permanent pavement patching will be performed as described in the pavement repair detail listed herein, and in compliance with Section 5-04 of the Standard Specifications. All fill material will be placed in lifts no thicker than six inches and mechanically compacted to 95 percent of standard density, as described in Section 2-03 of the Standard Specifications and to the satisfaction of the city engineer.

The City has established minimum surfacing requirements, for collectors and local access streets only. These minimum standards are to be used in lieu of a pavement design by a licensed engineer on collector or local access streets only and only upon approval by the city engineer:

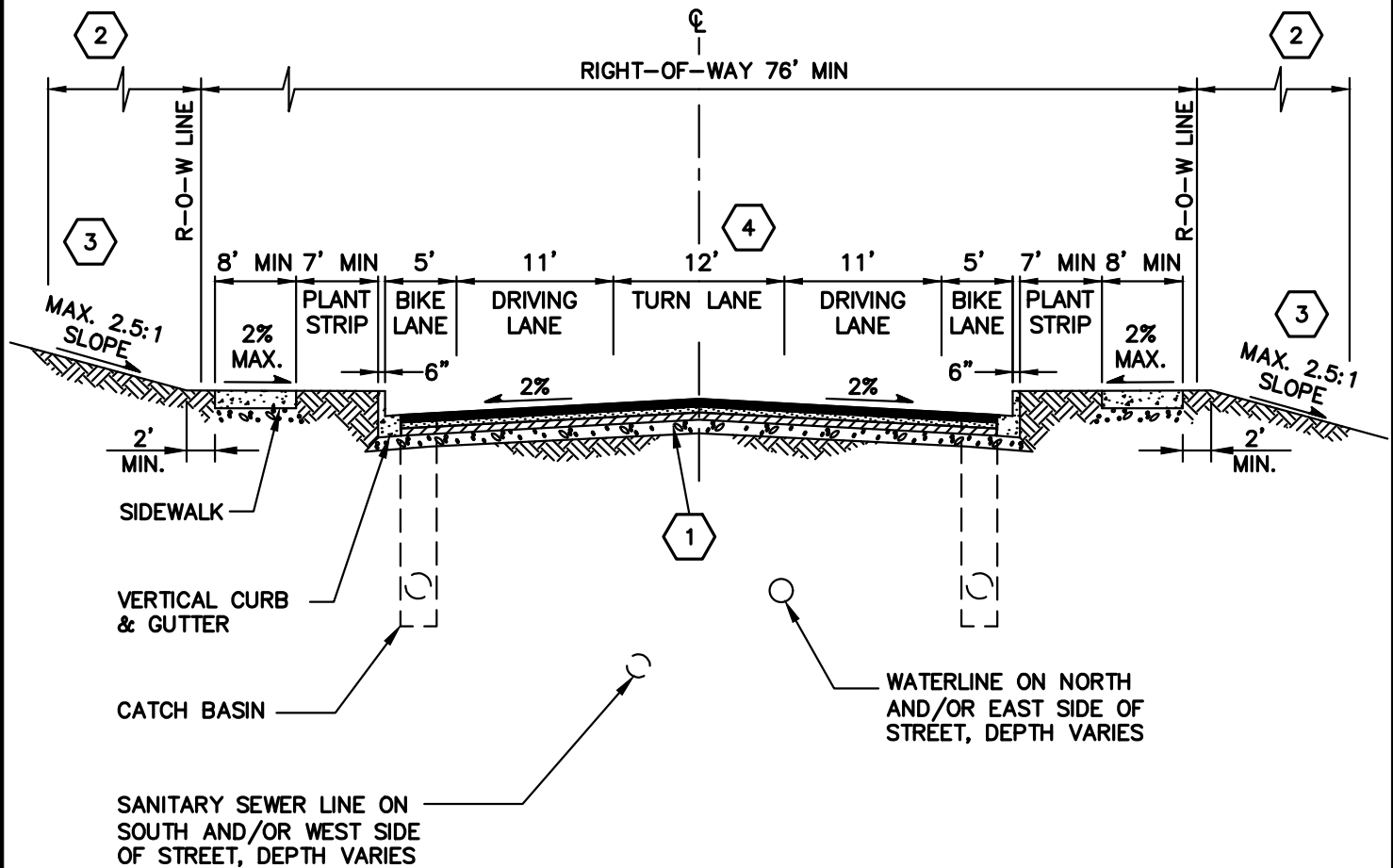
	Hot Mix <u>Asphalt</u>	Asphalt Treated Base or Crushed Surfacing <u>Top Course</u>	Crushed Surfacing <u>Base Course</u>
Collector	3"	4"	6"
Local Access	3"	4"	6"

APPENDIX 4-1**STREETS, PEDESTRIAN PATHWAYS, AND BIKEWAYS
STANDARD DETAILS**

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NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER.
- 2 10' UTILITY AND/OR SLOPE EASEMENT AS REQUIRED.
- 3 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.
- 4 TURN LANES SHALL BE CONSTRUCTED WHERE REQUIRED.



CITY OF NORTH BEND
ARTERIAL STREETS (INCLUDES CEDAR
FALLS WAY FROM NORTH BEND WAY
TO MALONEY GROVE AVENUE SE)
TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

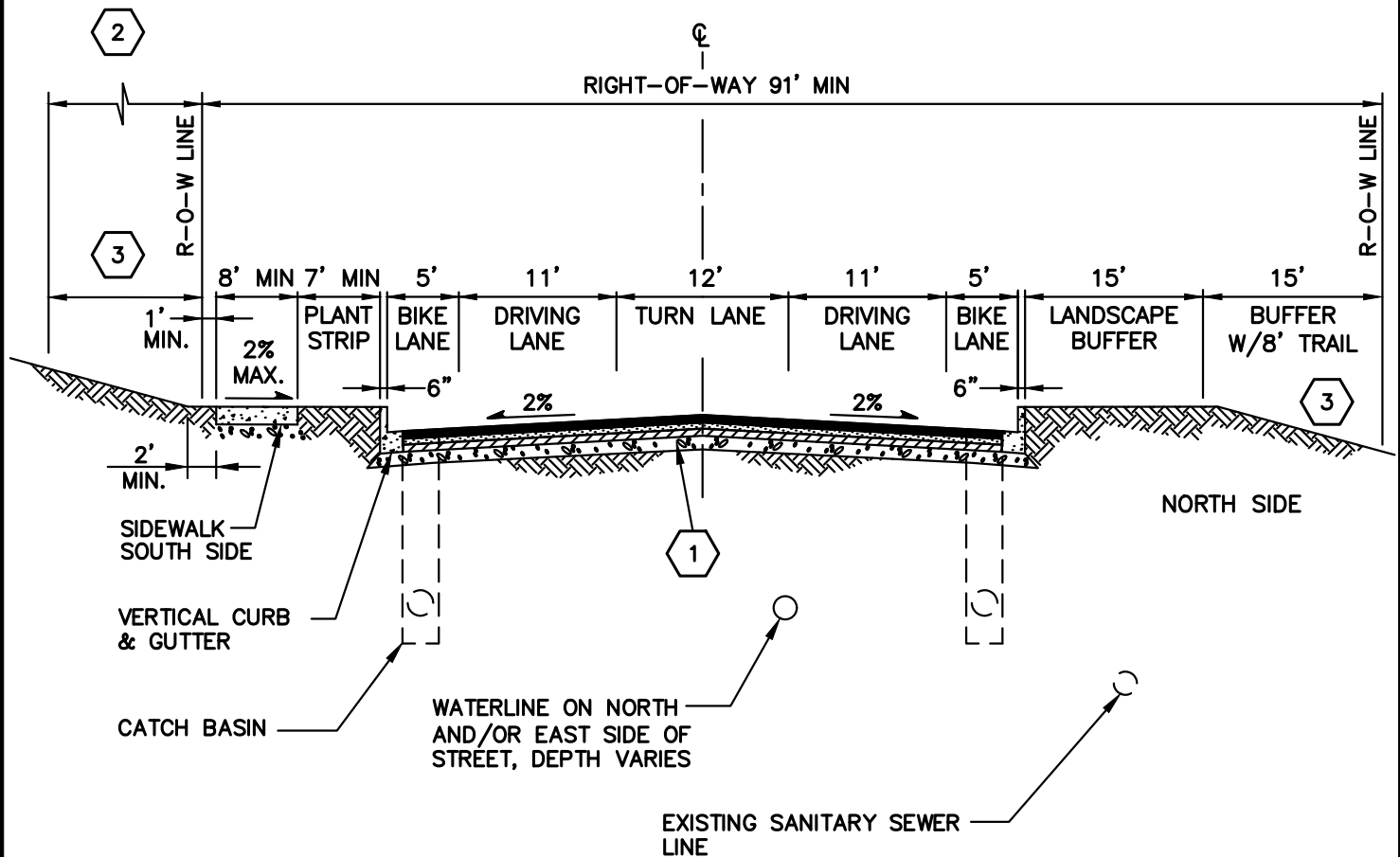
BY CITY

MAY 2018

DATE

DWG. NO.

T-1A



NOTES:

- 1** PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER.
- 2** 10' UTILITY AND/OR SLOPE EASEMENT AS REQUIRED.
- 3** SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.



CITY OF NORTH BEND
CEDAR FALLS WAY
 (MALONEY GROVE AVE SE TO
 436TH AVE SE)
 TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

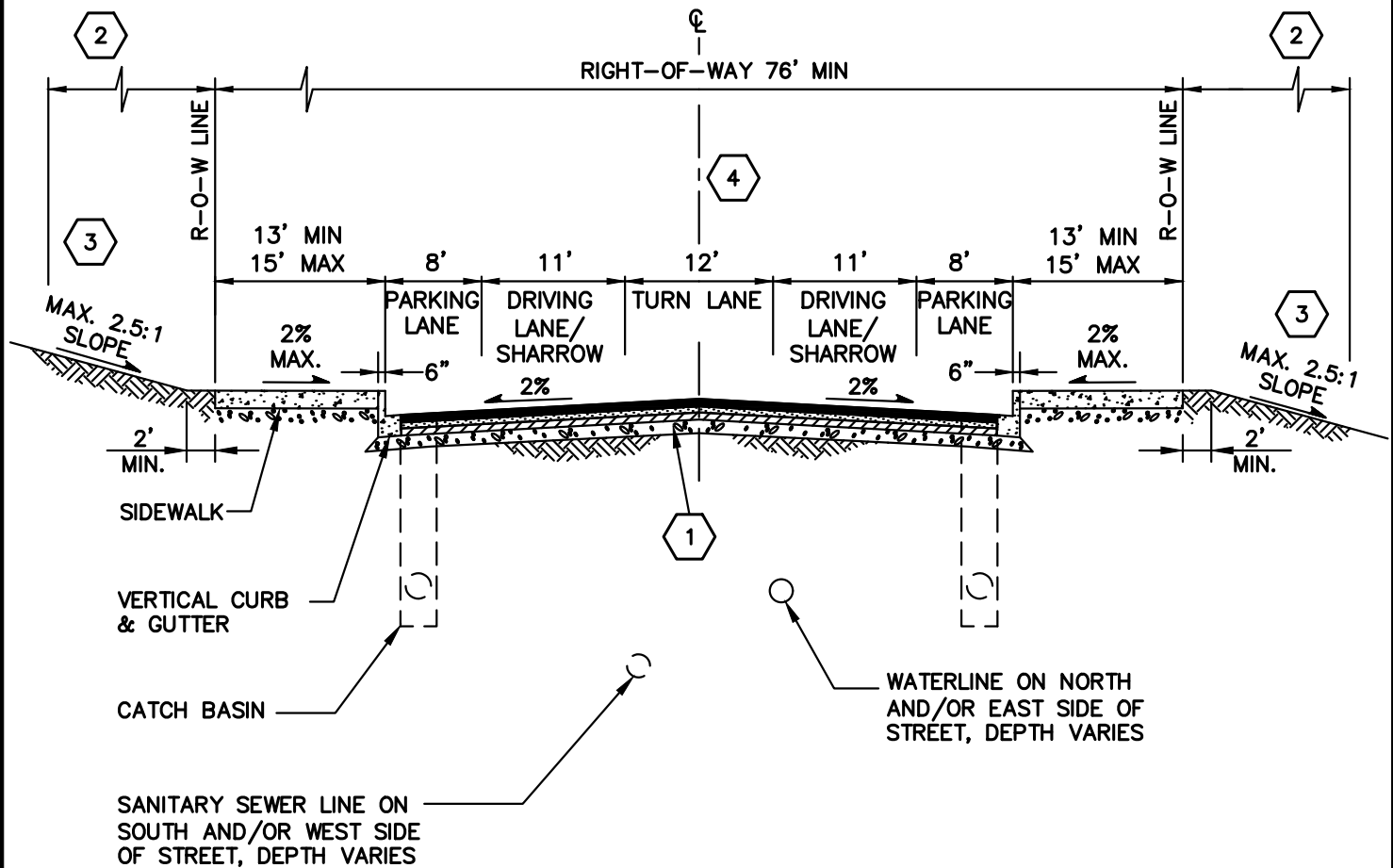
BY CITY

MAY 2018

DATE

DWG. NO.

T-1B



NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER.
- 2 10' UTILITY AND/OR SLOPE EASEMENT AS REQUIRED.
- 3 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.
- 4 WHERE INTERSECTION BULB-OUTS ARE INSTALLED STREET WIDTH SHALL BE ADJUSTED.



CITY OF NORTH BEND
NORTH BEND WAY (BETWEEN
BRIDGE AND E. PARK STREET)
TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

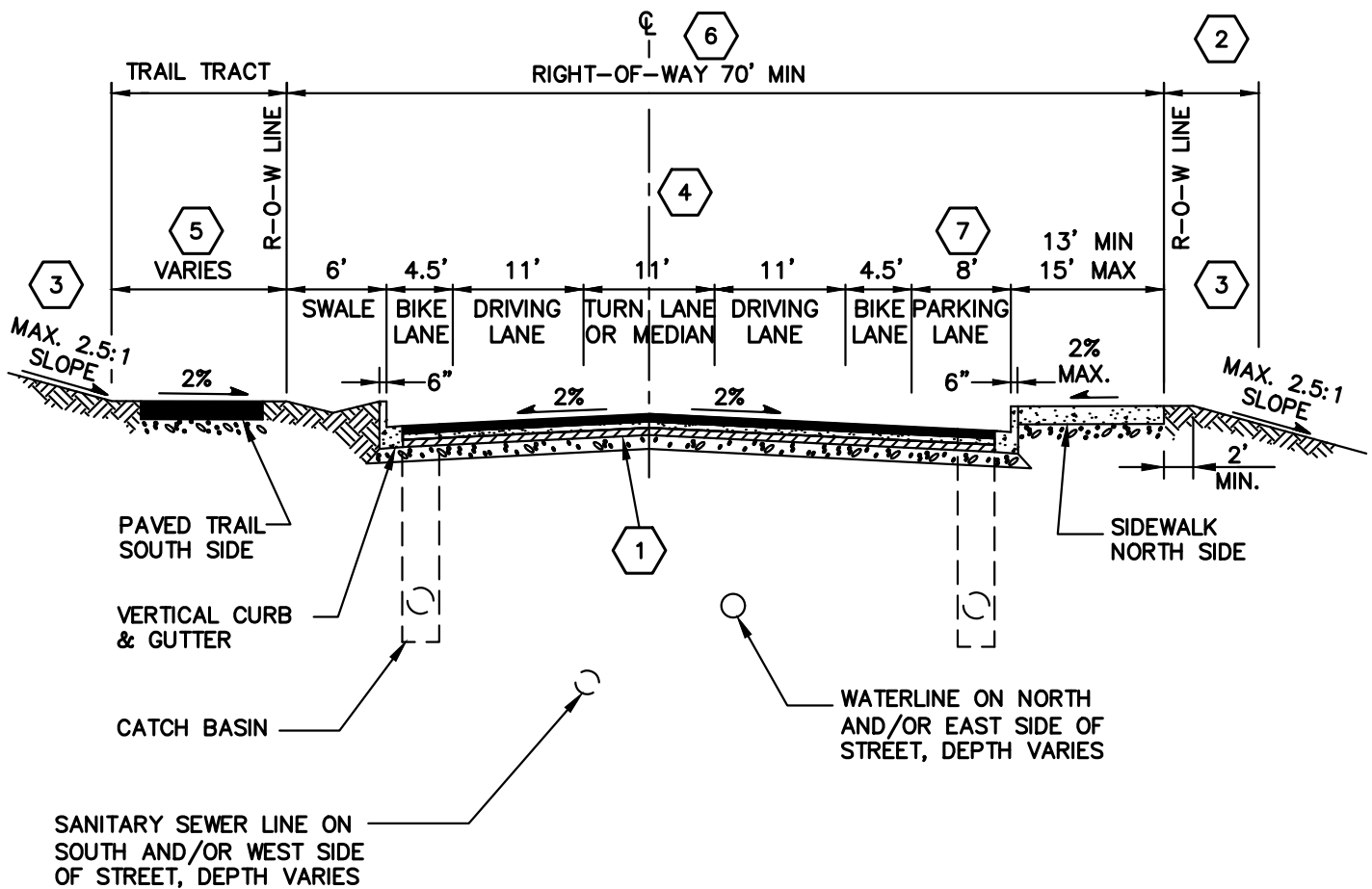
BY CITY

MAY 2018

DATE

DWG. NO.

T-2



CITY OF NORTH BEND
NORTH BEND WAY (E. PARK STREET TO CEDAR FALLS WAY)
TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

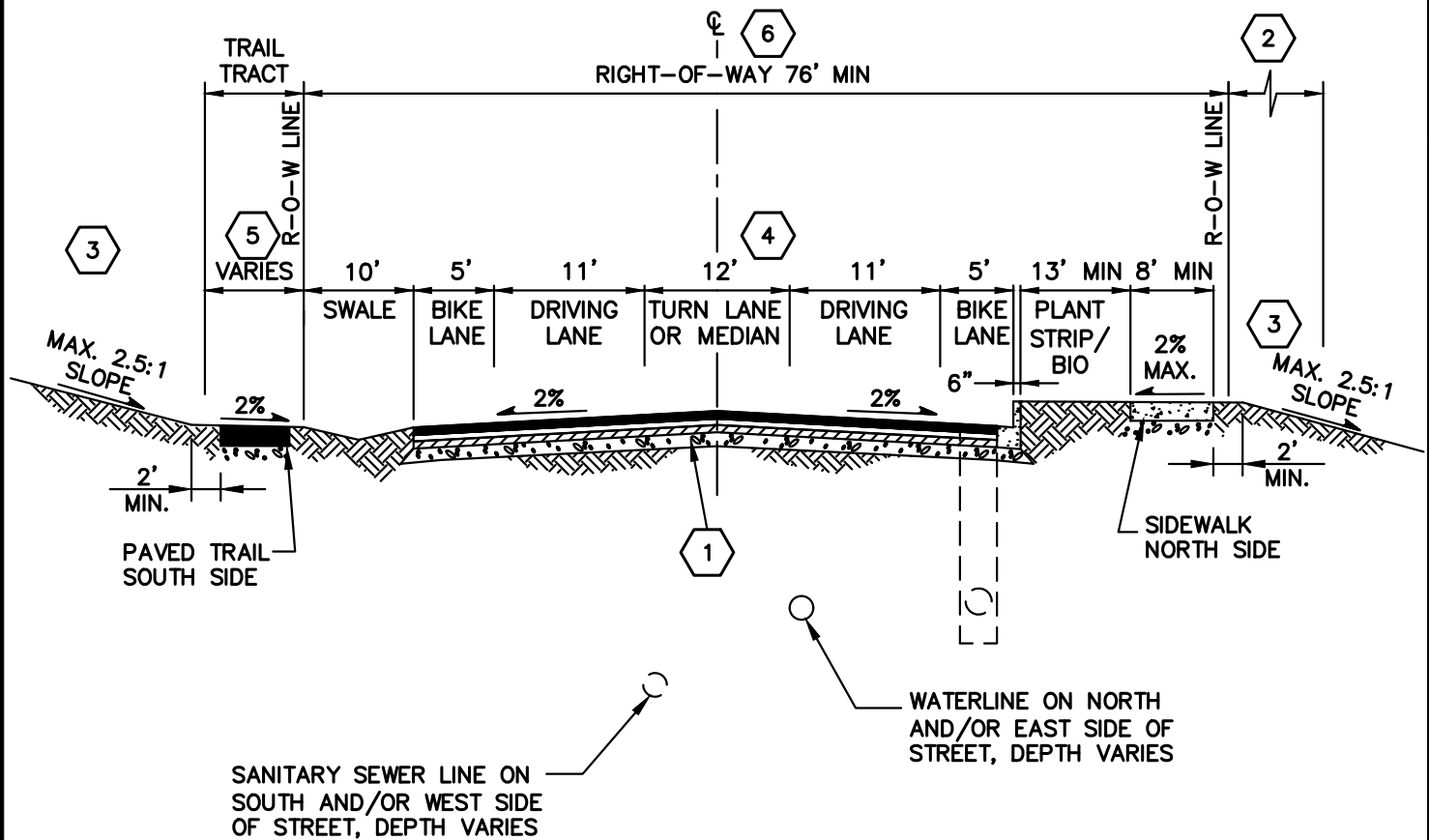
BY CITY

MAY 2018

DATE

DWG. NO.

T-3



NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER.
- 2 10' UTILITY AND/OR SLOPE EASEMENT AS REQUIRED.
- 3 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.
- 4 TURN LANES SHALL BE CONSTRUCTED AS VEGETATED MEDIANS IN AREAS WHERE DRIVEWAYS ARE INFREQUENT OR WHEN NECESSARY TO CONSOLIDATE DRIVEWAYS.
- 5 TRAIL ON SOUTH SIDE OF STREET SHALL BE BUILT TO MATCH EXISTING TANNER TRAIL SECTION.
- 6 SECTION DOES NOT APPLY TO SE MOUNT SI ROAD INTERSECTION.



CITY OF NORTH BEND
NORTH BEND WAY (CEDAR FALLS
WAY TO SE 140TH STREET)
TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

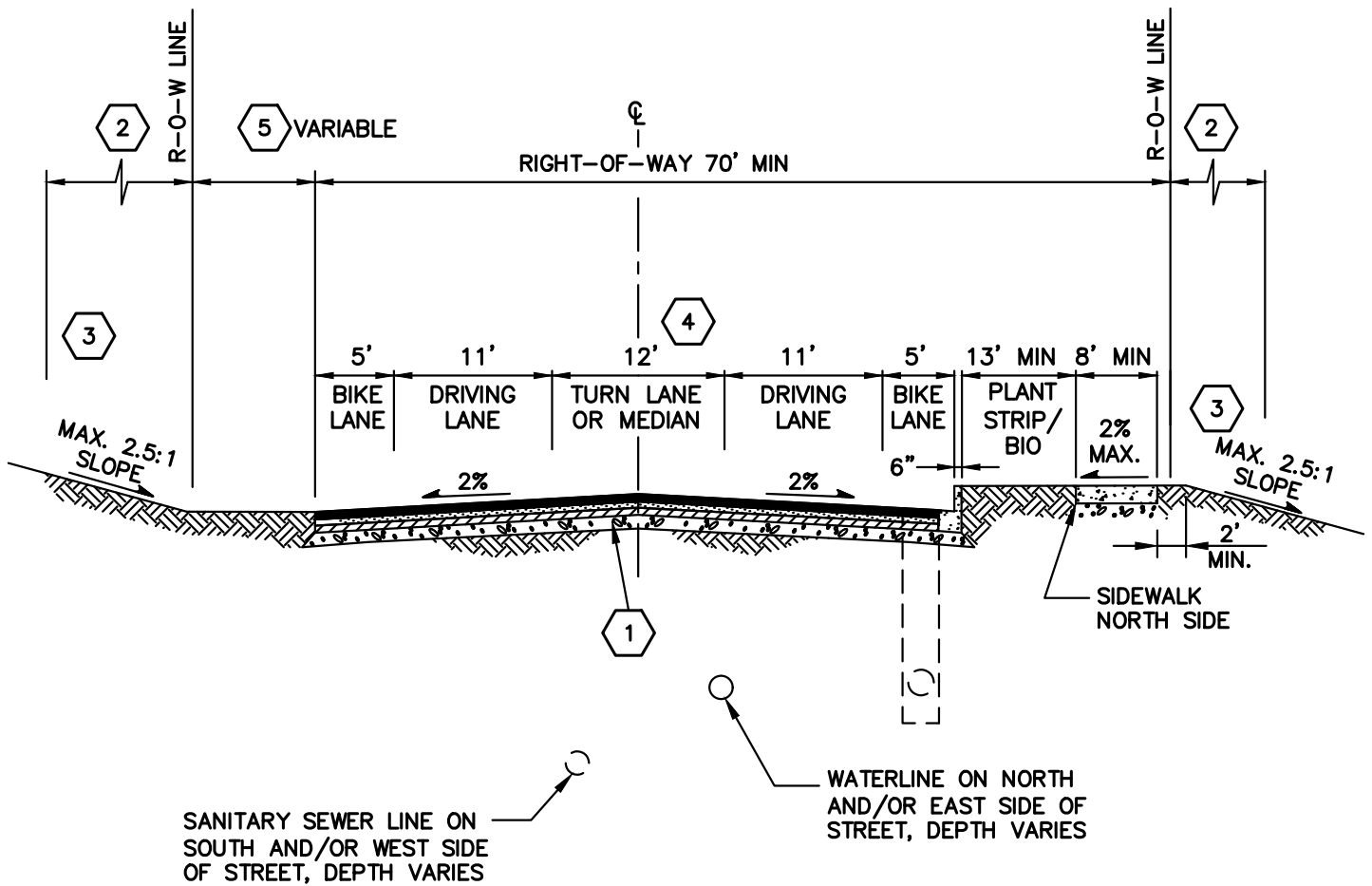
BY CITY

MAY 2018

DATE

DWG. NO.

T-4



NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER.
- 2 10' UTILITY AND/OR SLOPE EASEMENT AS REQUIRED.
- 3 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.
- 4 TURN LANES SHALL BE CONSTRUCTED AS VEGETATED MEDIANS IN AREAS WHERE DRIVEWAYS ARE INFREQUENT OR WHEN NECESSARY TO CONSOLIDATE DRIVEWAYS.
- 5 SUBJECT TO CITY OF NORTH BEND APPROVAL, ADDITIONAL RIGHT-OF-WAY MAY BE OBTAINED OR UTILIZED ON SOUTH ROADWAY EDGE FOR EMERGENCY PARKING IN THE EVENT OF PASS CLOSURES OR OTHER.



CITY OF NORTH BEND
 NORTH BEND WAY (SE 140TH STREET TO 468TH AVENUE SE)
 TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

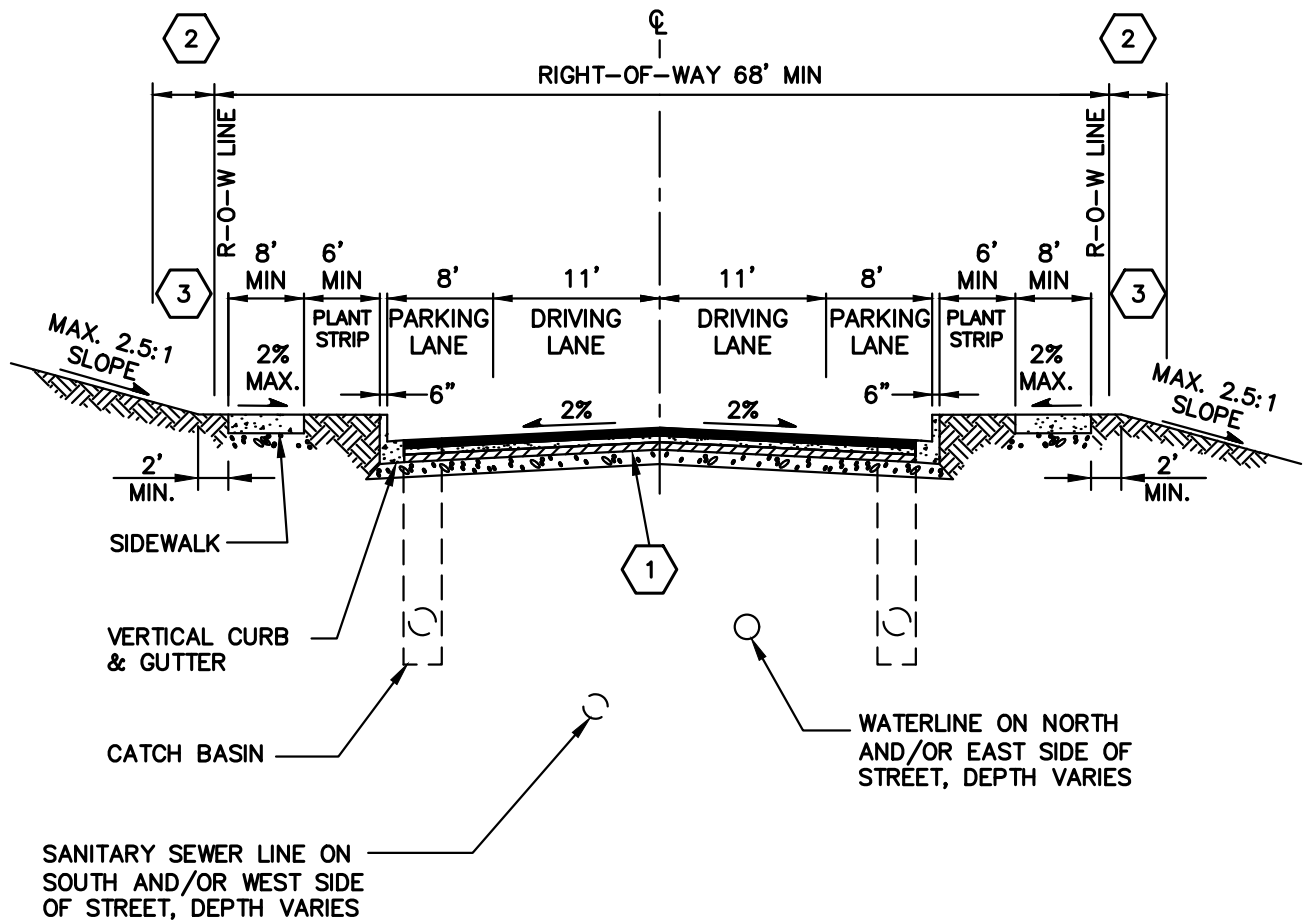
BY CITY

MAY 2018

DATE

DWG. NO.

T-5



NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER, OR MINIMUM PER SECTION 4.38.
- 2 5' UTILITY EASEMENT (BOTH SIDES)
- 3 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.



CITY OF NORTH BEND

COLLECTOR STREETS
TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

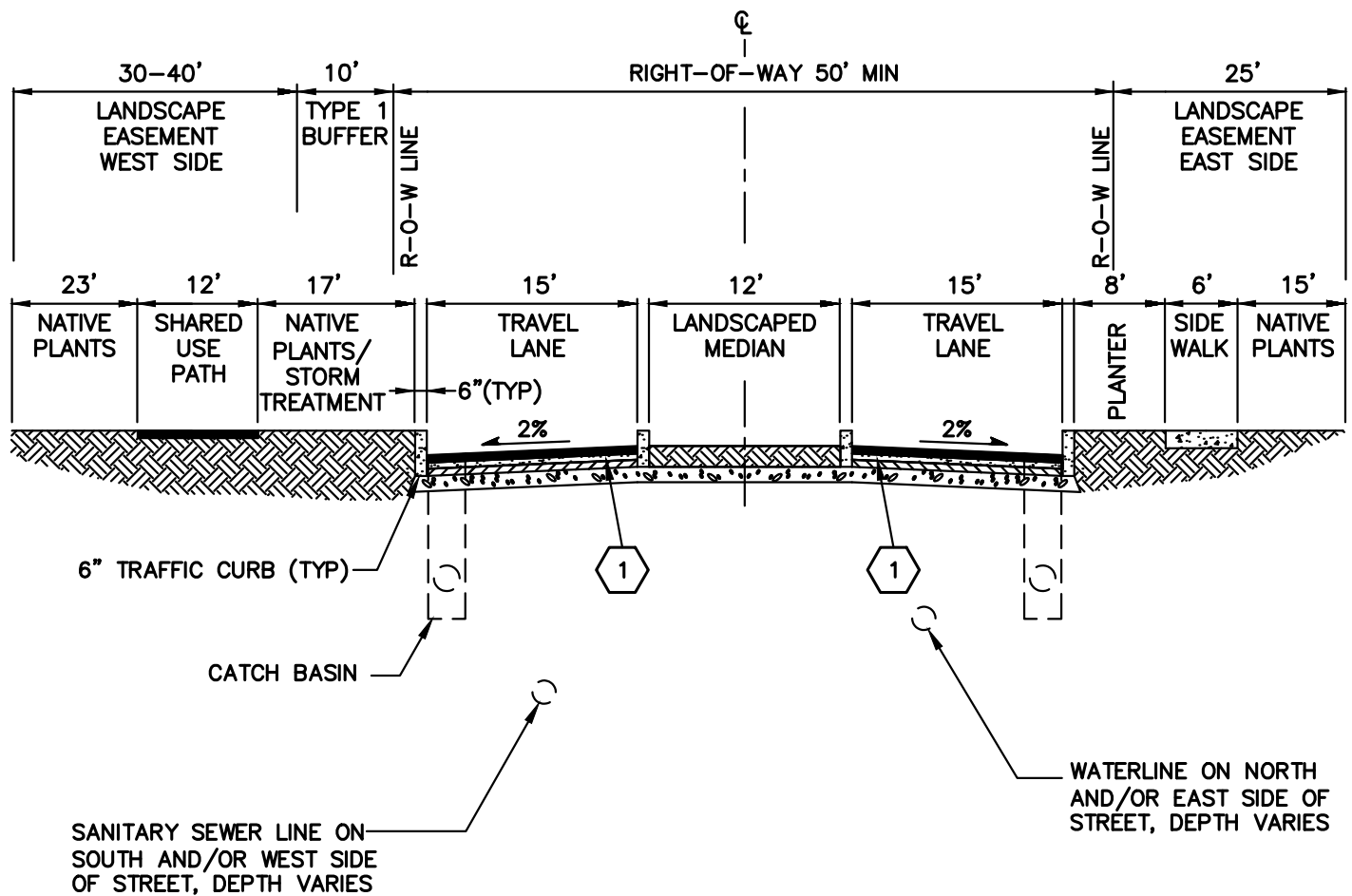
BY CITY

MAY 2018

DATE

DWG. NO.

T-6A



NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER, OR MINIMUM PER SECTION 4.38.
- 2 5' UTILITY EASEMENT (BOTH SIDES)



CITY OF NORTH BEND
 468TH AVE SE-NORTH OF SE
 146TH ST TO SE 144TH ST
 TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

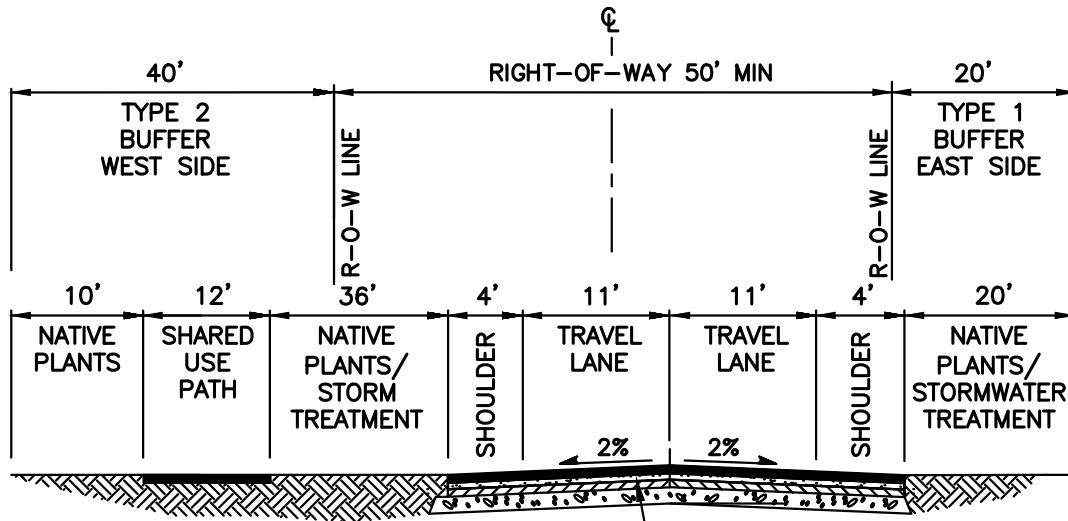
BY CITY

MAY 2018

DATE

DWG. NO.

T-6B



SANITARY SEWER LINE ON
SOUTH AND/OR WEST SIDE
OF STREET, DEPTH VARIES

WATERLINE ON NORTH
AND/OR EAST SIDE OF
STREET, DEPTH VARIES

NOTES:

1

PAVEMENT DESIGN BY WASHINGTON STATE LICENSED
CIVIL ENGINEER AND AS APPROVED BY THE CITY
ENGINEER, OR MINIMUM PER SECTION 4.38.

2

5' UTILITY EASEMENT (BOTH SIDES)



CITY OF NORTH BEND
468TH AVE SE-NORTH OF SE
144TH ST TO SE MIDDLE
FORK ROAD

APPROVED:

MARK RIGOS, P.E.

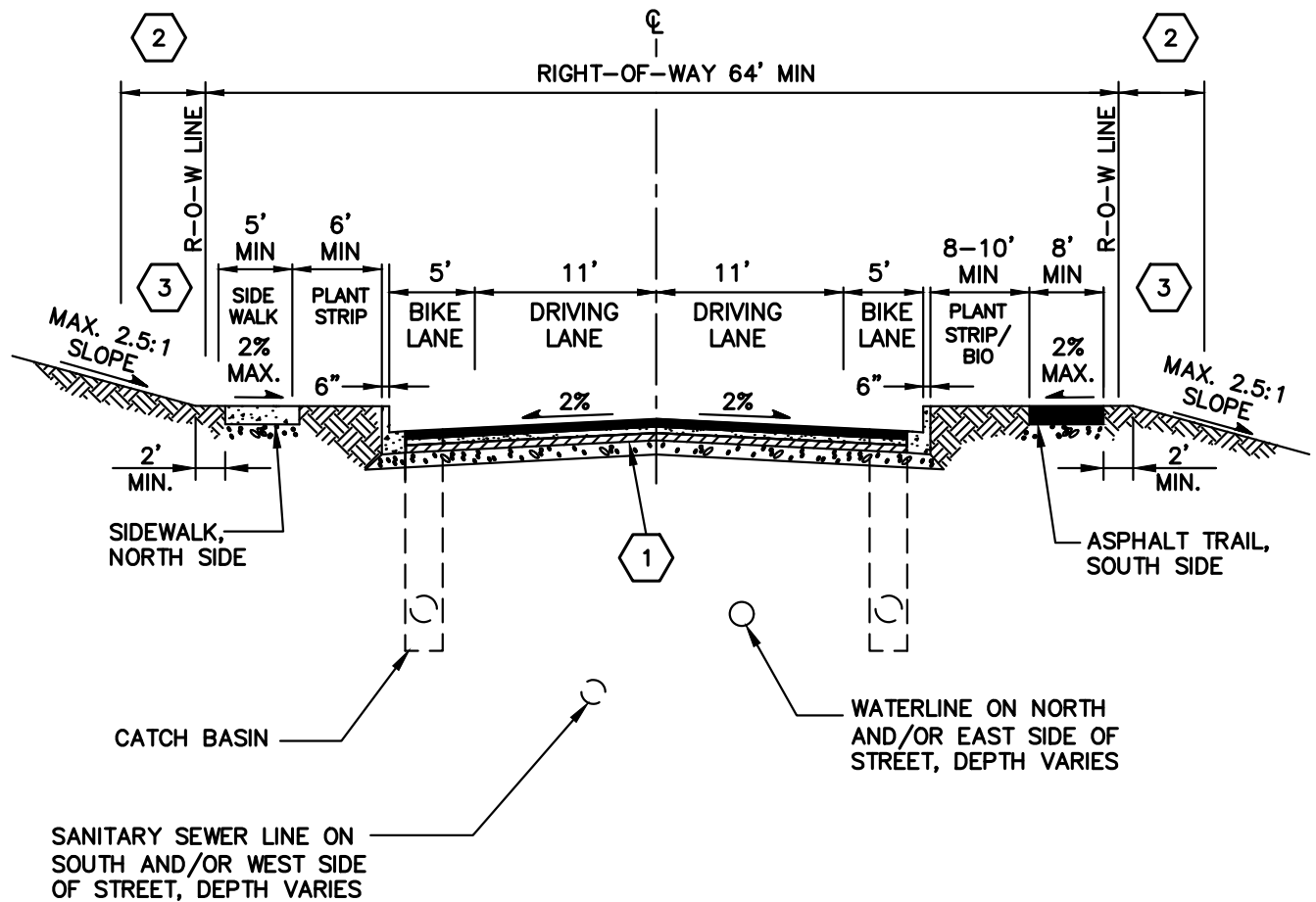
BY CITY

MAY 2018

DATE

DWG. NO.

T-6C



NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER, OR MINIMUM PER SECTION 4.38.
- 2 5' UTILITY EASEMENT (BOTH SIDES)
- 3 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.



CITY OF NORTH BEND

SE 140TH STREET FROM NORTH BEND WAY TO MIDDLE FORK ROAD
TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

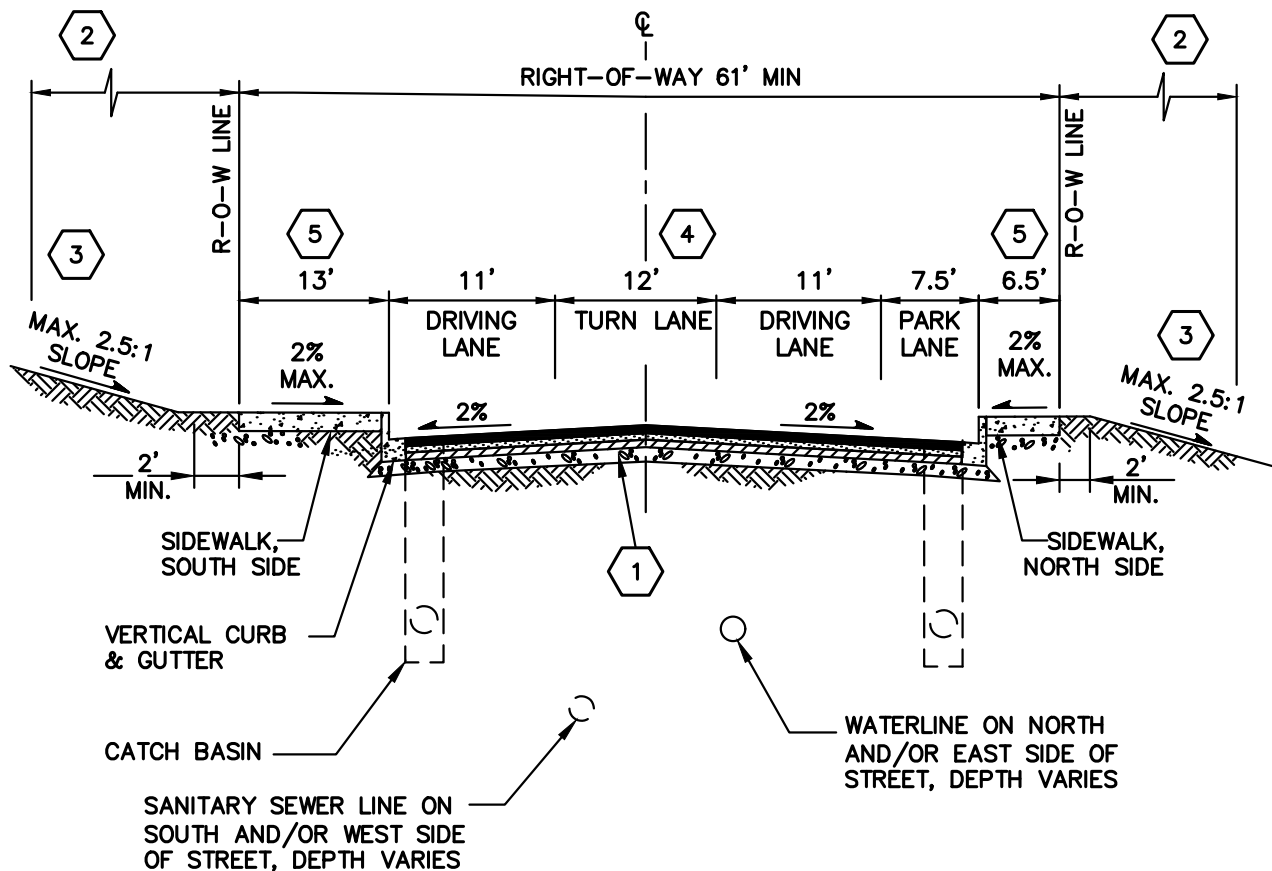
BY CITY

MAY 2018

DATE

DWG. NO.

T-6D



NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER.
- 2 10' UTILITY AND/OR SLOPE EASEMENT AS REQUIRED.
- 3 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.
- 4 TURN LANES SHALL BE CONSTRUCTED WHERE REQUIRED.
- 5 CURB IS INCLUDED IN SIDEWALK DIMENSION.



CITY OF NORTH BEND
PARK STREET-BENDINGO
TO MAIN STREET
TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

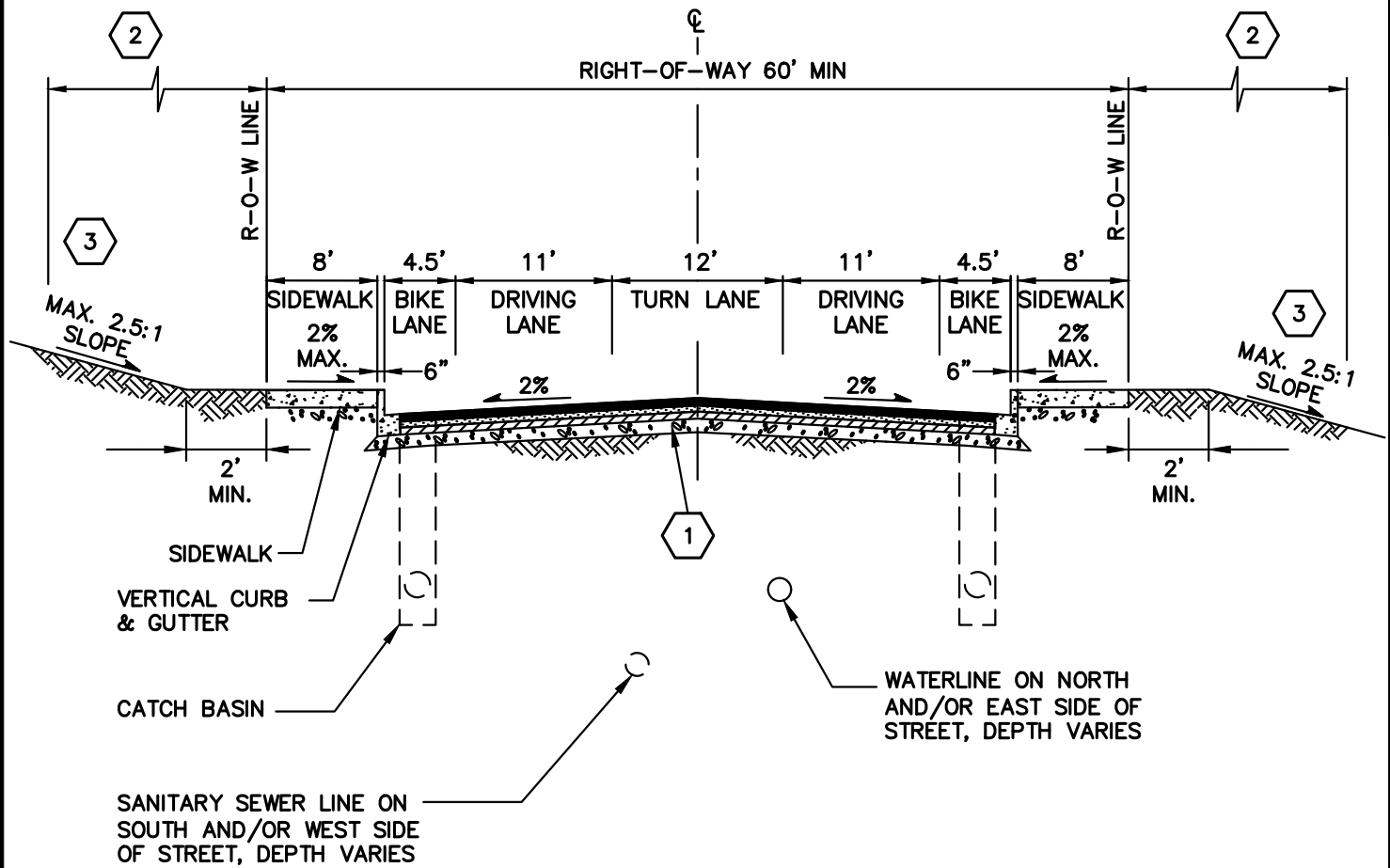
BY CITY

MAY 2018

DATE

DWG. NO.

T-6E



NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER.
- 2 10' UTILITY AND/OR SLOPE EASEMENT AS REQUIRED.
- 3 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.



CITY OF NORTH BEND
PARK STREET—MAIN STREET
TO HEALY AVE
TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

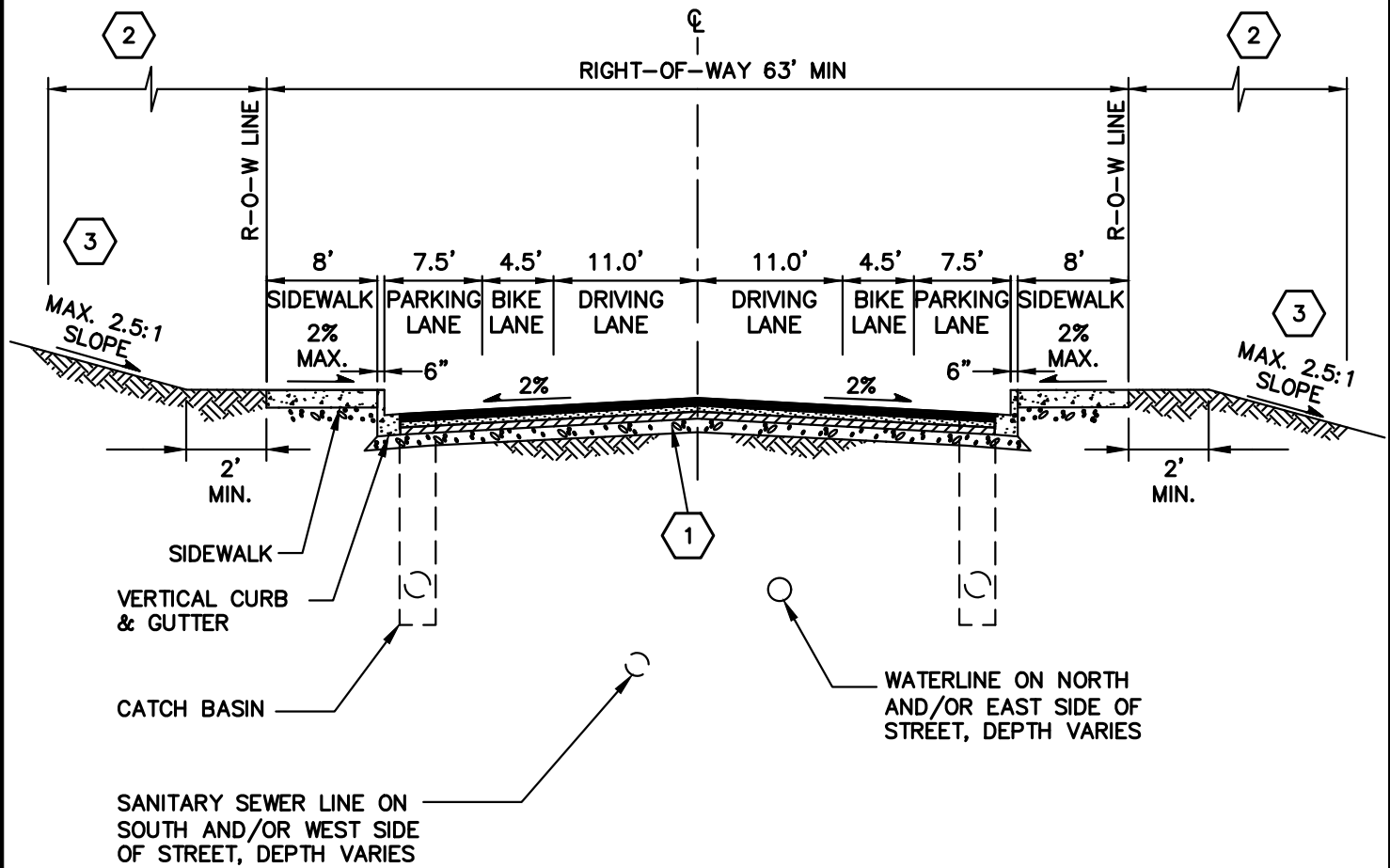
BY CITY

MAY 2018

DATE

DWG. NO.

T-6F



NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER.
- 2 10' UTILITY AND/OR SLOPE EASEMENT AS REQUIRED.
- 3 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.



CITY OF NORTH BEND
PARK STREET-HEALY AVE
TO NORTH BEND WAY
TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

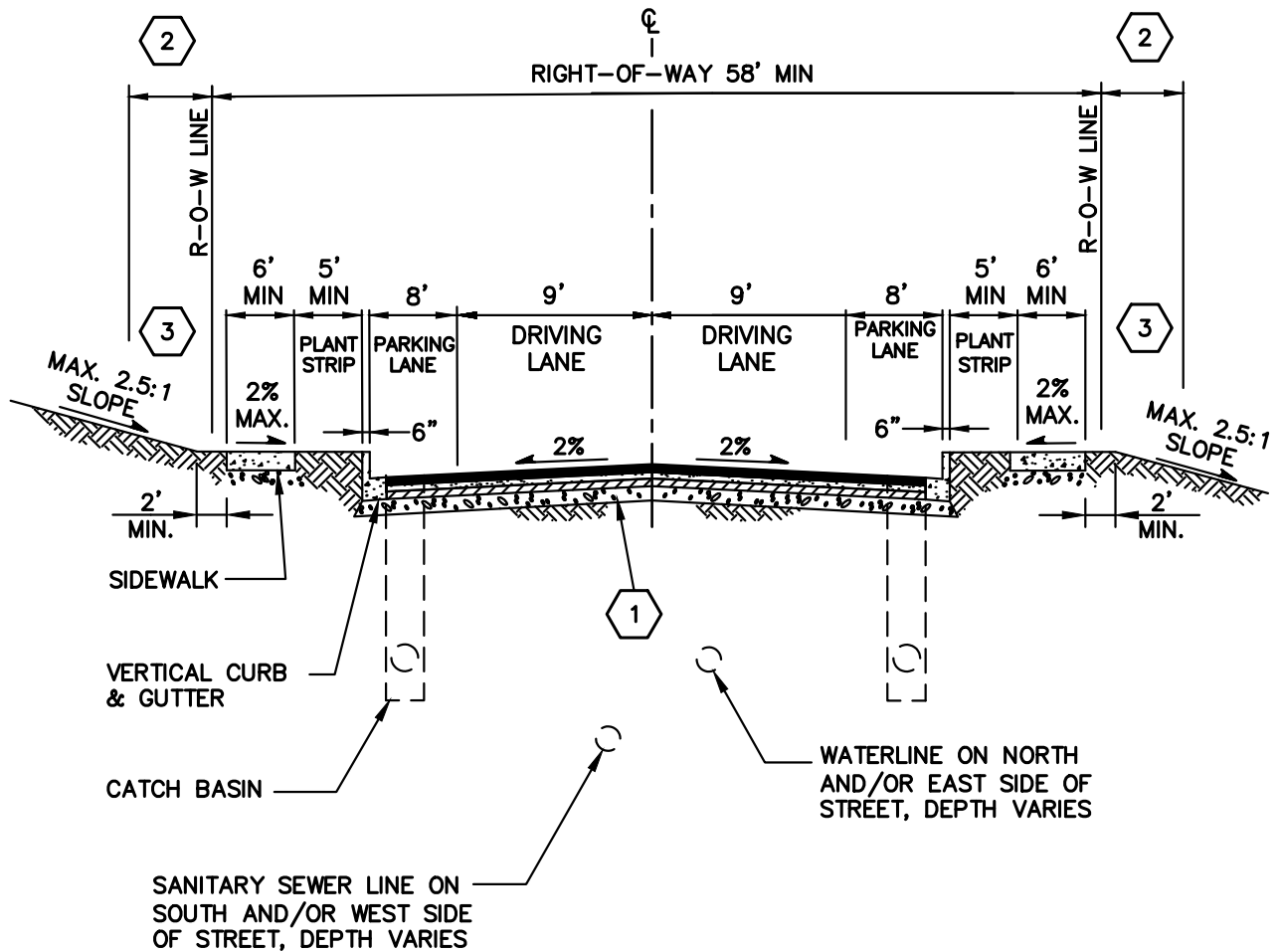
BY CITY

MAY 2018

DATE

DWG. NO.

T-6G



NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER, OR MINIMUM PER SECTION 4.38.
- 2 5' UTILITY EASEMENT (BOTH SIDES)
- 3 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.



CITY OF NORTH BEND
RESIDENTIAL LOCAL STREETS FOR
COTTAGE HOUSING AND
MULTIFAMILY TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

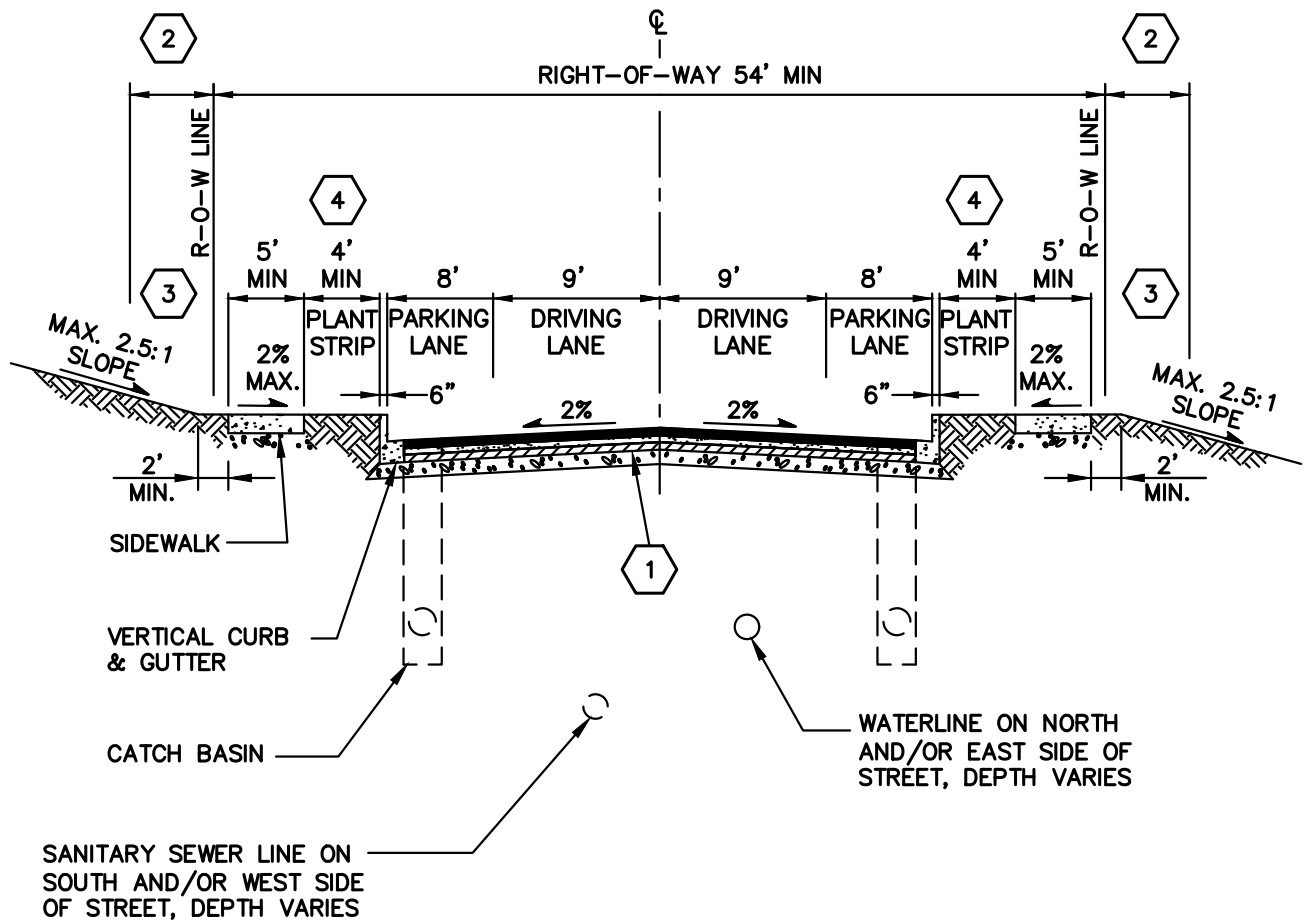
BY CITY

MAY 2018

DATE

DWG. NO.

T-7



NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER, OR MINIMUM PER SECTION 4.38.
- 2 5' UTILITY EASEMENT (BOTH SIDES)
- 3 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.
- 4 DUE TO NARROW WIDTH OF PLANTING STRIP, VEGETATION SHALL INCLUDE GRASSES, ORNAMENTAL SHRUBS, AND GROUNDCOVER, BUT SHALL NOT INCLUDE TREES.



CITY OF NORTH BEND
RESIDENTIAL LOCAL STREETS FOR
LOW DENSITY RESIDENTIAL
TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

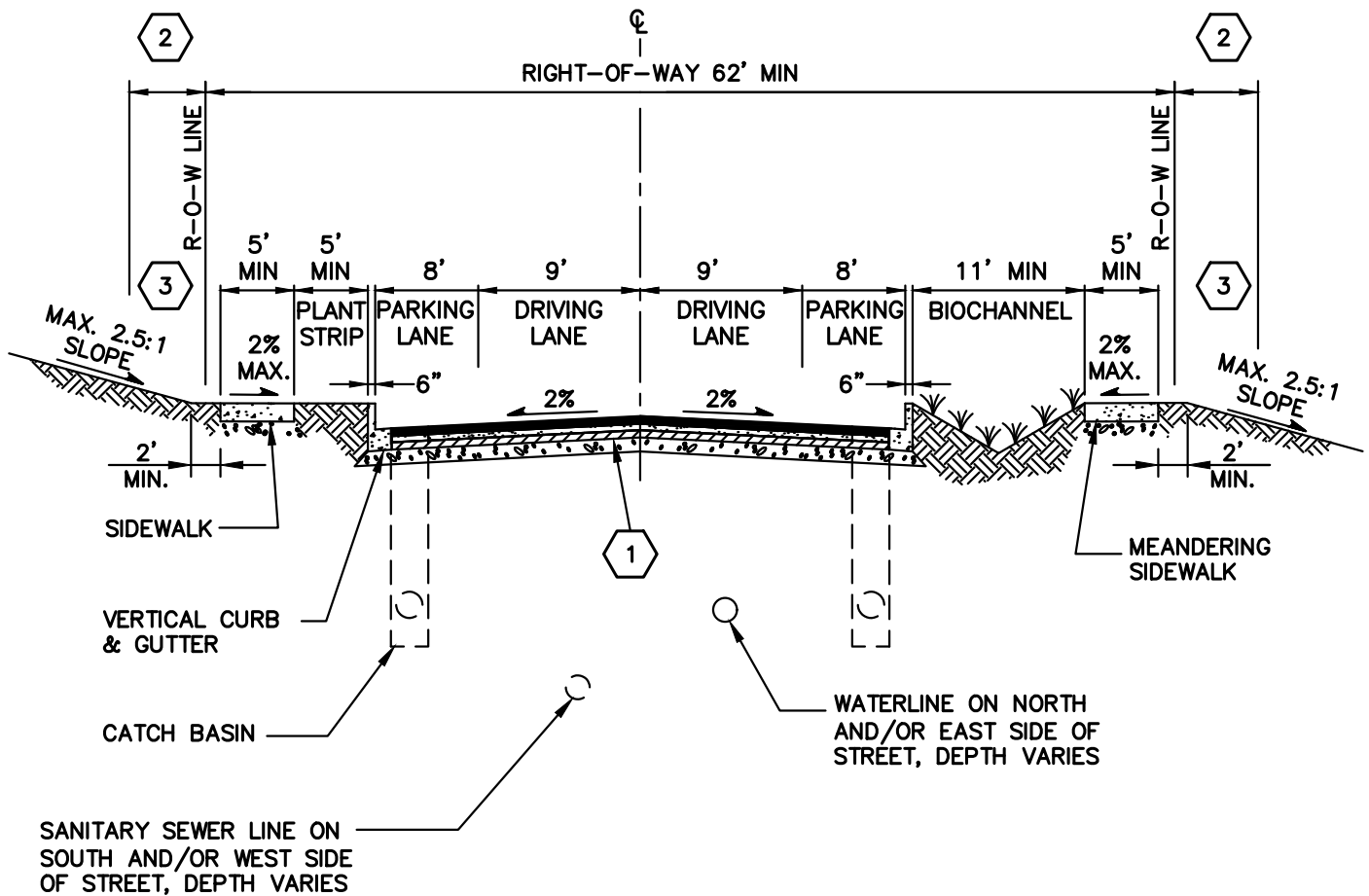
BY CITY

MAY 2018

DATE

DWG. NO.

T-8



NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER, OR MINIMUM PER SECTION 4.38.
- 2 5' UTILITY EASEMENT (BOTH SIDES)
- 3 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.



CITY OF NORTH BEND
RESIDENTIAL LOCAL STREETS
LOW-IMPACT DESIGN
TYPICAL SECTION

APPROVED:

MARK RIGOS, P.E.

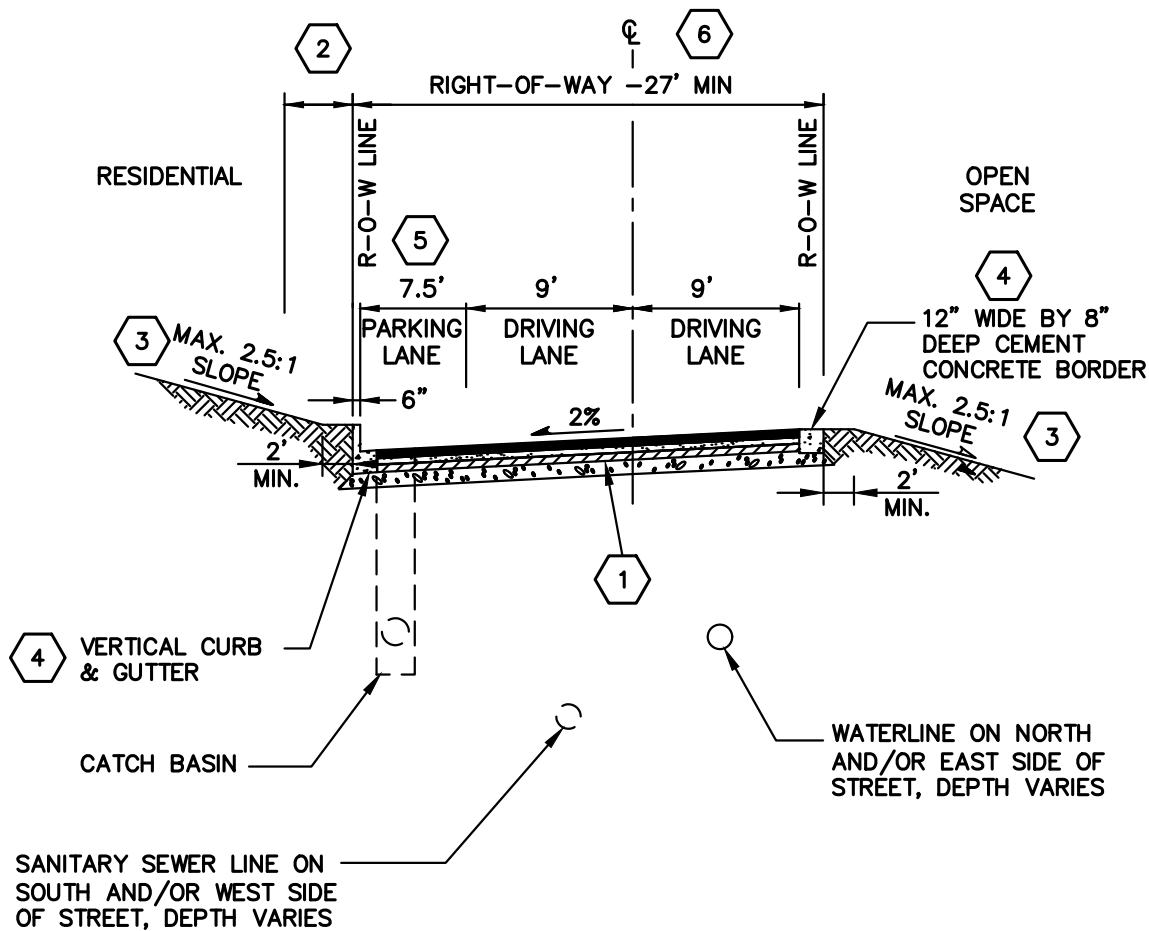
BY CITY

MAY 2018

DATE

DWG. NO.

T-9



NOTES:

- 1 PAVEMENT DESIGN BY WASHINGTON STATE LICENSED CIVIL ENGINEER AND AS APPROVED BY THE CITY ENGINEER, OR MINIMUM PER SECTION 4.38.
- 2 5' UTILITY EASEMENT (BOTH SIDES)
- 3 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.
- 4 AT-GRADE 12" CEMENT CONCRETE BORDER SHALL BE INSTALLED AT EDGE OF TRAVEL LANE ON OPEN SPACE SIDE OF ROADWAY. VERTICAL CURB AND GUTTER SHALL BE USED IN CONJUNCTION WITH PARKING LANE ON RESIDENTIAL SIDE OF ROADWAY.
- 5 PARKING LANE IS OPTIONAL. WHEN PARKING LANE IS PROVIDED, OPEN SPACE SIDE SHALL BE SIGNED WITH "NO PARKING-FIRE LANE" PER MUTCD. BOTH SIDES SHALL BE SIGNED "NO PARKING-FIRE LANE" WHEN PARKING LANE IS NOT PROVIDED. IF NO PARKING LANE IS PROVIDED, ROAD WIDTH SHALL BE MINIMUM OF 18 FEET, PLUS 12" CEMENT CONCRETE BORDER, EAST SIDE.
- 6 RIGHT-OF-WAY WIDTH SHALL BE 27 FEET WITH PARKING LANE AND 20 FEET WITHOUT PARKING LANE.



CITY OF NORTH BEND
WOONERF ROUTE FOR HOMES
FRONTING TO OPEN SPACE
TYPICAL SECTION - OPTION 1

APPROVED:

MARK RIGOS, P.E.

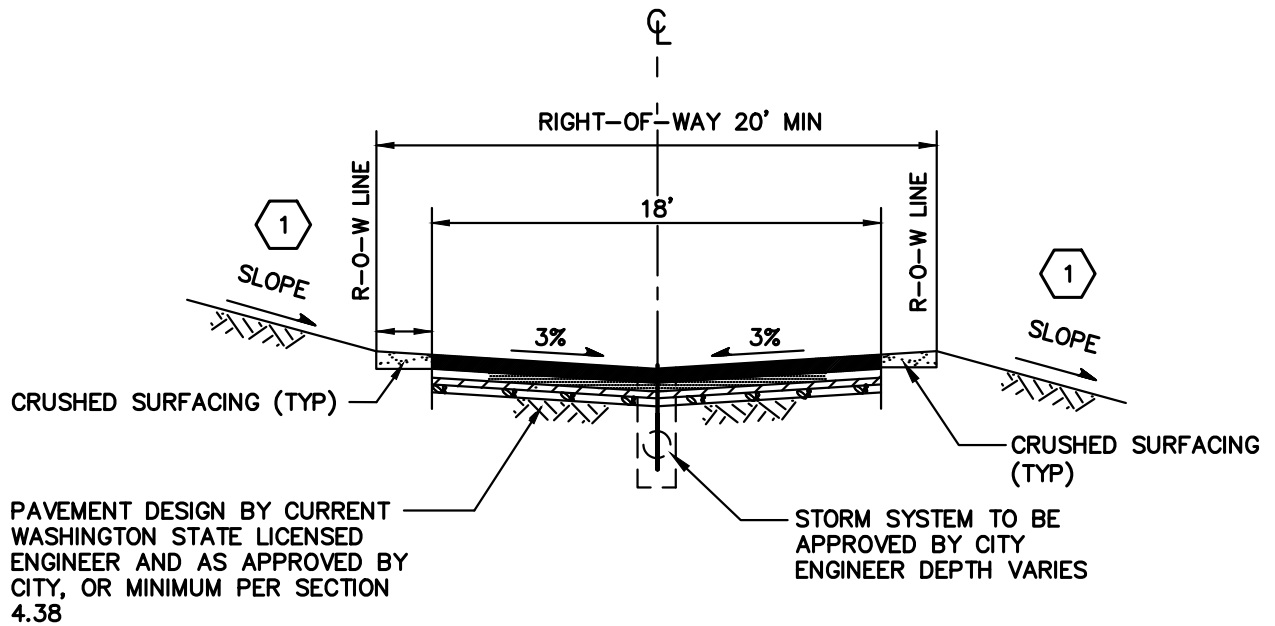
BY CITY

MAY 2018

DATE

DWG. NO.

T-10



NOTES:

- 1 SLOPE MUST ALLOW REASONABLE ACCESS TO ABUTTING PROPERTIES.



CITY OF NORTH BEND

ALLEY SECTION

APPROVED:

MARK RIGOS, P.E.

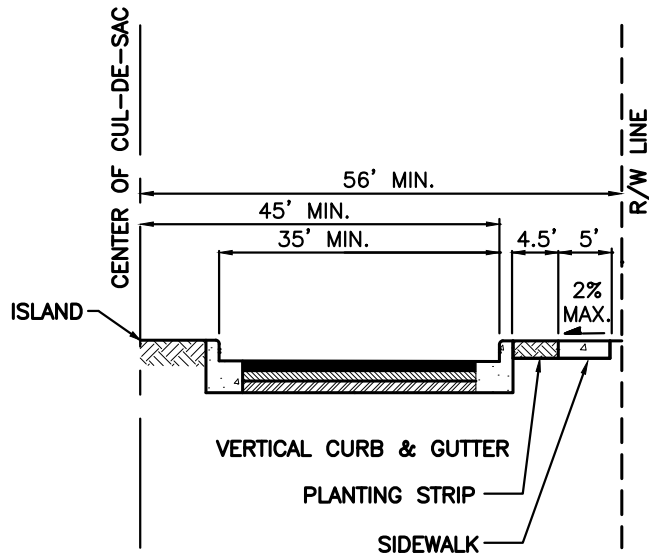
BY CITY

MAY 2018

DATE

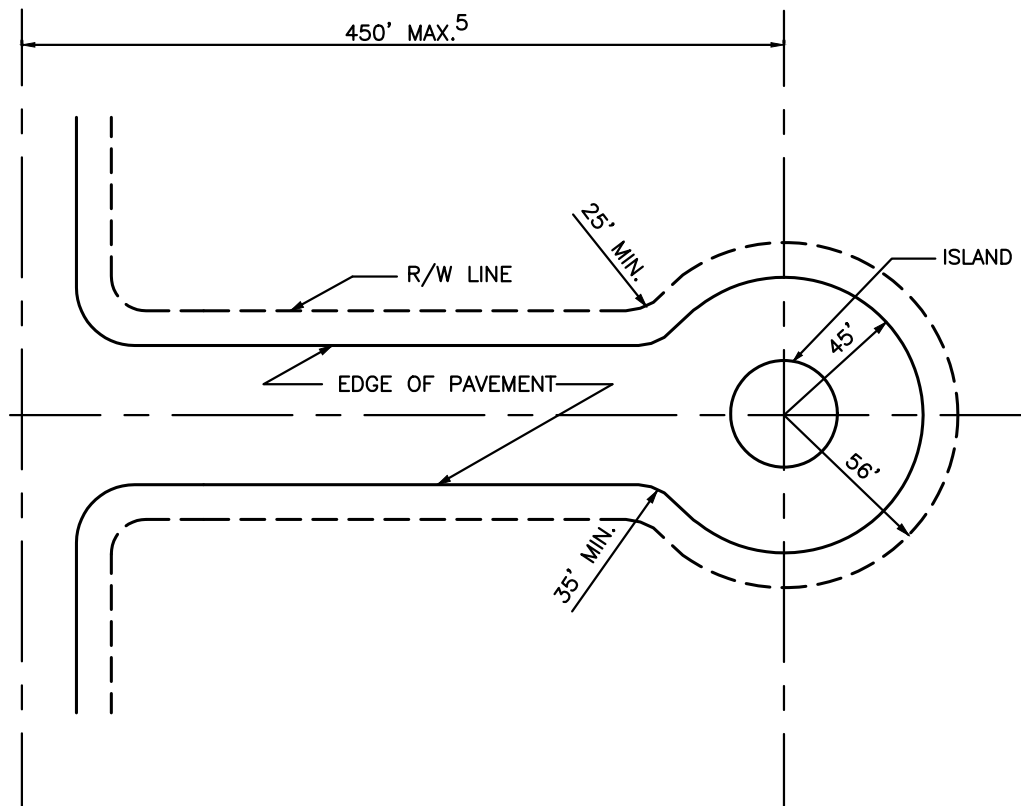
DWG. NO.

T-11



NOTES:

1. SEE SEC. 4.06.
2. ISLAND IS MANDATORY. MINIMUM DIAMETER 20'.
3. ISLAND AT CENTER OF BULB SHALL HAVE VERTICAL CURB.
4. ISLAND TO BE LANDSCAPED AND MAINTAINED BY ADJACENT PROPERTY OWNERS.
5. SEE SEC. 4.06 FOR CUL-DE-SAC LENGTH EXCEPTION.



CITY OF NORTH BEND

CUL-DE-SAC

APPROVED:

MARK RIGOS, P.E.

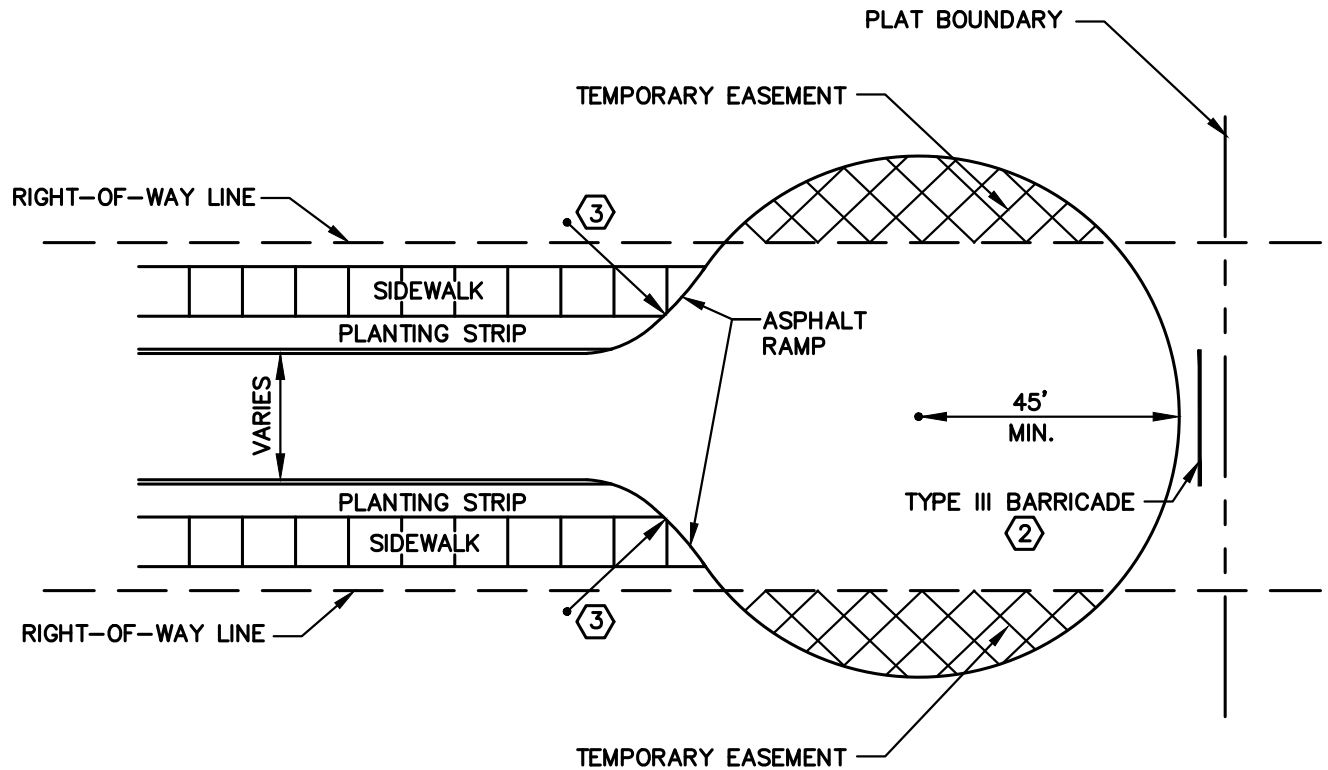
BY CITY

MAY 2018

DATE

DWG. NO.

T-12



NOTES:

- ① SEE SEC. 4.06.
- ② BARRICADE REQUIRED AT END OF BULB.
SEE SEC. 4.11.
- ③ 28 FOOT RADIUS (TYP)



CITY OF NORTH BEND

TEMPORARY CUL-DE-SAC

APPROVED:

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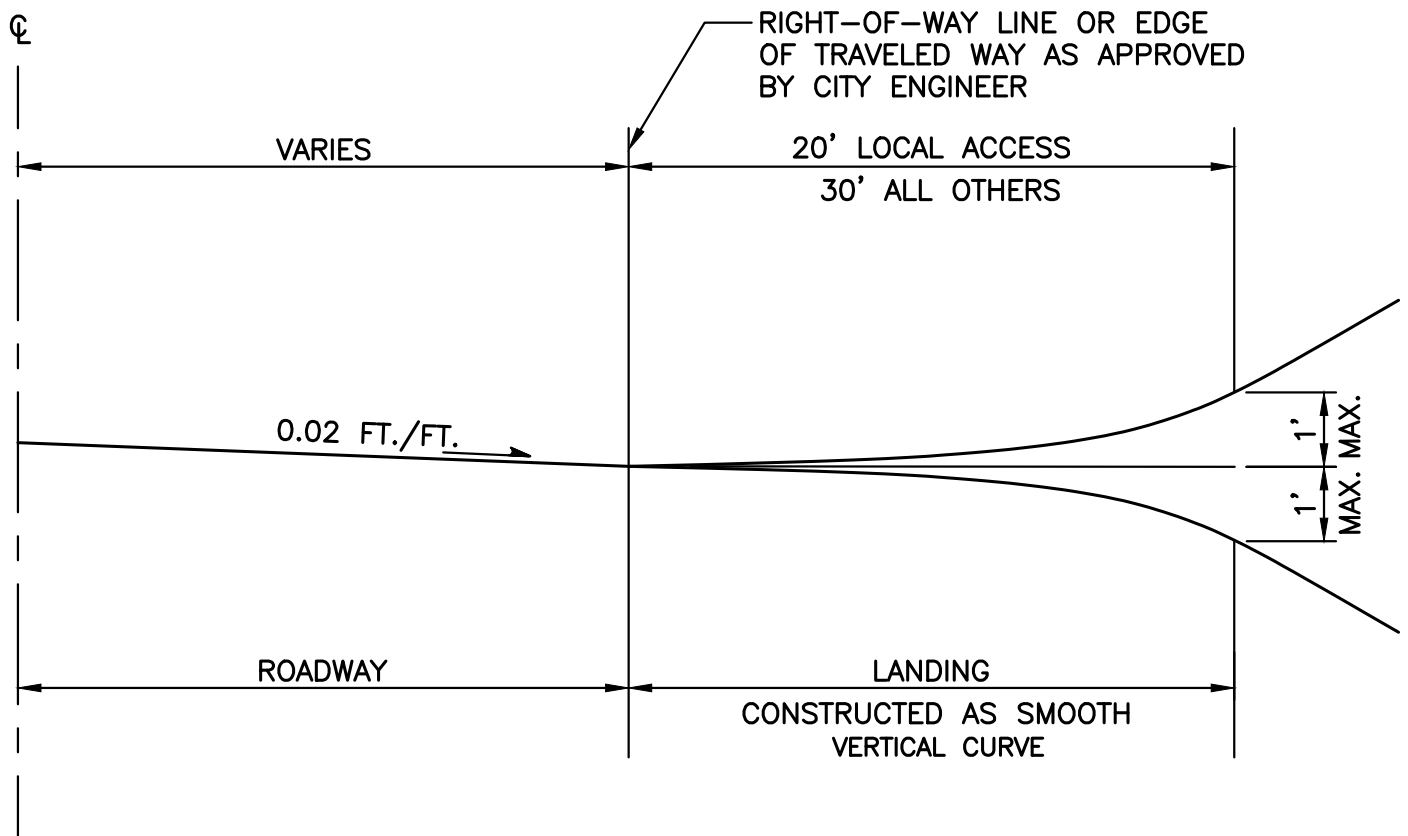
BY CITY

MAY 2018

DATE

DWG. NO.

T-13



SECTION

NOTES:

1. SEE SEC. 4.07 FOR INTERSECTION REQUIREMENTS.



CITY OF NORTH BEND

INTERSECTION LANDING

APPROVED:

MARK RIGOS, P.E.

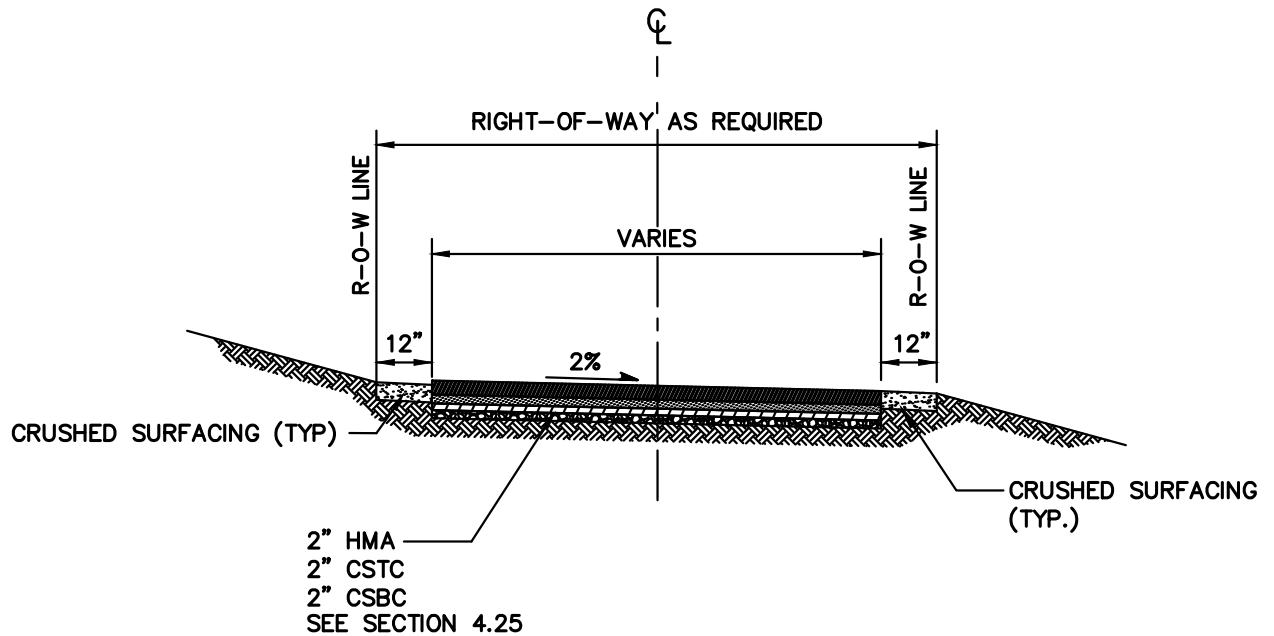
BY CITY

MAY 2018

DATE

DWG. NO.

T-14



NOTES:

SEPARATED WALKWAYS, BIKEWAYS AND TRAILS



CITY OF NORTH BEND

**SEPARATED WALKWAY AND/OR
BIKEWAY SECTION**

APPROVED:

MARK RIGOS, P.E.

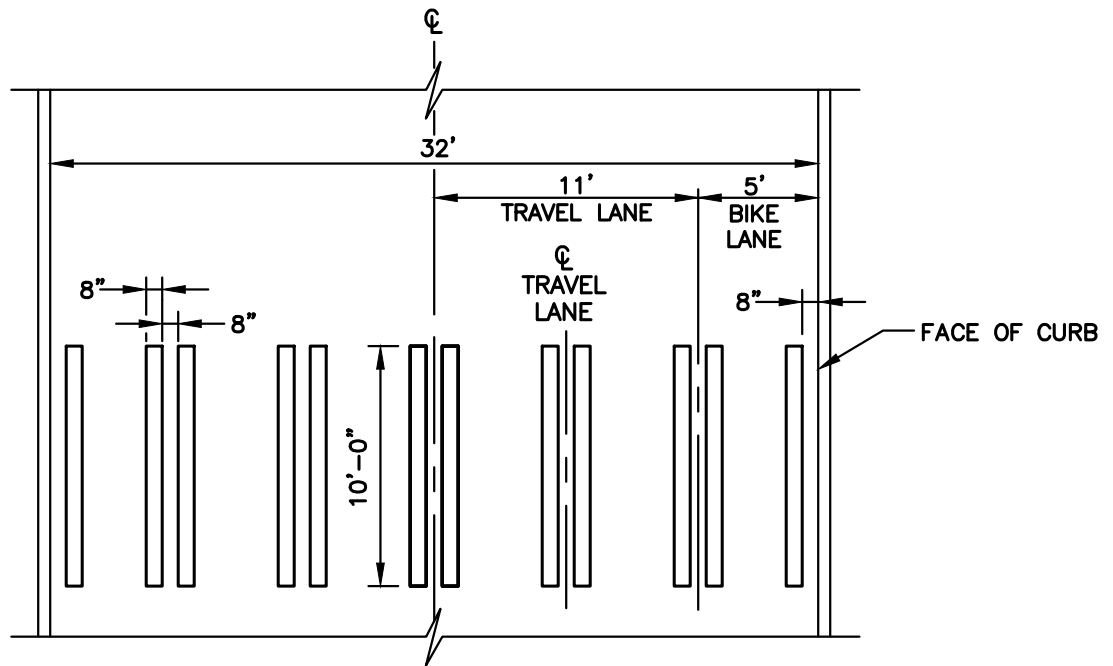
BY CITY

MAY 2018

DATE

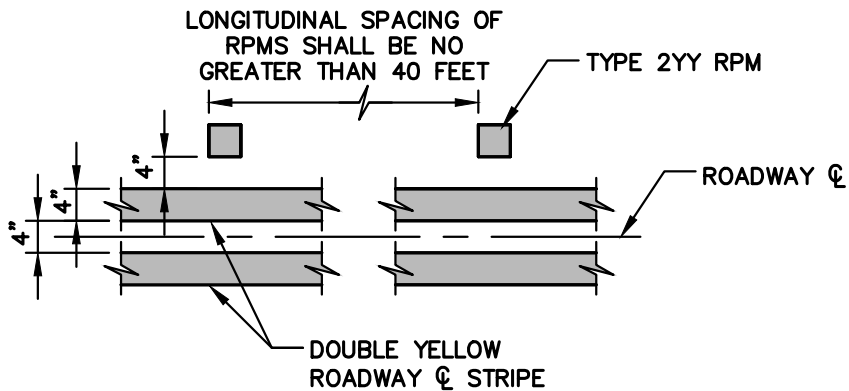
DWG. NO.

T-15



TYPICAL CROSSWALK ON ARTERIAL AND COLLECTOR STREETS

NTS



TYPICAL DOUBLE YELLOW CENTER STRIPE

NTS

NOTES:

1. ALL CROSSWALK STRIPING TO BE THERMOPLASTIC.
2. DOUBLE YELLOW STRIPING TO BE REFLECTIVE PAINT.



CITY OF NORTH BEND

TYPICAL STRIPING DETAILS

APPROVED:

MARK RIGOS, P.E.

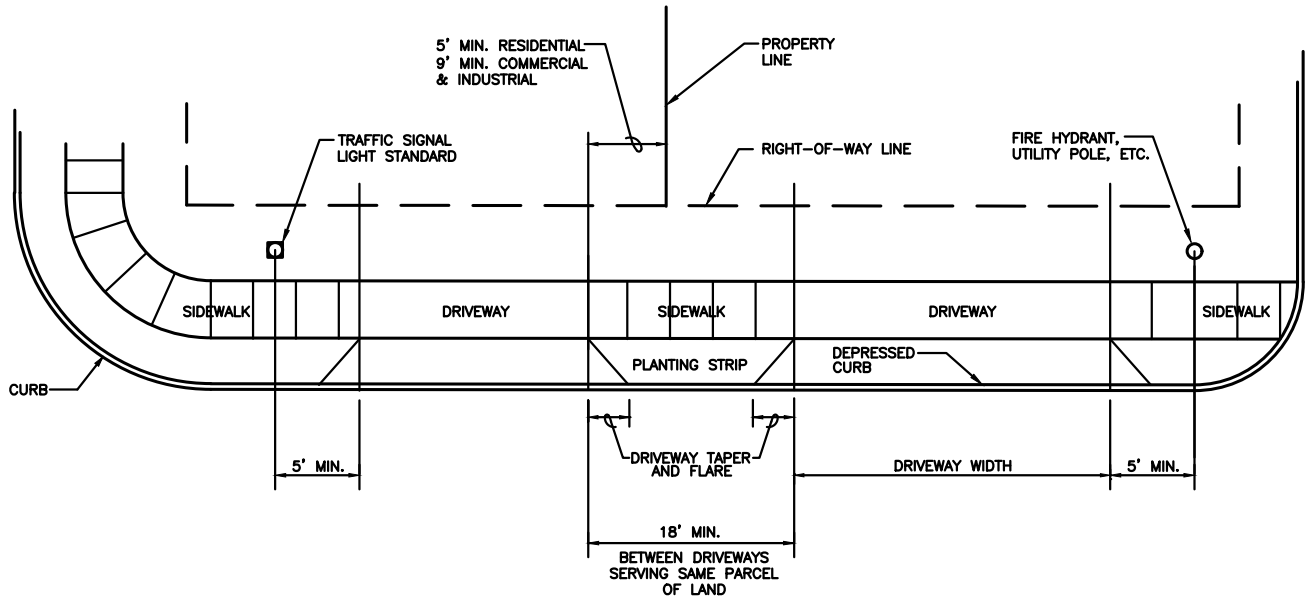
BY CITY

MAY 2018

DATE

DWG. NO.

T-16



NOTES:

1. SEE SECTION 4.24.
2. COMMERCIAL/INDUSTRIAL DRIVEWAYS MUST BE APPROVED BY THE ENGINEER, CONSIDERING BOTH TRAFFIC SAFETY AND THE ACTIVITY BEING SERVED. ALL COMMERCIAL/INDUSTRIAL DRIVEWAYS SHALL HAVE AN EXPANSION JOINT LOCATED MID-WIDTH.
3. DRIVEWAYS SHALL BE LOCATED AS FAR FROM THE INTERSECTION AS POSSIBLE.
4. NO PORTION OF ANY DRIVEWAY SHALL ENCROACH IN CURB RETURN.
5. DRIVEWAYS SHALL BE SETBACK A MINIMUM OF 5' FROM OBJECTS.
6. MAXIMUM DRIVEWAY SLOPE IS 15% (PERCENT).
7. MAXIMUM DRIVEWAY WIDTH IS 10 FEET FOR RESIDENTIAL FRONT-LOADED SINGLE-BAY GARAGES, SIDE LOADED GARAGES AND GARAGES AT THE REAR OF THE LOT; 16 FEET FOR RESIDENTIAL FRONT-LOADED DOUBLE AND TRIPLE BAY GARAGES; 30 FEET FOR COMMERCIAL.
8. DRIVEWAYS SHALL BE SETBACK A MINIMUM OF 20 FEET FROM CROSSWALKS AND TRAFFIC CALMING DEVICES.
9. ALL DRIVEWAYS SHALL BE PAVED WITH ASPHALT OR CONCRETE.



CITY OF NORTH BEND

**LOCATION AND WIDTH OF
NEW DRIVEWAYS**

APPROVED:

MARK RIGOS, P.E.

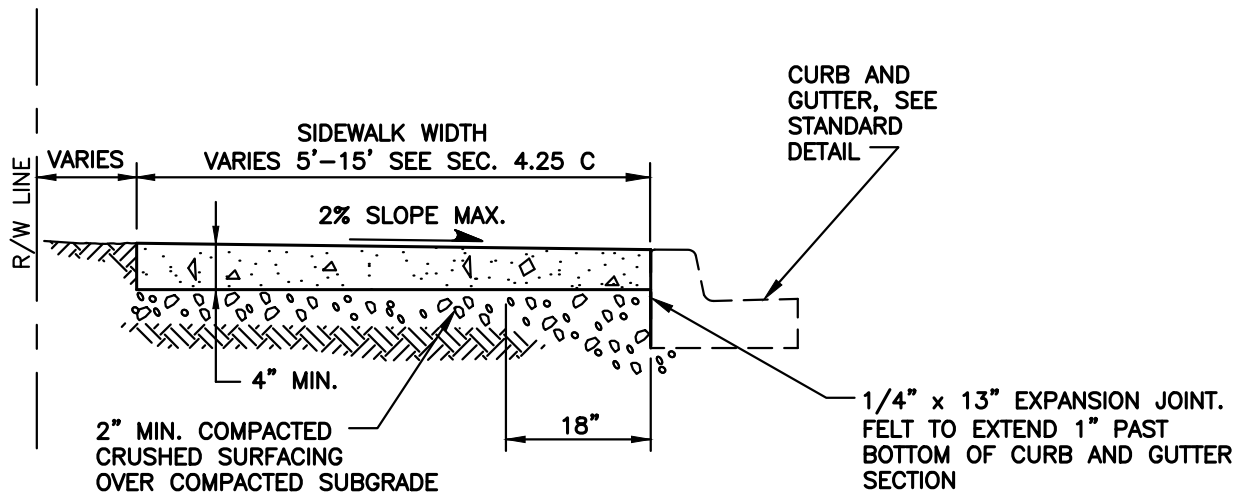
BY CITY

MAY 2018

DATE

DWG. NO.

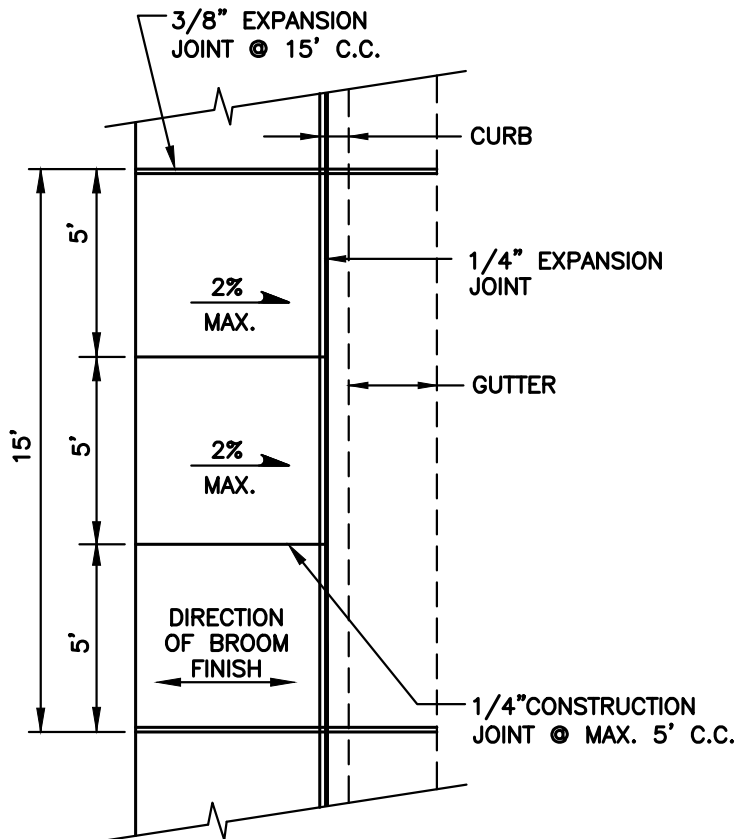
T-17



SECTION

NOTES:

1. THRU JOINTS AND CONTRACTION JOINTS SHALL BE AS SHOWN ABOVE. THRU JOINTS SHALL ALSO BE PLACED IN THE SIDEWALK SECTION AT DRIVEWAY RETURNS. ALL JOINTS SHALL BE CLEAN AND EDGED WITH AN EDGE HAVING 1/4" RADIUS. JOINT SHALL BE FLUSH WITH THE FINISHED SURFACE.
2. ALL METER BOXES, ETC. IN SIDEWALK AREAS SHALL HAVE 3/8" JOINT MATERIAL (FULL DEPTH) PLACED AROUND THEM BEFORE PLACING CONCRETE.
3. PREMOLDED JOINT FILLER SHALL BE ASPHALT SATURATED FELT OR PAPER, FULL DEPTH OF SIDEWALK.
4. FORMS SHALL BE EITHER WOOD OR STEEL AND SHALL MEET ALL REQUIREMENTS OF THESE SPECIFICATIONS.
5. CEMENT CONCRETE SHALL BE AIR-ENTRAINED CLASS 3000 PSI, EXCEPT CLASS 4000 SHALL BE USED AT DRIVEWAY CROSSINGS.
6. FOR SIDEWALKS GREATER THAN 8' IN WIDTH, ADDITIONAL EXPANSION AND CONTRACTION JOINTS WILL BE REQUIRED.



PLAN



CITY OF NORTH BEND

SIDEWALK WITHOUT
PLANTING STRIP

APPROVED:

MARK RIGOS, P.E.

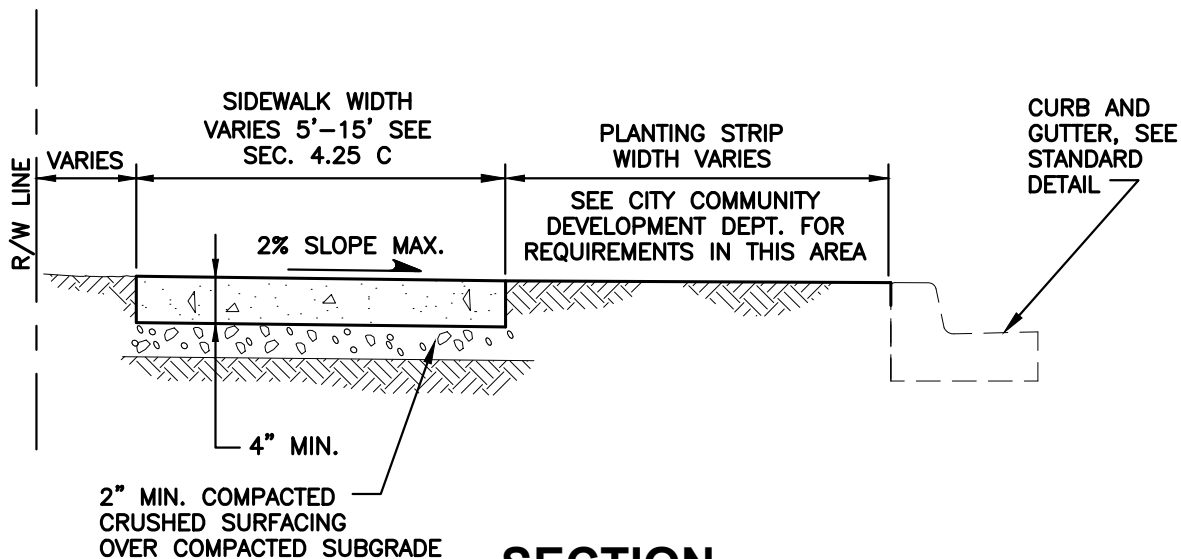
BY CITY

MAY 2018

DATE

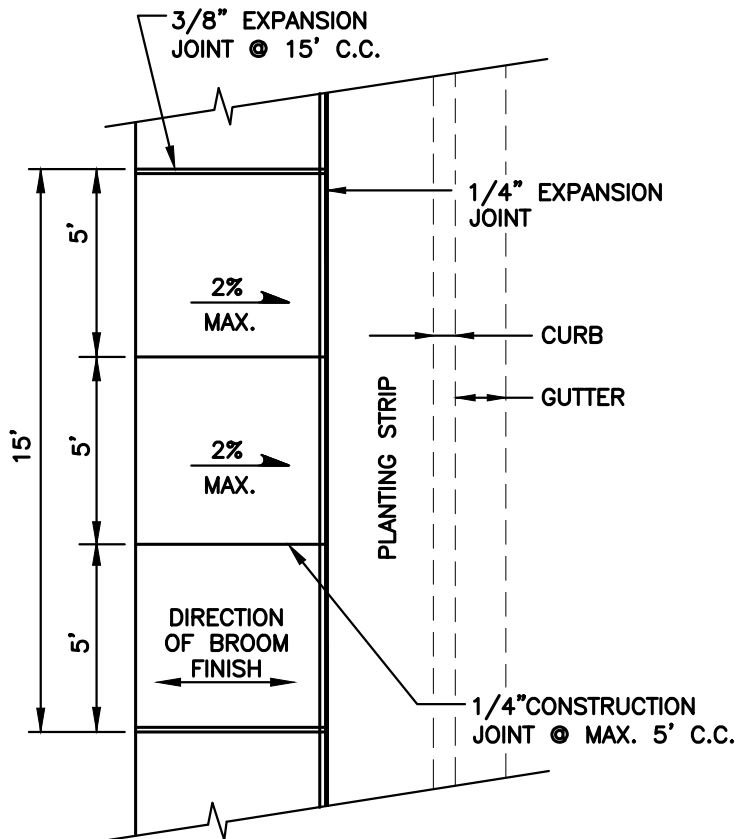
DWG. NO.

T-18



NOTES:

1. THRU JOINTS AND CONTRACTION JOINTS SHALL BE AS SHOWN ABOVE. THRU JOINTS SHALL ALSO BE PLACED IN THE SIDEWALK SECTION AT DRIVEWAY RETURNS. ALL JOINTS SHALL BE CLEAN AND EDGED WITH AN EDGE HAVING 1/4" RADIUS. JOINT SHALL BE FLUSH WITH THE FINISHED SURFACE.
2. ALL METER BOXES, ETC. IN SIDEWALK AREAS SHALL HAVE 3/8" JOINT MATERIAL (FULL DEPTH) PLACED AROUND THEM BEFORE PLACING CONCRETE.
3. PREMOLDED JOINT FILLER SHALL BE ASPHALT SATURATED FELT OR PAPER, FULL DEPTH OF SIDEWALK.
4. FORMS SHALL BE EITHER WOOD OR STEEL AND SHALL MEET ALL REQUIREMENTS OF THESE SPECIFICATIONS.
5. CEMENT CONCRETE SHALL BE AIR-ENTRAINED CLASS 3000 PSI, EXCEPT CLASS 4000 SHALL BE USED AT DRIVEWAY CROSSINGS.
6. FOR SIDEWALKS GREATER THAN 8' IN WIDTH, ADDITIONAL EXPANSION AND CONTRACTION JOINTS WILL BE REQUIRED.



CITY OF NORTH BEND

SIDEWALK WITH PLANTING STRIP

APPROVED:

MARK RIGOS, P.E.

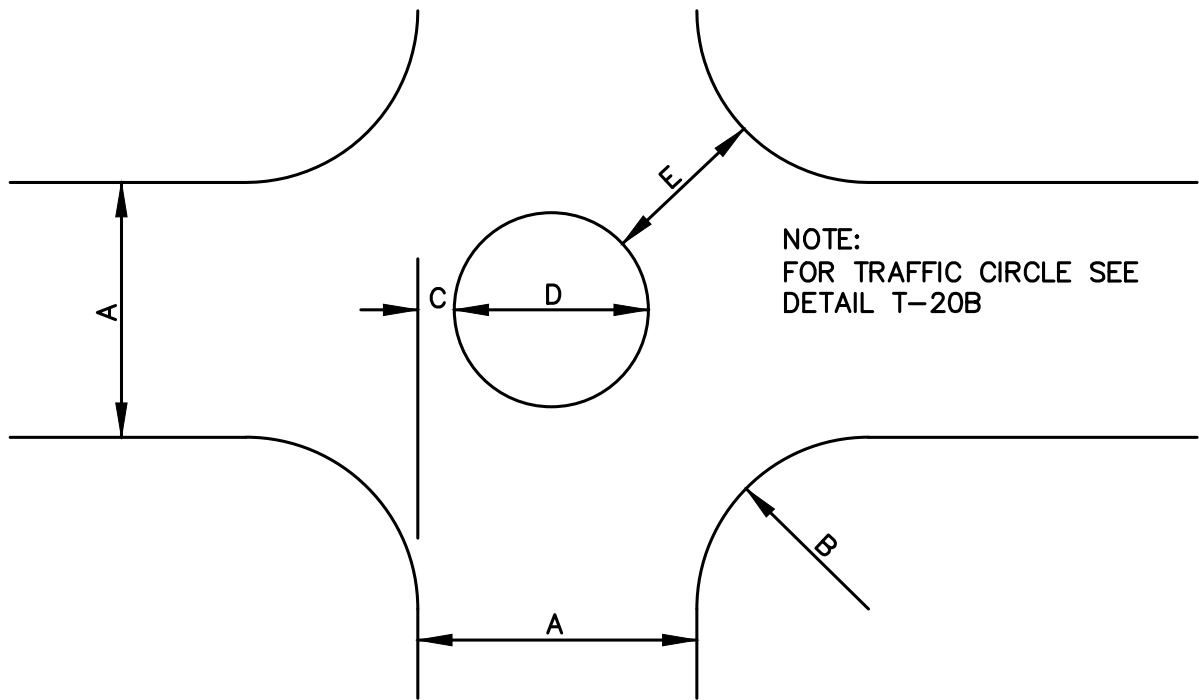
BY CITY

MAY 2018

DATE

DWG. NO.

T-19



INTERSECTION DIAGRAM

DIMENSIONS:

A – VARIES 22' – 36'

B – 25' MIN.

C – 1'-0" – 5'-0"

D – VARIES

E – 20' MIN.

NOTE: TRAFFIC CIRCLES SHALL NOT BE CONSTRUCTED
ON COLLECTOR OR LOCAL ACCESS STREETS.



CITY OF NORTH BEND

TRAFFIC CIRCLE

APPROVED:

MARK RIGOS, P.E.

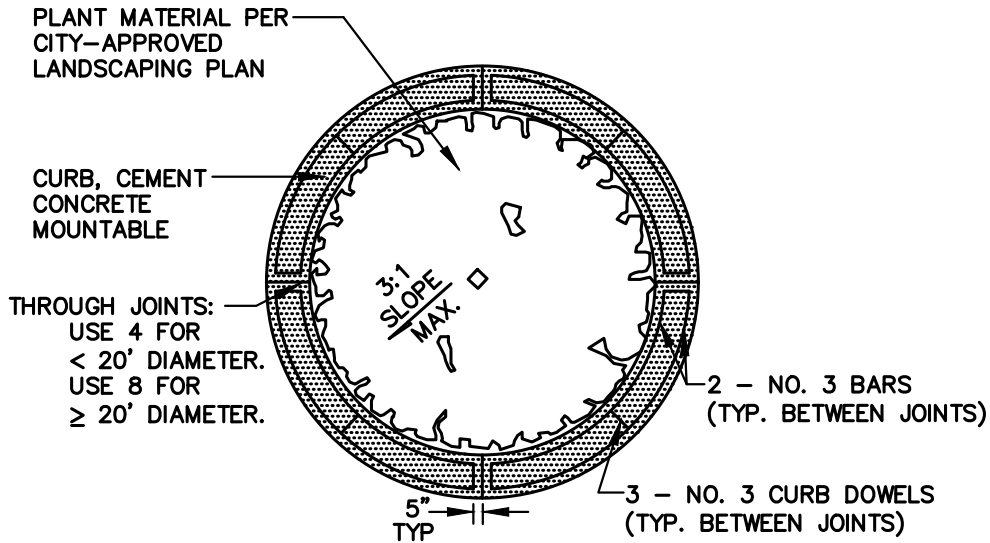
BY CITY

MAY 2018

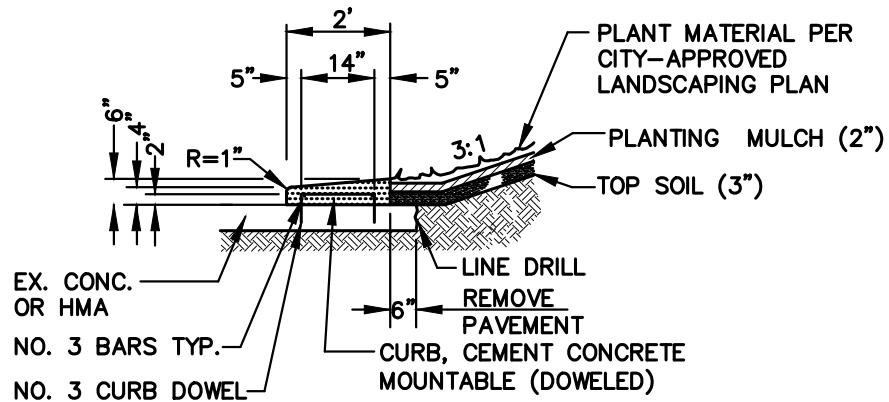
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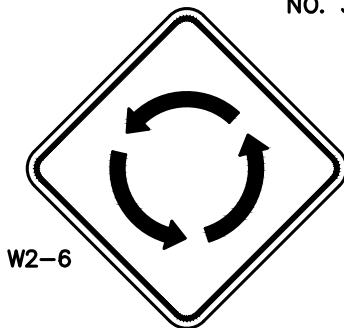
T-20A



TYPICAL TRAFFIC CIRCLE



TYPICAL SECTION A



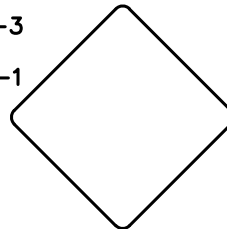
W16-12P

**TRAFFIC
CIRCLE**

30" x 30" BLACK ON YELLOW
PLACED 75' TO 100' BACK
FROM TRAFFIC CIRCLE ON
EACH APPROACH.

NOTE: LANDSCAPED AREAS MUST BE PROVIDED WITH SEPARATE WATER METER. ALL IRRIGATION PLANS MUST BE APPROVED BY THE CITY.

OM1-3
OR
OM1-1



18" x 18" YELLOW HIGH INTENSITY TYPE 1 OBJECT MARKER PLACED IN TRAFFIC CIRCLE FOR EACH APPROACH.



CITY OF NORTH BEND

TRAFFIC CIRCLE

APPROVED:

MARK RIGOS, P.E.

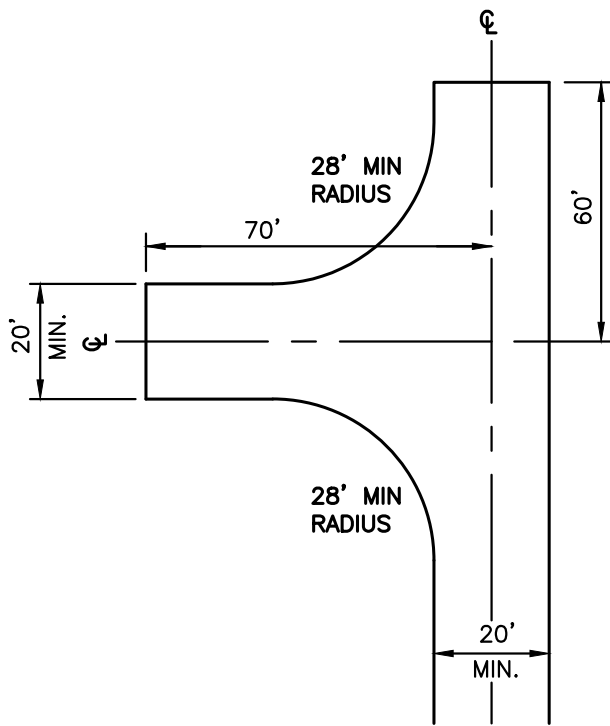
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MAY 2018

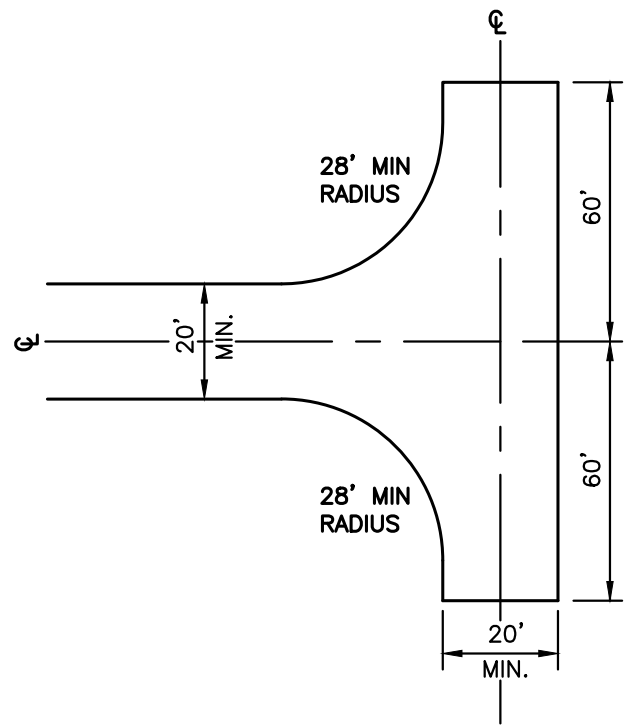
DATE

DWG. NO.

T-20B



OFFSET HAMMERHEAD



HAMMERHEAD

NOTES:

1. THIS TURNAROUND SHALL ONLY BE UTILIZED IF SPECIFICALLY APPROVED IN WRITING BY THE CITY.
2. ALL DIMENSIONS ARE MINIMUM REQUIREMENTS.
3. MINIMUM ROAD WIDTH SHOWN DOES NOT INCLUDE ANY SHOULDER DIMENSIONS OR CURB DIMENSIONS IF REQUIRED.
4. ALL LEGS OF THE TURNAROUND SHALL BE A MINIMUM OF 20 FEET OF UNOBSTRUCTED WIDTH.
5. THE TURNAROUND SHALL BE MARKED AS A FIRE LANE.
6. THE TURNAROUND SHALL MEET THE SAME GRADE AND SURFACING STANDARDS APPLIED TO FIRE ACCESS ROADS.
7. THE MAXIMUM CROSS SLOPE ON TURNAROUND SHALL NOT EXCEED SIX PERCENT.
8. ALTERNATIVE DESIGNS THAT DO NOT MEET THE CRITERIA ESTABLISHED IN THIS SECTION MAY BE APPROVED BY THE CITY.



CITY OF NORTH BEND

HAMMERHEAD TURNAROUND

APPROVED:

MARK RIGOS, P.E.

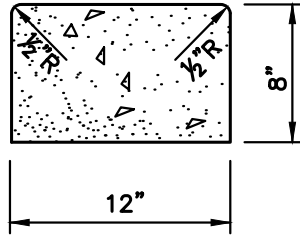
BY CITY

MAY 2018

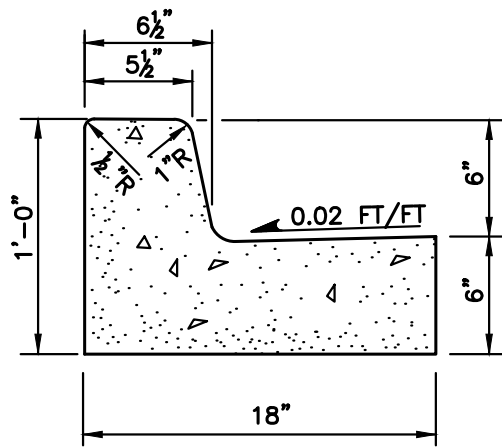
DATE

DWG. NO.

T-21



BORDER CURB



VERTICAL CONCRETE CURB AND GUTTER

NOTES:

1. THE CURBS, GUTTERS AND SIDEWALKS SHALL HAVE EXPANSION JOINTS (3/8") AT INTERVALS OF NOT GREATER THAN 15'-0"
2. CEMENT CONCRETE SHALL BE AIR-ENTRAINED CLASS 3000, EXCEPT CLASS 4000 SHALL BE USED AT DRIVEWAY APPROACHES.
3. WHEN REPAIRING AND/OR REPLACING CEMENT CONCRETE CURB AND GUTTER, EXISTING CURB AND GUTTER SHALL BE REMOVED TO THE NEAREST JOINT, SAWCUTTING AND REMOVAL SHALL NOT BE ALLOWED.



CITY OF NORTH BEND

CONCRETE CURB
AND GUTTER

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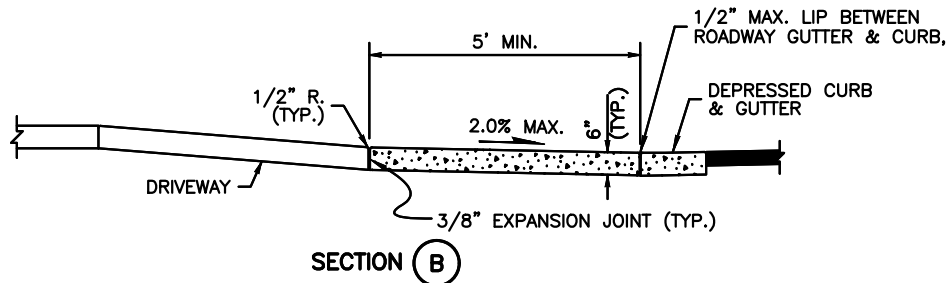
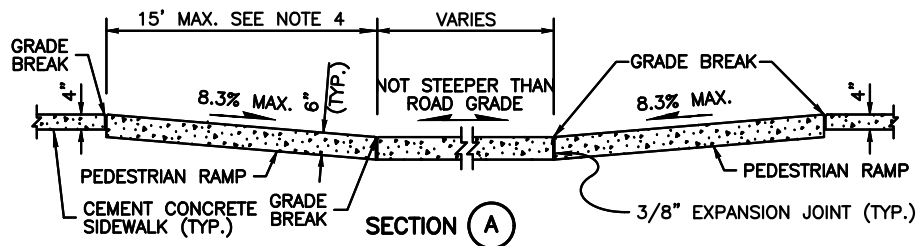
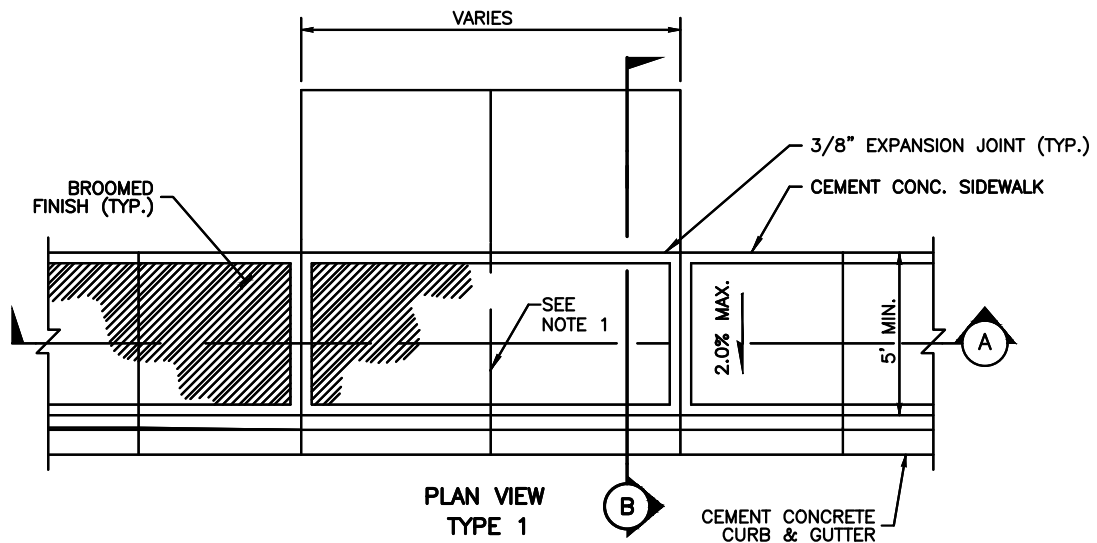
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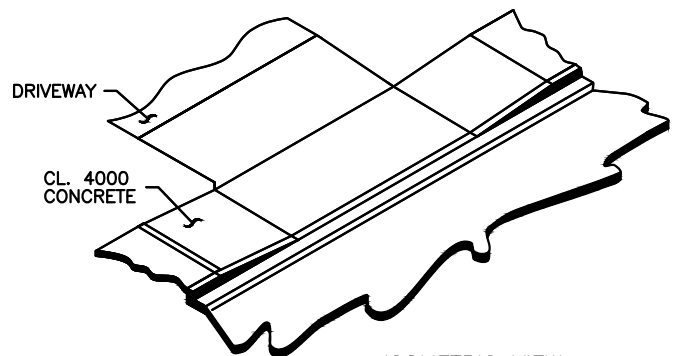
DWG. NO.

T-22



NOTES:

1. WHEN THE DRIVEWAY WIDTH EXCEEDS 15 FEET, CONSTRUCT A FULL DEPTH EXPANSION JOINT WITH 3/8" JOINT FILLER ALONG THE DRIVEWAY CENTERLINE. CONSTRUCT EXPANSION JOINTS PARALLEL WITH THE CENTERLINE AS REQUIRED AT 15 FEET MAXIMUM SPACING WHEN DRIVEWAY WIDTHS EXCEED 30 FEET.
2. ALL CEMENT CONCRETE SHALL BE AIR-ENTRAINED.
3. WHERE "GRADE BREAK" IS CALLED OUT, THE ENTIRE LENGTH OF THE LINE BETWEEN THE TWO ADJACENT SURFACE PLANES SHALL BE FLUSH.
4. THE RAMP MAXIMUM RUNNING SLOPE SHALL NOT REQUIRE THE RAMP LENGTH TO EXCEED 15 FEET TO AVOID CHASING THE SLOPE INDEFINITELY WHEN CONNECTING TO STEEP GRADES. WHEN APPLYING THE 15 FOOT MAX. LENGTH, THE RUNNING SLOPE OF THE RAMP SHALL BE AS FLAT AS FEASIBLE.
5. MINIMUM LENGTH OF FULL HEIGHT CURB BETWEEN DRIVEWAYS SHALL BE 2 FEET.



ISOMETRIC VIEW
TYPE 1

LEGEND



SLOPE IN EITHER DIRECTION



CITY OF NORTH BEND

CEMENT CONCRETE DRIVEWAY TYPE 1

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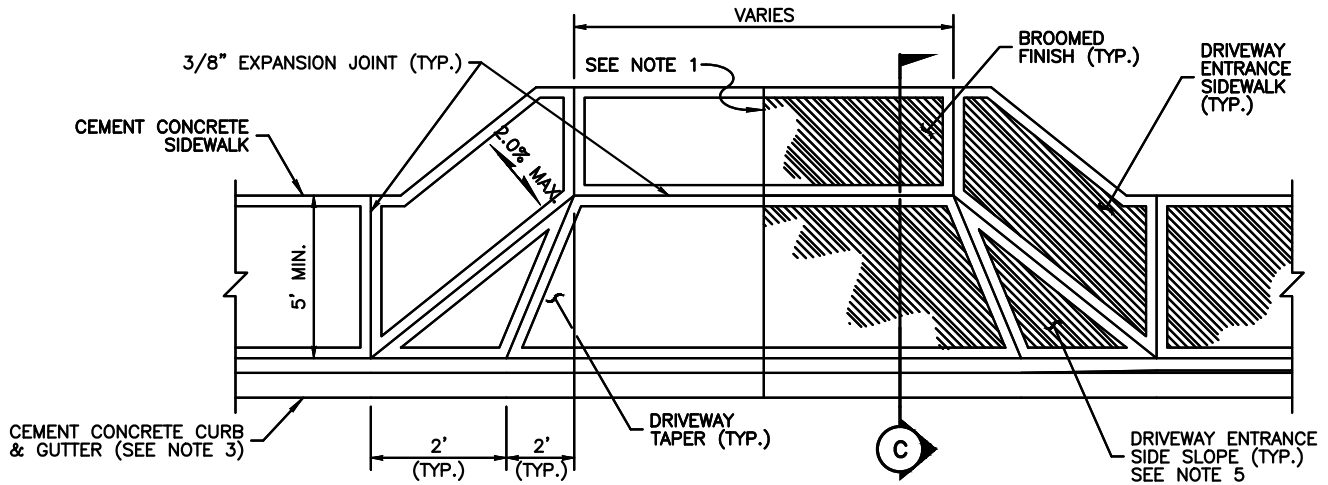
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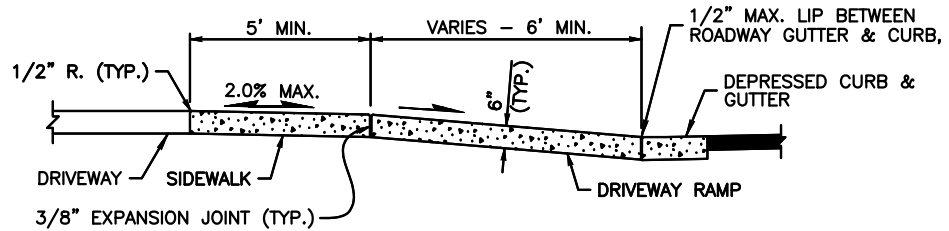
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T-23A



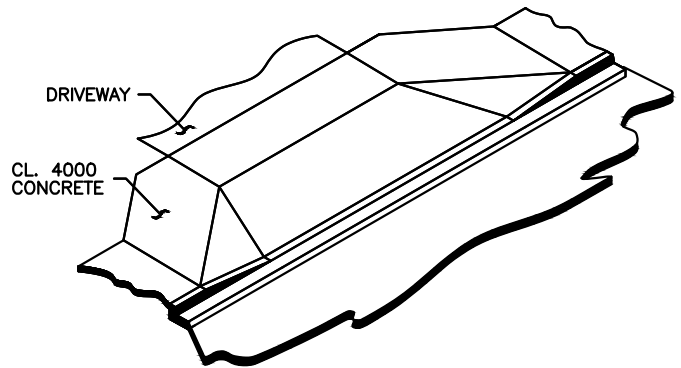
PLAN VIEW
TYPE 2



SECTION C

NOTES:

1. WHEN THE DRIVEWAY WIDTH EXCEEDS 15 FEET, CONSTRUCT A FULL DEPTH EXPANSION JOINT WITH 3/8" JOINT FILLER ALONG THE DRIVEWAY CENTERLINE. CONSTRUCT EXPANSION JOINTS PARALLEL WITH THE CENTERLINE AS REQUIRED AT 15 FEET MAXIMUM SPACING WHEN DRIVEWAY WIDTHS EXCEED 30 FEET.
2. ALL CEMENT CONCRETE SHALL BE AIR-ENTRAINED.
3. WHERE "GRADE BREAK" IS CALLED OUT, THE ENTIRE LENGTH OF THE LINE BETWEEN THE TWO ADJACENT SURFACE PLANES SHALL BE FLUSH.
4. THE RAMP MAXIMUM RUNNING SLOPE SHALL NOT REQUIRE THE RAMP LENGTH TO EXCEED 15 FEET TO AVOID CHASING THE SLOPE INDEFINITELY WHEN CONNECTING TO STEEP GRADES. WHEN APPLYING THE 15 FOOT MAX. LENGTH, THE RUNNING SLOPE OF THE RAMP SHALL BE AS FLAT AS FEASIBLE.
5. MINIMUM LENGTH OF FULL HEIGHT CURB BETWEEN DRIVEWAYS SHALL BE 2 FEET.



ISOMETRIC VIEW
TYPE 2

LEGEND



SLOPE IN EITHER DIRECTION



CITY OF NORTH BEND
CEMENT CONCRETE DRIVEWAY
TYPE 2

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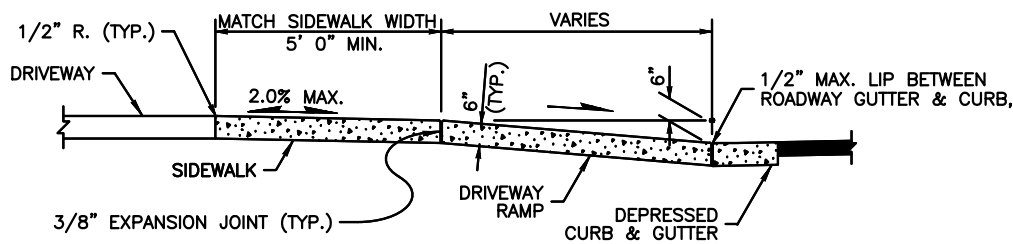
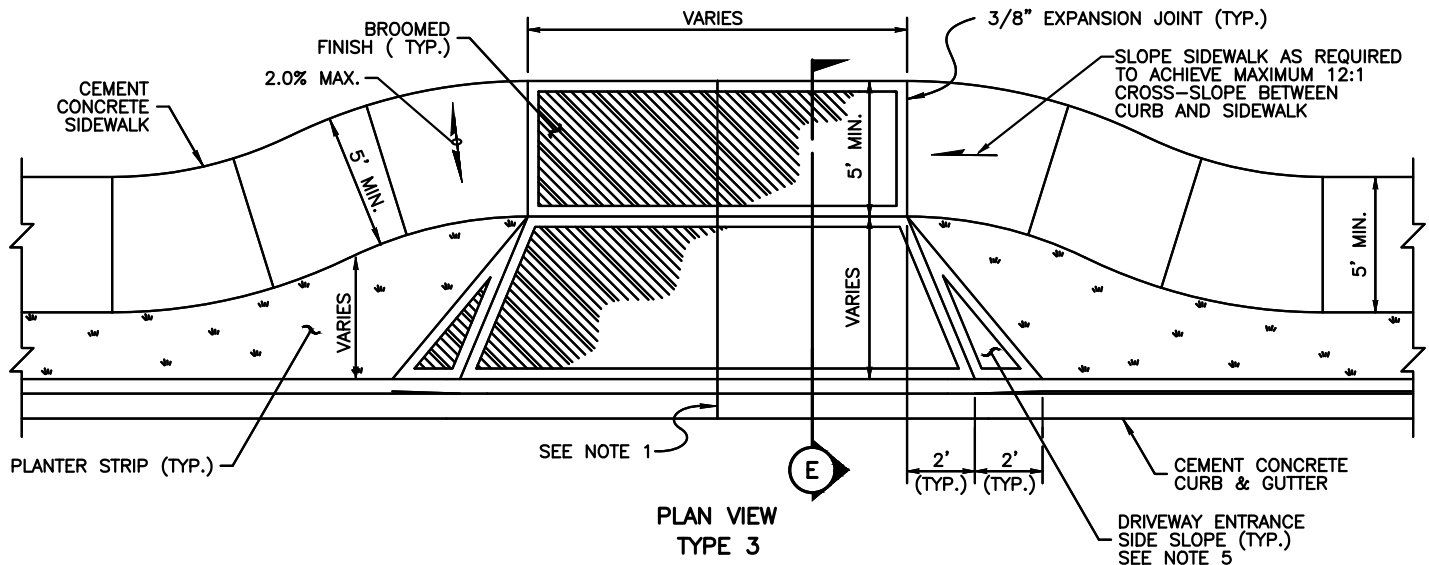
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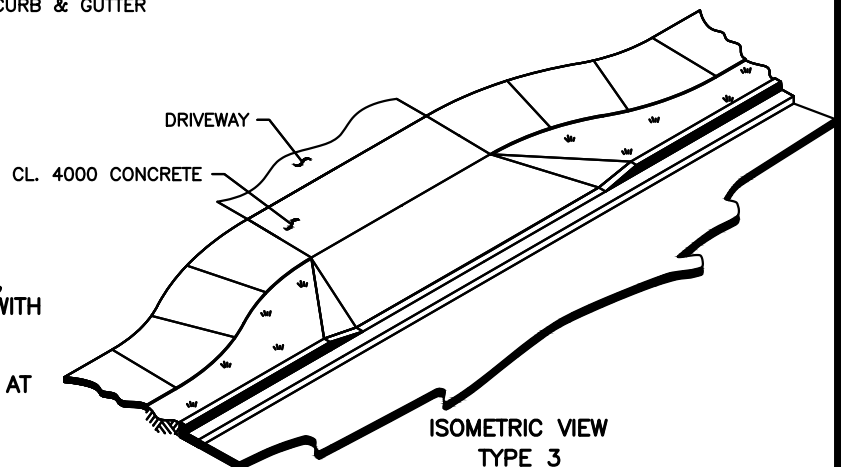
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T-23B



SECTION (E)



NOTES:

1. WHEN THE DRIVEWAY WIDTH EXCEEDS 15 FEET, CONSTRUCT A FULL DEPTH EXPANSION JOINT WITH 3/8" JOINT FILLER ALONG THE DRIVEWAY CENTERLINE. CONSTRUCT EXPANSION JOINTS PARALLEL WITH THE CENTERLINE AS REQUIRED AT 15 FEET MAXIMUM SPACING WHEN DRIVEWAY WIDTHS EXCEED 30 FEET.
2. ALL CEMENT CONCRETE SHALL BE AIR-ENTRAINED.
3. WHERE "GRADE BREAK" IS CALLED OUT, THE ENTIRE LENGTH OF THE LINE BETWEEN THE TWO ADJACENT SURFACE PLANES SHALL BE FLUSH.
4. THE RAMP MAXIMUM RUNNING SLOPE SHALL NOT REQUIRE THE RAMP LENGTH TO EXCEED 15 FEET TO AVOID CHASING THE SLOPE INDEFINITELY WHEN CONNECTING TO STEEP GRADES. WHEN APPLYING THE 15 FOOT MAX. LENGTH, THE RUNNING SLOPE OF THE RAMP SHALL BE AS FLAT AS FEASIBLE.
5. MINIMUM LENGTH OF FULL HEIGHT CURB BETWEEN DRIVEWAYS SHALL BE 2 FEET.

LEGEND



SLOPE IN EITHER DIRECTION



CITY OF NORTH BEND CEMENT CONCRETE DRIVEWAY TYPE 3

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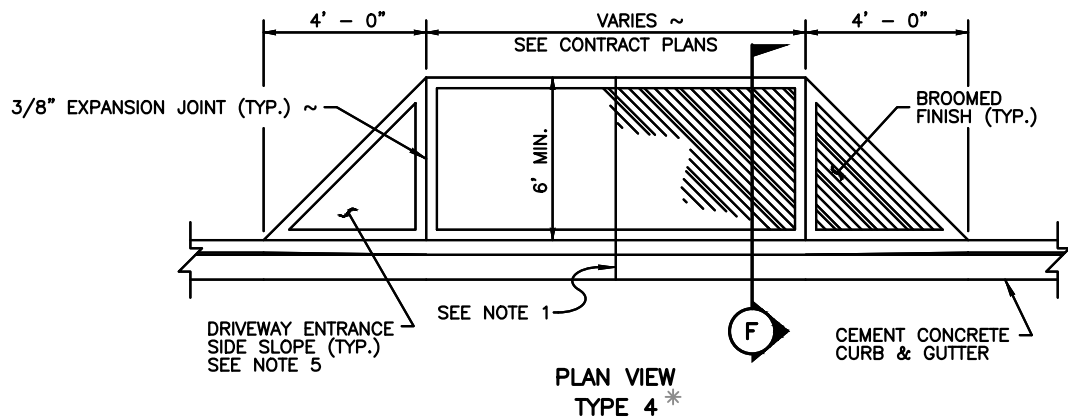
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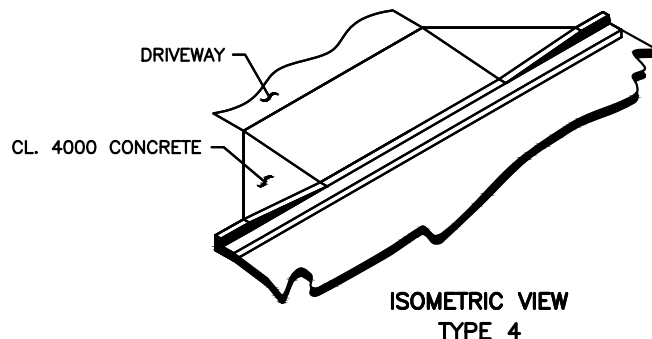
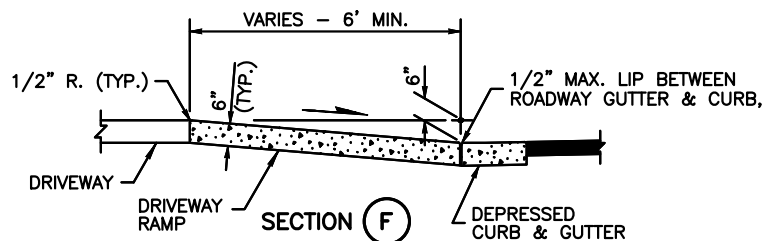
DATE

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T-23C



* THIS ENTRANCE TYPE SHALL NOT BE USED ALONG A PEDESTRIAN ROUTE



NOTES:

1. WHEN THE DRIVEWAY WIDTH EXCEEDS 15 FEET, CONSTRUCT A FULL DEPTH EXPANSION JOINT WITH 3/8" JOINT FILLER ALONG THE DRIVEWAY CENTERLINE. CONSTRUCT EXPANSION JOINTS PARALLEL WITH THE CENTERLINE AS REQUIRED AT 15 FEET MAXIMUM SPACING WHEN DRIVEWAY WIDTHS EXCEED 30 FEET.
2. ALL CEMENT CONCRETE SHALL BE AIR-ENTRAINED.
3. WHERE "GRADE BREAK" IS CALLED OUT, THE ENTIRE LENGTH OF THE LINE BETWEEN THE TWO ADJACENT SURFACE PLANES SHALL BE FLUSH.
4. THE RAMP MAXIMUM RUNNING SLOPE SHALL NOT REQUIRE THE RAMP LENGTH TO EXCEED 15 FEET TO AVOID CHASING THE SLOPE INDEFINITELY WHEN CONNECTING TO STEEP GRADES. WHEN APPLYING THE 15 FOOT MAX. LENGTH, THE RUNNING SLOPE OF THE RAMP SHALL BE AS FLAT AS FEASIBLE.
5. MINIMUM LENGTH OF FULL HEIGHT CURB BETWEEN DRIVEWAYS SHALL BE 2 FEET.

LEGEND



SLOPE IN EITHER DIRECTION



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CEMENT CONCRETE DRIVEWAY TYPE 4

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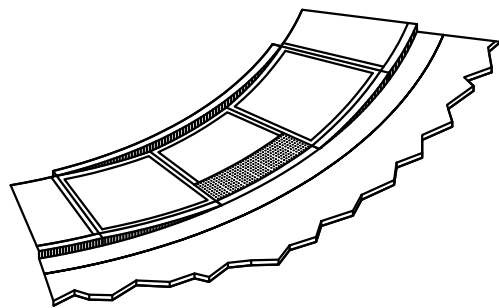
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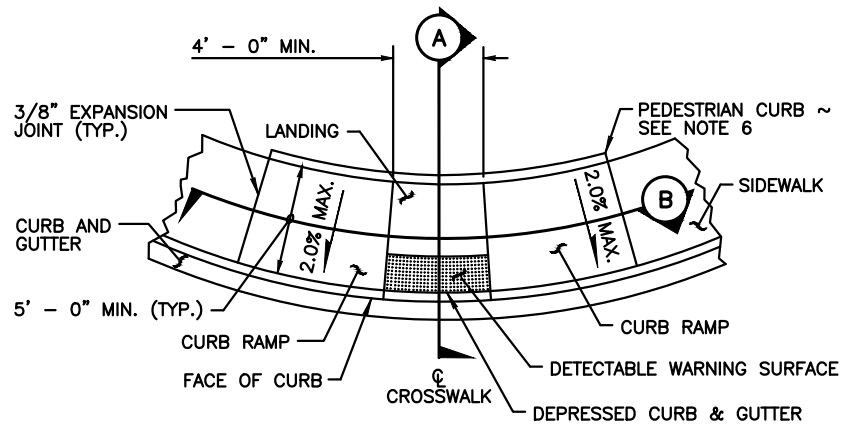
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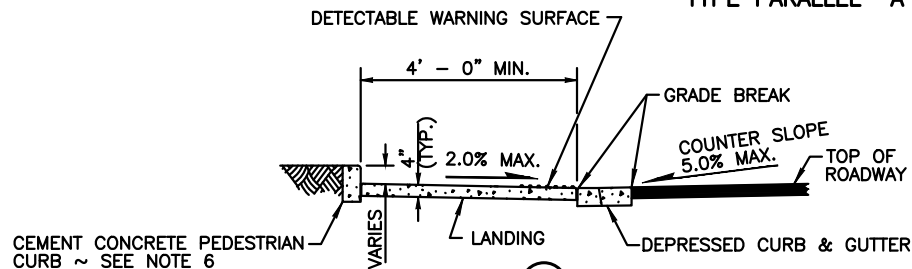
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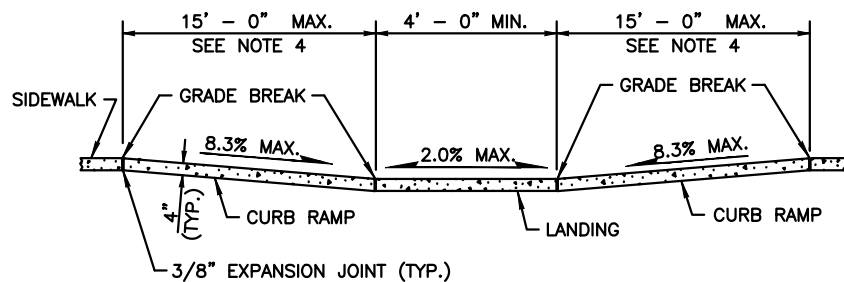
ISOMETRIC VIEW
TYPE PARALLEL A



PLAN VIEW
TYPE PARALLEL A



SECTION A



SECTION B

NOTES

1. CURB RAMP LOCATION SHALL BE PLACED WITHIN THE WIDTH OF THE ASSOCIATED CROSSWALK.
2. WHERE "GRADE BREAK" IS CALLED OUT, THE ENTIRE LENGTH OF THE GRADE BREAK BETWEEN THE TWO ADJACENT SURFACE PLANES SHALL BE FLUSH.
3. DO NOT PLACE GRATINGS, JUNCTION BOXES, ACCESS COVERS, OR OTHER APPURTENANCES IN FRONT OF THE CURB RAMP OR ON ANY PART OF THE CURB RAMP OR LANDING.
4. THE CURB RAMP MAXIMUM RUNNING SLOPE SHALL NOT REQUIRE THE RAMP LENGTH TO EXCEED 15 FEET TO AVOID CHASING THE SLOPE INDEFINITELY WHEN CONNECTING TO STEEP GRADES. WHEN APPLYING THE 15-FOOT MAX. LENGTH, THE RUNNING SLOPE OF THE CURB RAMP SHALL BE AS FLAT AS FEASIBLE.
5. CURB RAMP, LANDING, AND FLARES SHALL RECEIVE BROOM FINISH.
6. PEDESTRIAN CURB MAY BE OMITTED IF THE GROUND SURFACE AT THE BACK OF THE CURB RAMP AND/OR LANDING WILL BE AT THE SAME ELEVATION AS THE CURB RAMP OR LANDING AND THERE WILL BE NO MATERIAL TO RETAIN.
7. SUBGRADE AND FORM INSPECTION BY THE CITY SHALL BE REQUIRED PRIOR TO PLACING CEMENT CONCRETE. ALL CEMENT CONCRETE SHALL BE AIR-ENTRAINED.

LEGEND

 SLOPE IN EITHER DIRECTION



CITY OF NORTH BEND

PARALLEL CURB RAMP

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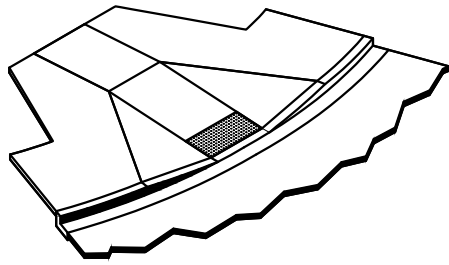
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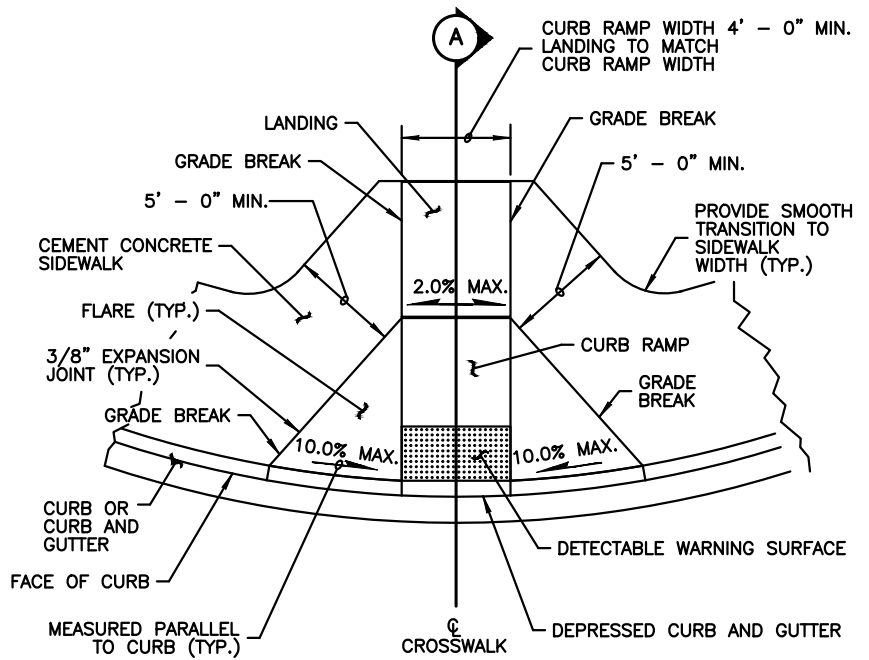
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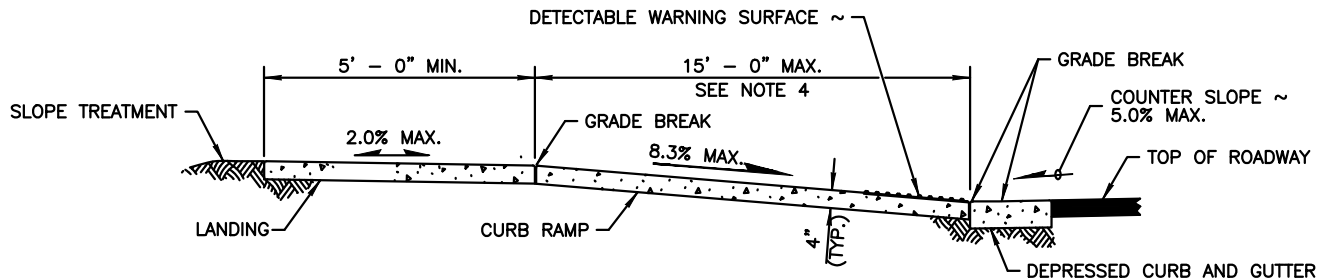
T-24A



ISOMETRIC VIEW
TYPE PERPENDICULAR A



PLAN VIEW
TYPE PERPENDICULAR A



SECTION (A)

NOTES

1. PROVIDE A SEPARATE CURB RAMP FOR EACH MARKED OR UNMARKED CROSSWALK. CURB RAMP LOCATION SHALL BE PLACED WITHIN THE WIDTH OF THE ASSOCIATED CROSSWALK.
2. WHERE "GRADE BREAK" IS CALLED OUT, THE ENTIRE LENGTH OF THE GRADE BREAK BETWEEN THE TWO ADJACENT SURFACE PLANES SHALL BE FLUSH.
3. DO NOT PLACE GRATINGS, JUNCTION BOXES, ACCESS COVERS, OR OTHER APPURTENANCES IN FRONT OF THE CURB RAMP OR ON ANY PART OF THE CURB RAMP OR LANDING.
4. THE CURB RAMP MAXIMUM RUNNING SLOPE SHALL NOT REQUIRE THE RAMP LENGTH TO EXCEED 15- FEET TO AVOID CHASING THE SLOPE INDEFINITELY WHEN CONNECTING TO STEEP GRADES. WHEN APPLYING THE 15-FOOT MAXIMUM LENGTH, THE RUNNING SLOPE OF THE CURB RAMP SHALL BE AS FLAT AS FEASIBLE.
5. CURB RAMP, LANDING, AND FLARES SHALL RECEIVE BROOM FINISH.
6. SUBGRADE AND FORM INSPECTION BY THE CITY SHALL BE REQUIRED PRIOR TO PLACING CEMENT CONCRETE. ALL CEMENT CONCRETE SHALL BE AIR-ENTRAINED.

LEGEND



SLOPE IN EITHER DIRECTION



CITY OF NORTH BEND

PERPENDICULAR CURB RAMP

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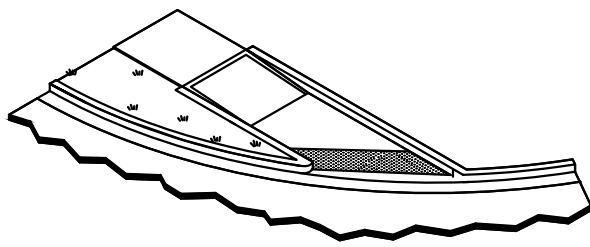
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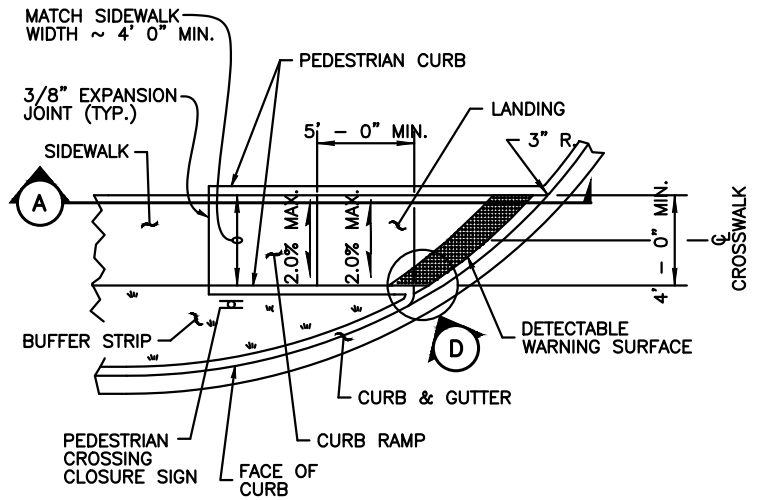
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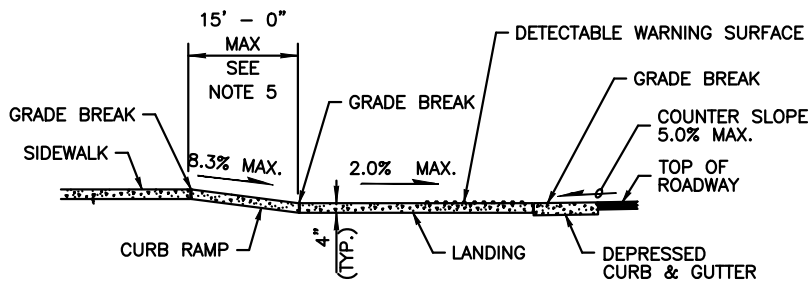
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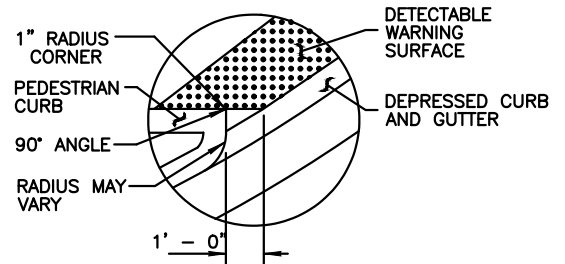
ISOMETRIC VIEW
TYPE SINGLE DIRECTION



PLAN VIEW
TYPE SINGLE DIRECTION



SECTION A



DETAIL D

NOTES

1. THIS PLAN IS TO BE USED WHERE PEDESTRIAN CROSSING IN ONE DIRECTION IS NOT PERMITTED.
2. CURB RAMP LOCATION SHALL BE PLACED WITHIN THE WIDTH OF THE ASSOCIATED CROSSWALK, OR AS SHOWN IN THE CONTRACT PLANS.
3. WHERE "GRADE BREAK" IS CALLED OUT, THE ENTIRE LENGTH OF THE GRADE BREAK BETWEEN THE TWO ADJACENT SURFACE PLANES SHALL BE FLUSH.
4. DO NOT PLACE GRATINGS, JUNCTION BOXES, ACCESS COVERS OR OTHER APPURTENANCES IN FRONT OF THE CURB RAMP OR ON ANY PART OF THE CURB RAMP OR LANDING.
5. CURB RAMP MAXIMUM RUNNING SLOPE SHALL NOT REQUIRE THE RAMP LENGTH TO EXCEED 15 FEET TO AVOID CHASING THE SLOPE INDEFINITELY WHEN CONNECTING TO STEEP GRADES. WHEN APPLYING THE 15 FOOT MAXIMUM LENGTH, THE RUNNING SLOPE OF THE CURB RAMP SHALL BE AS FLAT AS FEASIBLE.
6. CURB RAMPS AND LANDINGS SHALL RECEIVE BROOM FINISH.
7. PEDESTRIAN CURB MAY BE OMITTED IF THE GROUND SURFACE AT THE BACK OF THE CURB RAMP AND/OR LANDING WILL BE AT THE SAME ELEVATION AS THE CURB RAMP OR LANDING AND THERE WILL BE NO MATERIAL TO RETAIN.
8. SUBGRADE AND FORM INSPECTION BY THE CITY SHALL BE REQUIRED PRIOR TO PLACING CEMENT CONCRETE. ALL CEMENT CONCRETE SHALL BE AIR-ENTRAINED.

LEGEND

 SLOPE IN EITHER DIRECTION



CITY OF NORTH BEND

SINGLE DIRECTION CURB RAMP

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BY CITY

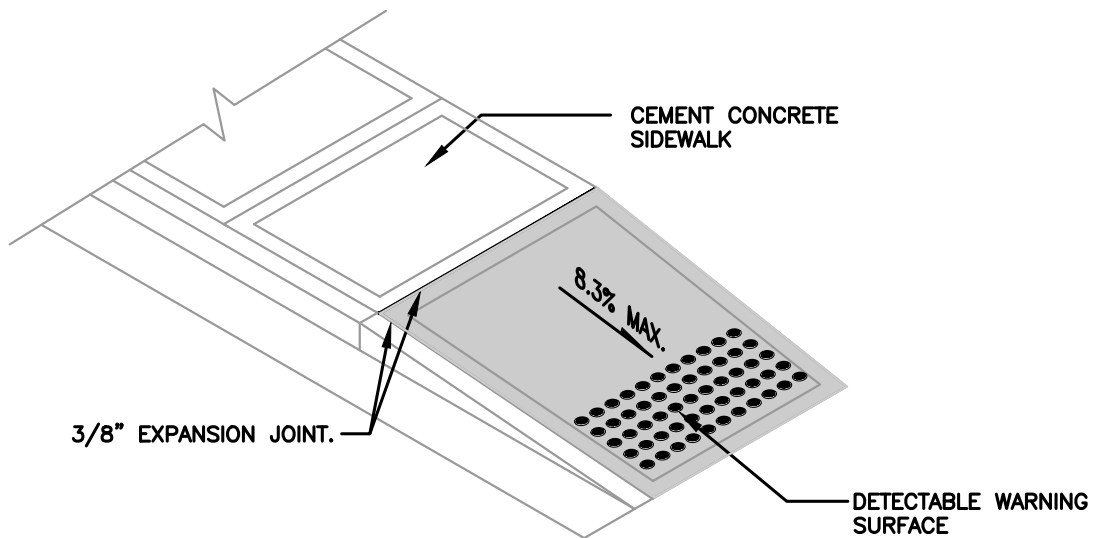
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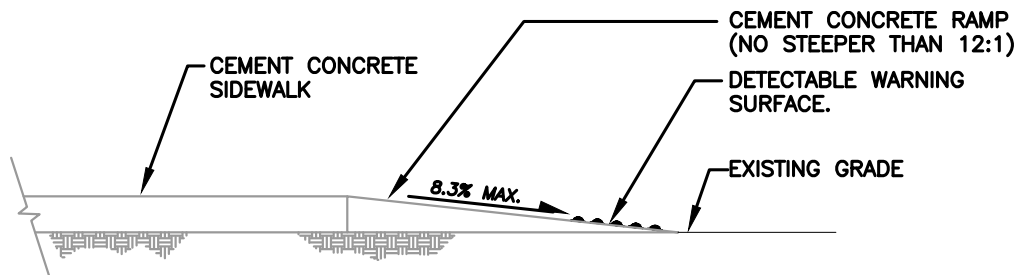
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T-24C

PLAN VIEW



ISOMETRIC VIEW



ELEVATION VIEW

NOTE: ALL CEMENT CONCRETE SHALL BE AIR-ENTRAINED



CITY OF NORTH BEND

SIDEWALK RAMP TO SHOULDER

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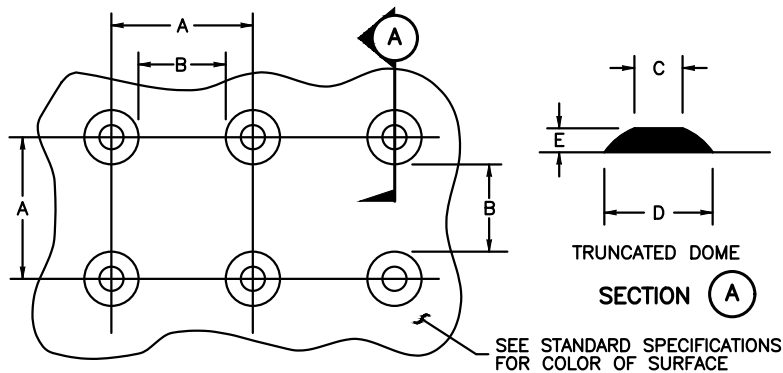
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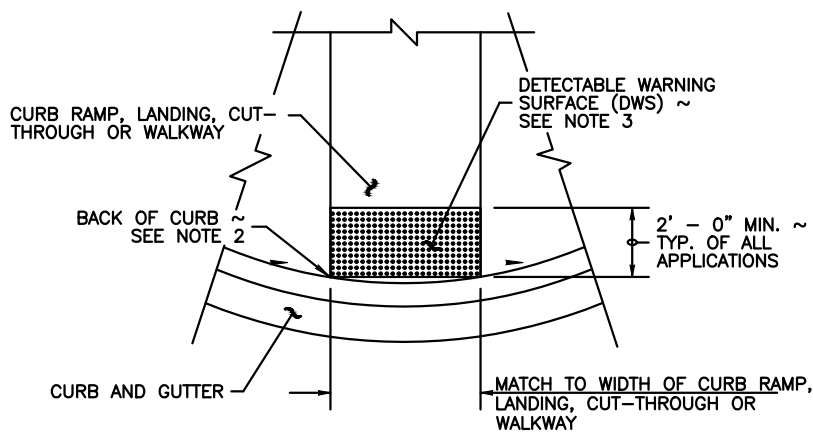
T-24D



TRUNCATED DOME SPACING
SEE NOTE 3

	MIN.	MAX.
A	1.60"	2.40"
B	0.65"	—
C	0.45"	0.90"
D	0.9"	1.40"
E	0.2"	0.2"

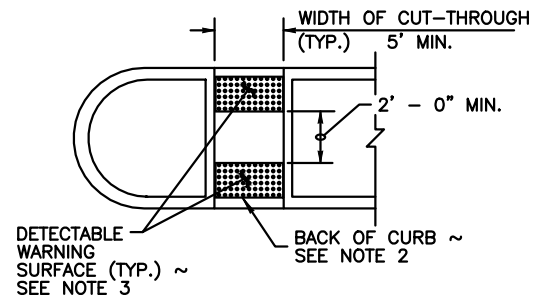
TRUNCATED DOME DETAILS



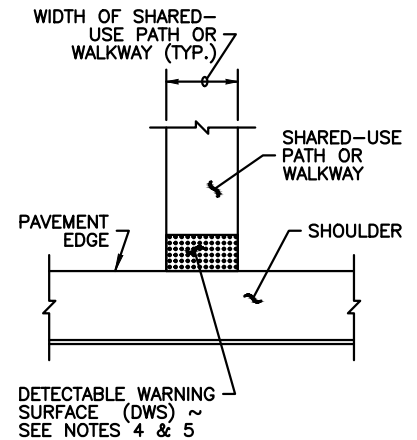
DETECTABLE WARNING SURFACE DETAIL

NOTES

1. THE DETECTABLE WARNING SURFACE (DWS) SHALL EXTEND THE FULL WIDTH OF THE CURB RAMP (EXCLUSIVE OF FLARES) OR THE LANDING.
2. THE DETECTABLE WARNING SURFACE SHALL BE PLACED AT THE BACK OF CURB, AND NEED NOT FOLLOW THE RADIUS.
3. THE ROWS OF TRUNCATED DOMES SHALL BE ALIGNED TO BE PERPENDICULAR TO THE GRADE BREAK AT THE BACK OF CURB.
4. THE ROWS OF TRUNCATED DOMES SHALL BE ALIGNED TO BE PARALLEL TO THE DIRECTION OF TRAVEL.
5. IF CURB AND GUTTER ARE NOT PRESENT, SUCH AS A SHARED-USE PATH CONNECTION, THE DETECTABLE WARNING SURFACE SHALL BE PLACED AT THE PAVEMENT EDGE.
6. WHEN THE GRADE BREAK BETWEEN THE CURB RAMP AND THE LANDING IS LESS THAN OR EQUAL TO 5 FT. FROM THE BACK OF CURB AT ALL POINTS, PLACE THE DETECTABLE WARNING SURFACE ON THE BOTTOM OF THE CURB RAMP.



MEDIAN CUT-THROUGH



SHARED-USE PATH CONNECTION



CITY OF NORTH BEND

DETECTABLE WARNING SURFACE

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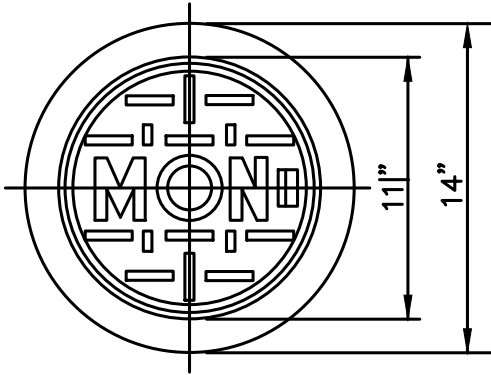
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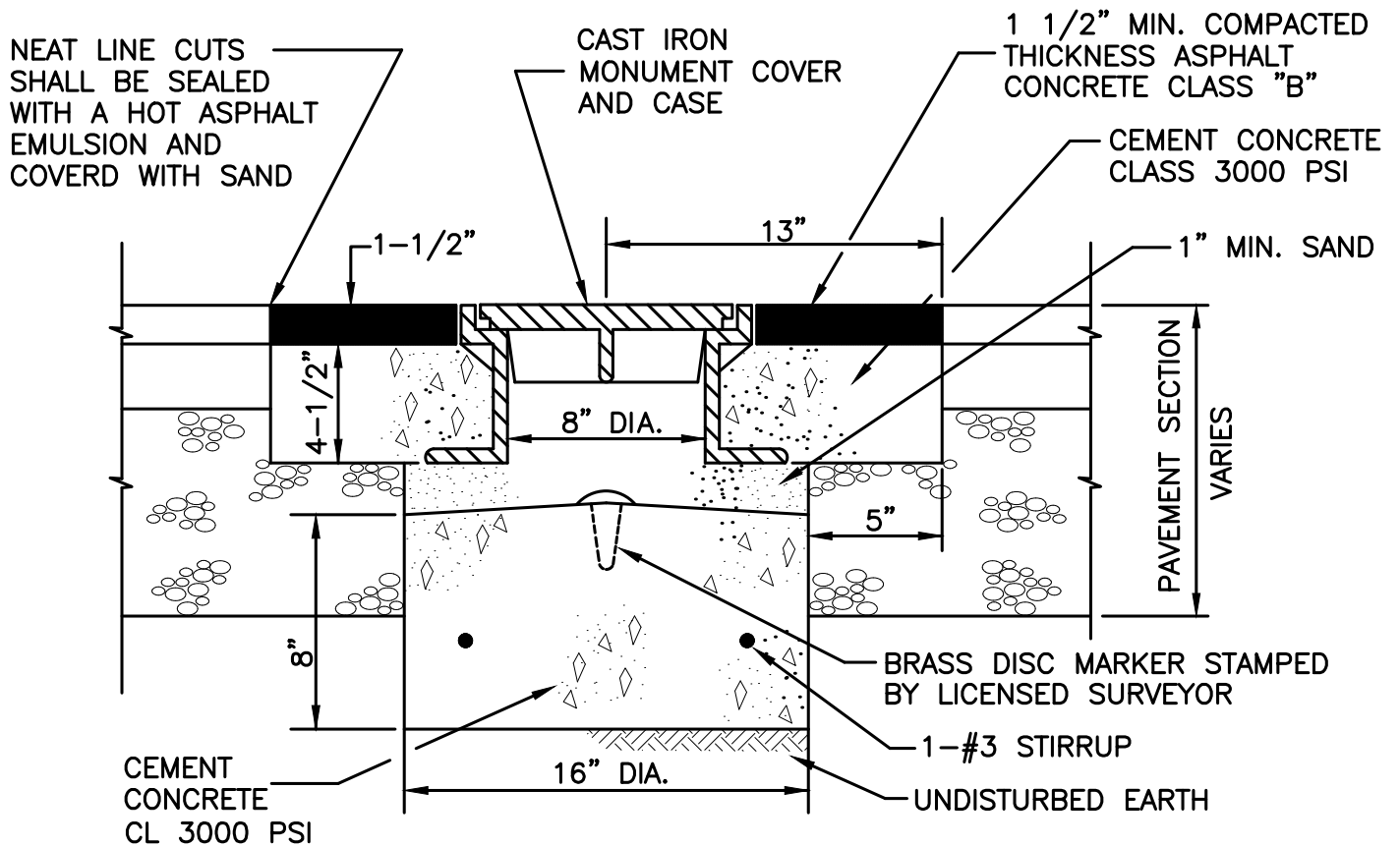
T-24E



NOTES:

1. MACHINE BEARING FACES OF COVER AND CASE TO INSURE POSITIVE FIT.
2. MATERIAL SHALL CONFORM TO THE CURRENT EDITION OF STANDARD SPECIFICATIONS.
3. SEE 4.31A(3) FOR REQUIRED LOCATIONS.

MONUMENT COVER



POURED-IN-PLACE MONUMENT



CITY OF NORTH BEND

POURED-IN-PLACE MONUMENT

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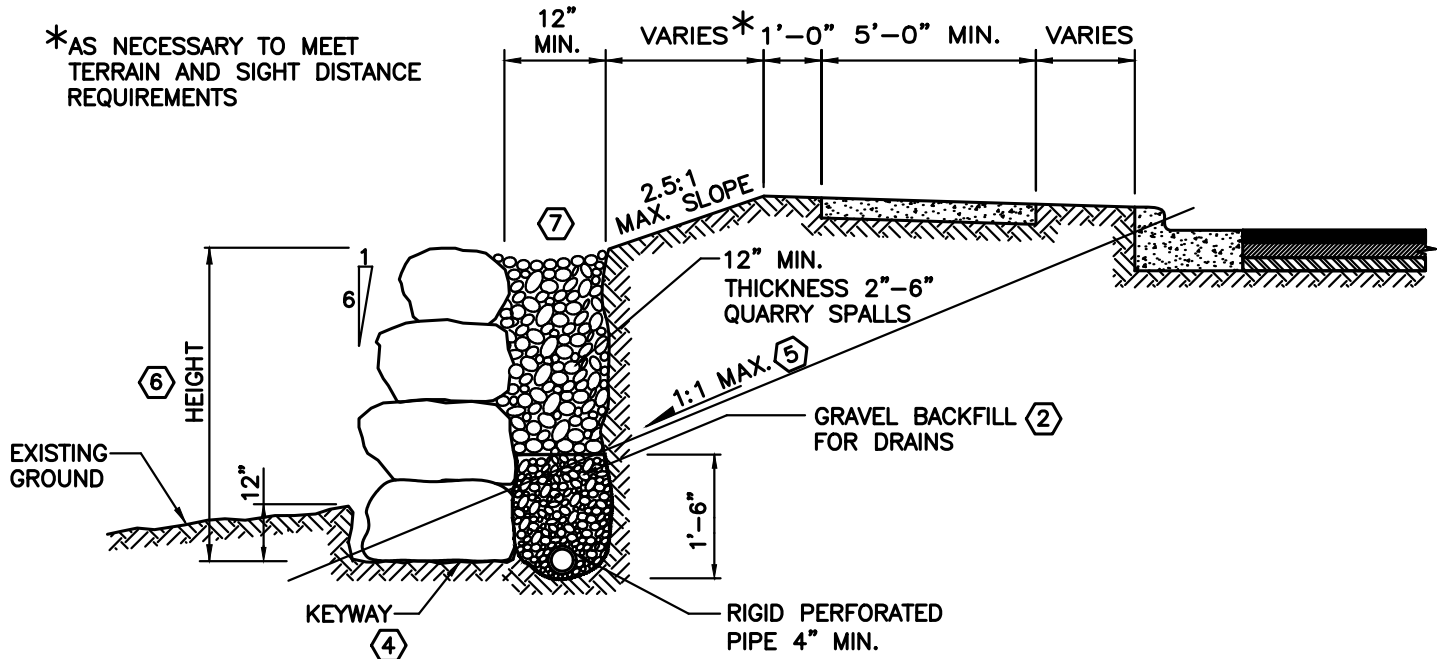
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DWG. NO.

T-25



NOTES:

- (1) SEE SECTION 4.31.
- (2) WSDOT/APWA 9-03.12(4)
- (3) FENCE OR HANDRAIL MAY BE REQUIRED WHEN ROCKERY HEIGHT EXCEEDS 30 INCHES AND IS LOCATED IN A PUBLIC AREA.
- (4) THE WALL FOUNDATION IS TO BE CLEARED OF ORGANIC MATTER AND DEBRIS AND THE UNDERLYING MINERAL SOIL COMPACTED TO 95 PERCENT OF THE MAX. DRY DENSITY.
- (5) ZONE OF INFLUENCE. FLATTER SLOPE MAY BE REQUIRED IN LESS STABLE SOILS. ALL DRIVEWAYS, PARKING AREAS, AND ROADS SHALL LIE BELOW THE ZONE OF INFLUENCE.
- (6) HEIGHT FOR BUILDING PERMIT PURPOSES. MAXIMUM HEIGHT, AS MEASURED FROM THE KEYWAY, IS EIGHT (8) FEET. ALL WALLS FOUR FEET OR HIGHER SHALL REQUIRE A BUILDING PERMIT. ALL WALLS SUPPORTING A SURCHARGE (DRIVEWAY, ROAD, BUILDING, OR PARKING AREA) SHALL REQUIRE DESIGN BY A LICENSED ENGINEER.
- (7) THE TOP OF ALL ROCK WALLS SHALL BE CONFIGURED TO PREVENT SURFACE DRAINAGE OVER THE TOP OF THE WALL.



CITY OF NORTH BEND

ROCK WALL – CUT SECTION

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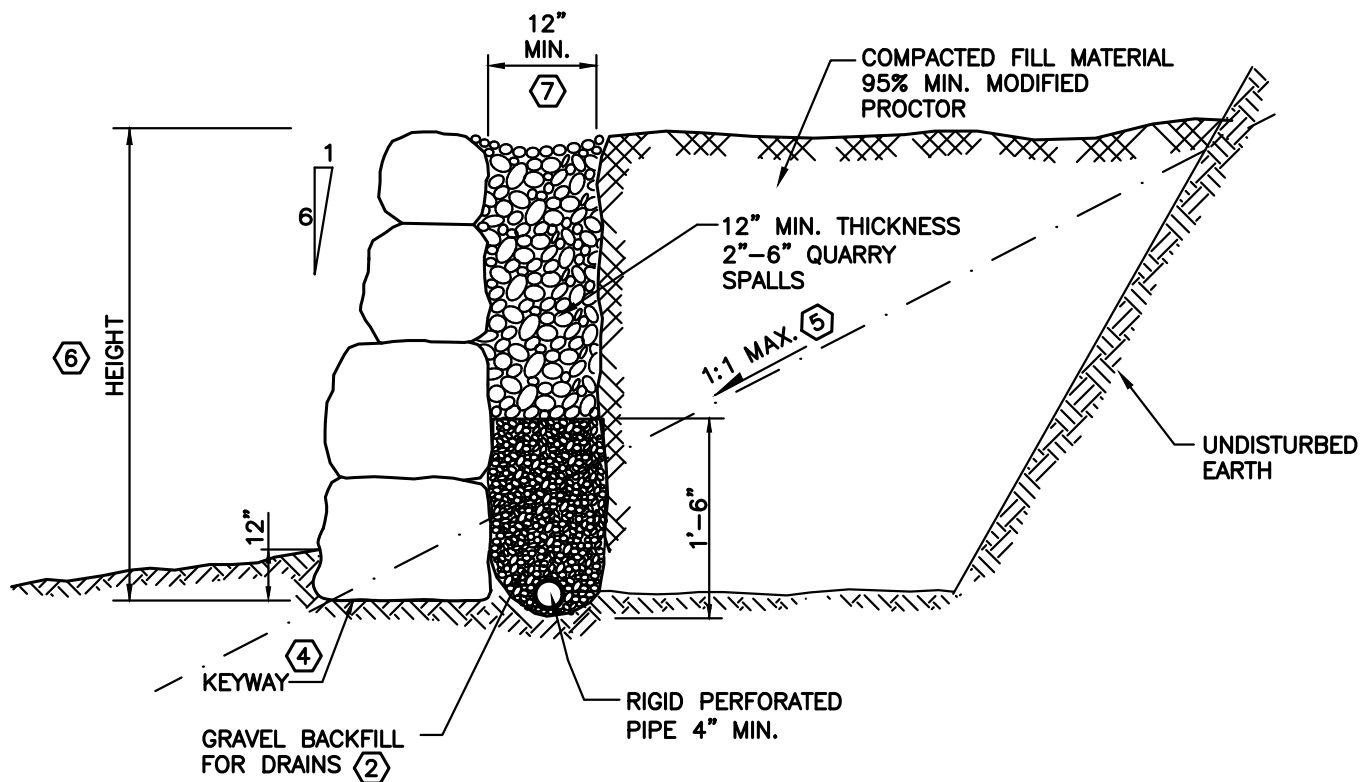
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DATE

DWG. NO.

T-26



NOTES:

- ① SEE SECTION 4.31.
- ② WSDOT/APWA 9-03.12(4)
- ③ FENCE OR HANDRAIL MAY BE REQUIRED WHEN ROCKERY HEIGHT EXCEEDS 30 INCHES AND IS LOCATED IN A PUBLIC AREA.
- ④ THE WALL FOUNDATION IS TO BE CLEARED OF ORGANIC MATTER AND DEBRIS AND THE UNDERLYING MINERAL SOIL COMPACTED TO 95 PERCENT OF THE MAX. DRY DENSITY. THE EMBANKMENT MATERIAL IS TO BE GRAVEL BORROW MEETING THE REQUIREMENTS OF 9-03.14 OF THE WSDOT STANDARDS. THE BACKFILL IS TO BE PLACED IN THIN LIFTS, NOT EXCEEDING SIX INCHES IN THICKNESS AND COMPACTED TO 95 PERCENT OF THE MAX. DRY DENSITY.
- ⑤ ZONE OF INFLUENCE. FLATTER SLOPE MAY BE REQUIRED IN LESS STABLE SOILS. ALL DRIVEWAYS, PARKING AREAS, AND ROADS SHALL LIE BELOW THE ZONE OF INFLUENCE.
- ⑥ HEIGHT FOR BUILDING PERMIT PURPOSES. MAXIMUM HEIGHT, AS MEASURED FROM THE KEYWAY, IS EIGHT (8) FEET. ALL WALLS FOUR FEET OR HIGHER SHALL REQUIRE A BUILDING PERMIT. ALL WALLS SUPPORTING A SURCHARGE (DRIVEWAY, ROAD, BUILDING, OR PARKING AREA) SHALL REQUIRE DESIGN BY A LICENSED ENGINEER.
- ⑦ THE TOP OF ALL ROCK WALLS SHALL BE CONFIGURED TO PREVENT SURFACE DRAINAGE OVER THE TOP OF THE WALL.
- ⑧ OVERBURDEN SHALL EXTEND BEYOND THE CUT FACE AT LEAST THE HEIGHT OF THE WALL.



CITY OF NORTH BEND

ROCK WALL – FILL SECTION

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MAY 2018

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T-27



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T-28



CITY OF NORTH BEND

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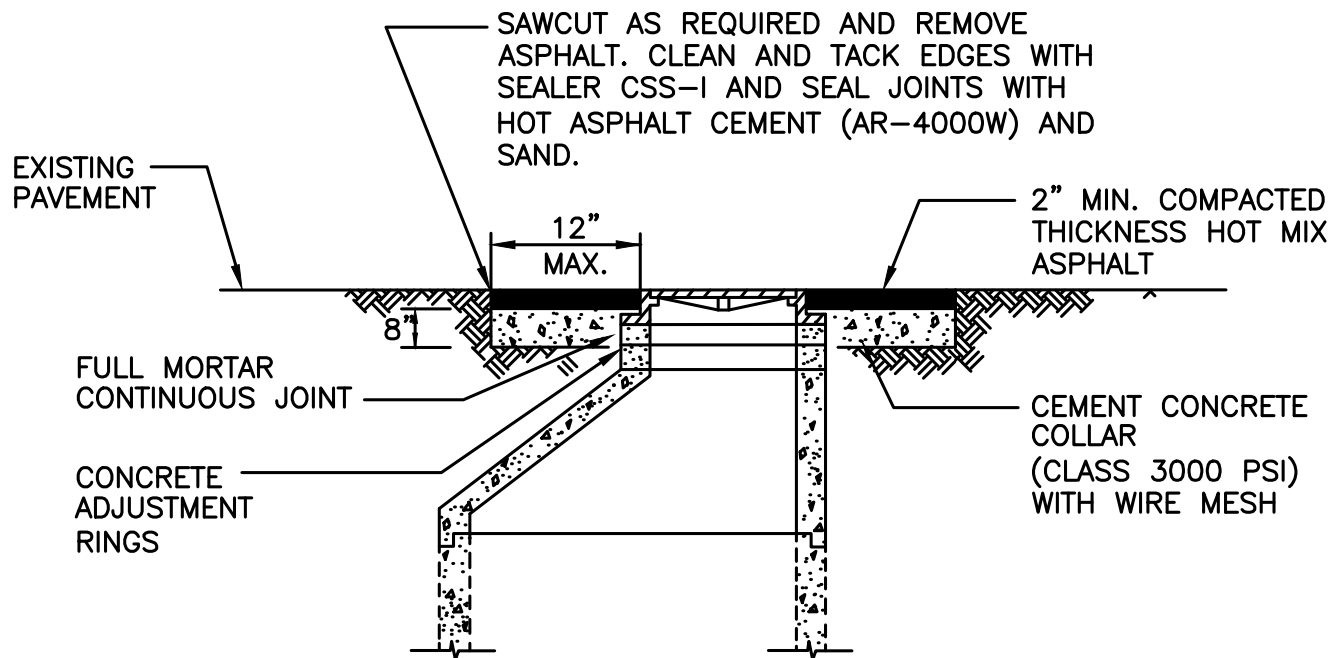
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DWG. NO.

T-29



NOTES:

1. HOT MIX ASPHALT SHALL BE HMA CLASS 1 1/2" PG 64-22.
2. ALL JOINTS SHALL BE SEALED WITH MATERIALS AND IN A MANNER TO PREVENT "TRACKING" OF SEALANT.



CITY OF NORTH BEND
MANHOLE OR CATCH BASIN
(TYPE II)
GRADE ADJUSTMENT DETAIL

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

T-30



CITY OF NORTH BEND

RESERVED

APPROVED:

MARK RIGOS, P.E.

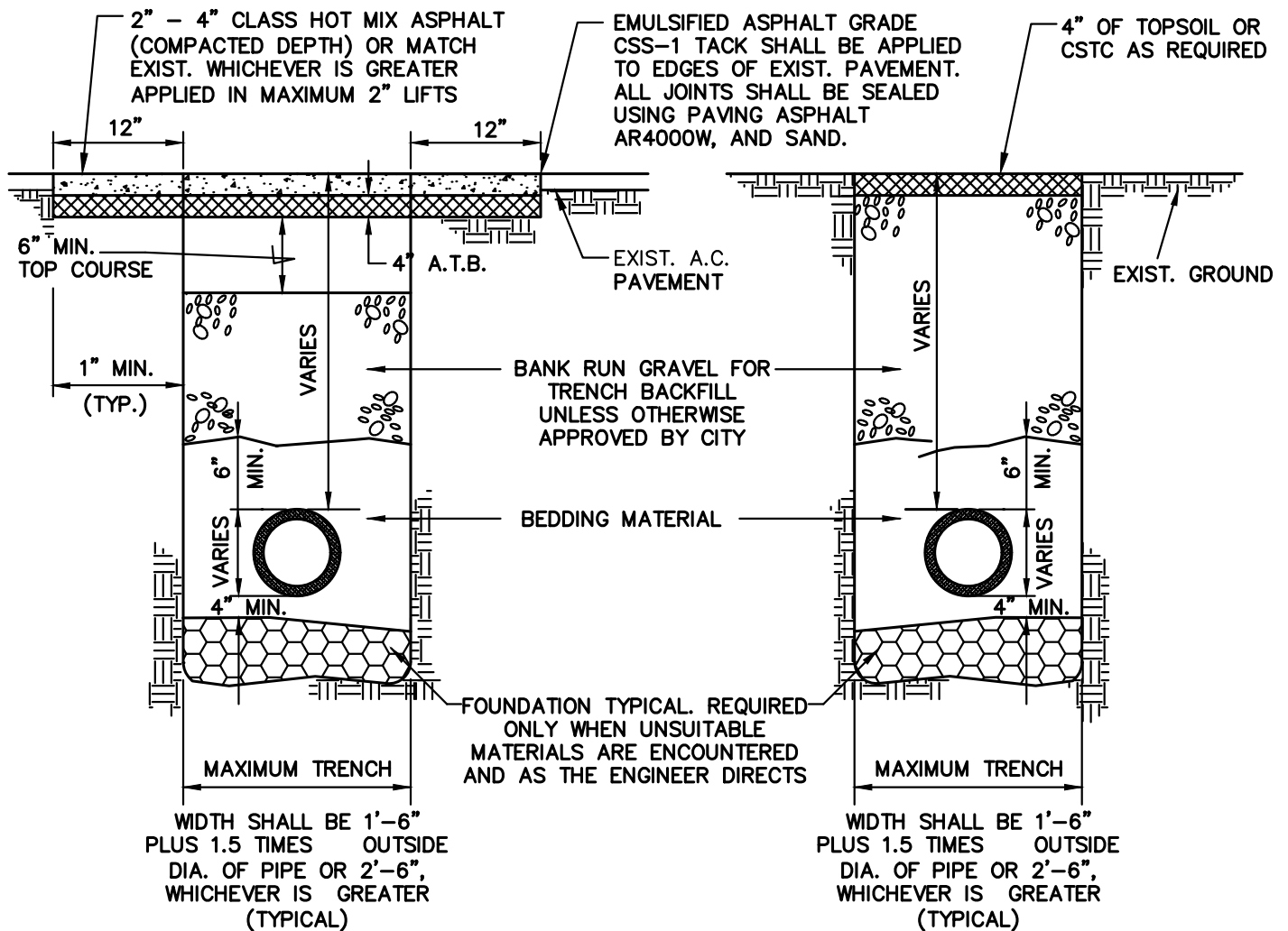
BY CITY

MAY 2018

DATE

DWG. NO.

T-31



WITHIN TRAVELED WAY

OUTSIDE OF TRAVELED WAY

NOTES:

- ALL MATERIALS EXCEPT HMA AND BEDDING MATERIAL SHALL BE COMPACTED IN 6-INCH MAXIMUM LIFTS TO 95% DENSITY.
- BEDDING SHALL CONFORM TO STANDARD SPECIFICATIONS.
- COMPACTION: BEDDING SHALL BE COMPACTED TO 95% MAX. AS DETERMINED BY ASTM D1557. BACKFILL SHALL BE COMPACTED TO 85% IN UNPAVED AREA, AND 95% IN PAVED OR SHOULDER AREAS AS DETERMINED BY ASTM D1557.
- ALL MATERIALS, WORKMANSHIP, AND INSTALLATION SHALL BE IN CONFORMANCE WITH THE STANDARD SPECIFICATIONS FOR ROAD, BRIDGE AND MUNICIPAL CONSTRUCTION AS AMENDED BY CITY STANDARDS.
- KEEP TRENCH BOTTOM COMPACTED WITH UNIFORM GRADE. A BELL JOINT SHALL BE REQUIRED AT EACH JOINT FOR PROPER SUPPORT. NO TEMPORARY SUPPORTS, I.E. BLOCKS, WILL BE ALLOWED TO SUPPORT PIPE. TRENCH BOTTOM SHALL BE TO GRADE PRIOR TO PIPE INSTALLATION.
- ALL EDGES SHALL BE NEAT-LINE SAWCUT.
- CLASS "B" ASPHALT SHALL BE HMA CLASS B PG 58-22



CITY OF NORTH BEND

TRENCH - PAVEMENT RESTORATION

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

T-32

SECTION 5

STORM DRAINAGE

Planning, Designing,
and Constructing



Drainage Systems
for Collection,
Conveyance,

Treatment, and
Discharge of Storm
Water Runoff...



SECTION 5 STORM DRAINAGE

5.01 General

All development projects shall evaluate the project's impact with respect to storm drainage and design and construct temporary measures and conduct best management practices (BMPs) necessary to prevent sediment-laden water from entering the drainage system during construction. Projects shall design and construct permanent conveyance, flow control, and water quality treatment facilities to mitigate for increased volume and rate of stormwater runoff and increased pollution in stormwater runoff from the project site. The analysis, design, implementation, and construction of necessary facilities shall be as required in NBMC 14.16 and the currently adopted King County Surface Water Design Manual ("surface water design manual"). Runoff computation and facility design shall utilize the King County Runoff Time Series (KCRTS) program.

The standards established by this chapter are intended to represent the **minimum** standards for the design and construction of storm drainage facilities and to supplement NBMC 14.16 and the surface water design manual. Greater or lesser requirements may be mandated by the City due to localized conditions. All storm drains and facilities shall be designed by a professional engineer licensed in the State of Washington.

If warranted based on the condition and capacity of the existing storm drainage infrastructure (or lack thereof) and impacts caused by the proposed development, off-site improvements may be required, at the Public Works Director's discretion, to mitigate impacts caused by the proposed development.

When working on existing drainage systems, including stream culverts, the bypass of incoming storm flows or stream flows shall be the responsibility of the party performing the work. Bypass shall be conducted with the least possible disturbance to traffic, adjacent properties, upstream and downstream drainage systems, and natural drainage systems.

Plugging and abandonment of existing pipes shall be in accordance with the Standard Specifications, however, storm drainage structures that are found or will no longer be used shall be removed and the resulting void filled with suitable compacted backfill material. Abandoned pipes shall be shown on as-built drawings.

5.02 Design Standards

All drainage facilities shall be designed and constructed in accordance with the surface water design manual. The following additional design considerations shall apply:

- A. Parking lots shall not be used for stormwater detention.
- B. Generally, storm drainage facilities located in public right-of-way or tracts dedicated to the City shall be publicly owned and maintained. The City may assume maintenance responsibility for some facilities located on private property under certain conditions. Otherwise facilities located on private property shall be privately owned and maintained with the City having right of entry for inspection. Privately owned and maintained facilities shall be constructed to the standards described herein. The owner of the facility shall be clearly defined, with documents recorded against the property's title.
- C. Privately maintained storm drainage facilities may be allowed within the public right-of-way only upon city approval. For instances where storm drainage facilities are located within the public right-of-way, and said facilities have specific landscaping requirements (i.e., bioretention,

bioswales, etc.), the facilities shall be maintained by the adjacent landowner, homeowners' association, or similar organization.

- D. The Standard Plan Notes, as contained in the appendices and further referenced herein shall be included on any plans submitted to the City for construction approval dealing with storm system design.
- E. The City has implemented supplemental requirements for the design and construction of stormwater facilities. All stormwater facilities constructed within the city shall be constructed in accordance with these requirements, which will provide a better functioning storm drainage system that provides safe, efficient, and maintainable facilities that are aesthetically pleasing and allow for potential expansion to provide protection of the environment. Therefore, the following shall be required for construction of new stormwater facilities:
- (1) General
 - (a) All open stormwater facilities shall be landscaped as described in the surface water design manual, Title 18.18 NBMC, and as approved by the City.
 - (b) Stormwater facilities shall not be located where, in the City's opinion, the facility will create an attractive nuisance or be considered as unattractive from any public street, park, or venue.
 - (c) When preparing the Technical Information Report and construction drawings, the engineer shall make appropriate accommodation for conveyance and bypass of upstream off-site runoff AND discharge onto adjacent downstream properties. This will include provisions for easements to accommodate upstream properties and/or constructing a tight line system across downstream properties (in an appropriate easement) where a suitable natural or previously constructed tight line system does not exist.
 - (d) No storm drainpipe shall be buried deeper than 20 feet except that installation to a depth greater than 20 feet can be approved to avoid the need for a pump system. Manhole access to a pipe deeper than 20 feet shall include a minimum 60-inch-diameter manhole and a grated landing mid-way.
 - (e) Unless otherwise approved by the City, pipes shall not be located underneath sidewalks, driveways, walls, or landscaped areas except for where drainpipes cross perpendicular to these areas.
 - (f) Where frontage improvements are required by the city, the developer shall include them in the detention and treatment calculations and provide detention and treatment for those improvements.
 - (g) Unless otherwise approved by the city, pump systems will not be allowed for conveying storm runoff to a detention or treatment system.
 - (h) Depending upon the soils and moisture conditions, for steep pipe runs, trench dams may be required to prevent the flow of water along the trench. If required, the trench drains shall be connected into the structures to drain the trench, and prevent water from "piping" down the trench.

(2) Detention and Treatment Facilities

- (a) Underground vaults or tanks shall not be located underneath public roads.
- (b) Underground vaults or tanks shall not protrude above the ground surface in any location. Where site conditions warrant and the City approves a portion of a vault to extend above the ground surface, the area shall be screened with landscaping and the exposed portion shall be configured with a decorative facing approved by the City.
- (c) Underground vaults shall be equipped with a locking hatch as described in the KCSWDM, rather than a standard manhole cover.
- (d) Underground vaults and tanks shall be accommodated with easements or setbacks large enough to provide for the complete replacement (without encroaching on any other structures, utilities, or roads) of the structure, should replacement be required in the future.
- (e) Open vaults with exposed vertical side(s) shall be prohibited.

(3) New Technology

Regarding new and evolving technology for treating stormwater, only those self-contained treatment devices certified by the Department of Ecology with a General Use Level Designation (GULD) will be approved. If selected, the developer shall provide proof that the associated maintenance costs do not exceed 50 percent of the total revenue from the stormwater utility fees for that specific project.

(4) Biofiltration

- (a) Bioswales shall only be constructed where approved by the city. Specifically, bioswales shall not be constructed in areas that are shaded during the growing season or between single family residences or commercial buildings.
- (b) Bioswales shall not be constructed with vertical side(s).
- (c) Bioswales shall not be designed as wet swales. Bioswales shall not be designed with a longitudinal slope less than 1.5 percent.

(5) Pond Design Criteria

- (a) Bollards or a gate shall be installed approximately 25 feet from the edge of the traveled way in order to provide a safe parking area for maintenance personnel when accessing the pond.

(6) Easements and Dedications

- (a) For privately owned and/or operated storm drainage systems, the developer shall execute and record a Declaration of Covenant that identifies the property and the storm drainage system, allows access to the city to inspect and maintain, if

necessary, and identifies the private owner as the party responsible for operation and maintenance.

- (b) All easements shall be of sufficient width to allow complete replacement of the identified storm system component without encroaching into the foundation support of nearby buildings, walls, roads, steep slopes, driveways, utilities, sidewalks, or other structures.
- (c) All easements shall be provided in a form acceptable to the city and recorded at the King County assessor's office prior to allowing the construction of a building on the property, or prior to recording of a plat. For land subdivisions, the easements may be shown on the plat map so long as the plat map identifies the specific party to which the easement is granted (grantee), the restrictions for the grantee and grantor, and clearly identifies the dimensions of the easement(s).
- (d) No public storm drainage easement shall be less than 15 feet in width. Where the easement is provided to gain access to a structure (catch basin, manhole, inlets) the easement width shall not be less than 20 feet. Building setbacks shall be applied at the easement boundary. Private storm drain easements may be 10 feet in width.
- (e) Pipes and swales not located in the center of the easement shall have at least 7.5 feet (5.0 feet for private easements) of easement width from the pipe or swale to the edge of the easement.
- (f) Easements shall be located entirely on a single property and shall not be split along property lines.
- (g) Where easements are provided between properties to convey runoff from an upstream property to a downstream conveyance system within a single project (e.g., subdivision), the conveyance system shall be installed as a requirement of the plat recording or project final approval.

(7) Infiltration Design Criteria

- (a) The fluctuation of groundwater levels in the City is very dynamic, and therefore, determining the wet season high groundwater level can be difficult, depending upon the time of year that groundwater observations are made. In addition to typical soil explorations and infiltration testing, groundwater levels, for the design of infiltration facilities, shall be monitored during the wet season. The monitoring shall include at least 3 months during the period of November 1 through March 31. This information shall be made available prior to engineering plan approval.

F. The city encourages the use of low impact design for the purpose of reducing stormwater quantity and quality impacts. These LID techniques may include those items listed in NBMC 18.50.070, as summarized herein, and also the specific requirements for LID street design in Section 4.03:

- (1) Maximizing retention of native forest cover and restoring disturbed vegetation to intercept, evaporate, and transpire precipitation.
- (2) Preserve permeable, native soil and enhance disturbed soils to store and infiltrate storm

flows.

- (3) Retain and incorporate topographic features that slow, store, and infiltrate stormwater.
- (4) Retain and incorporate natural drainage features and patterns.
- (5) Locate buildings and roads away from critical areas and soils that provide effective infiltration.
- (6) Minimize total impervious area and limit effective impervious surfaces.
- (7) Manage stormwater as close to its origin as possible to utilize small scale, distributed hydrologic controls.
- (8) Create a hydrologically rough landscape that slows storm flows and increases the time of concentration. Increase the reliability of the stormwater management system by providing multiple or redundant points of control.
- (9) Integrate stormwater controls into the development design and utilize the controls as amenities; create a multifunctional landscape.

5.03 Conveyance

The minimum pipe size shall be 12-inches diameter and minimum pipe slope shall be 0.5 percent. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to serve adjacent areas or for future service.

All pipe for storm mains shall be “preapproved” by the director based on localized conditions and comply with the WSDOT Standard Specifications Section 7-04. For conventional construction, storm pipe shall be lined corrugated polyethylene, solid wall PVC, or ductile iron, unless otherwise approved by the director. For above-ground steep slope pipe systems, the pipe material shall be butt fuse-welded high density polyethylene (HDPE), with energy-dissipation tee at the bottom of the slope, prior to discharge.

Where storm drain pipes run outside the public right-of-way, permanent easements shall be recorded for public or private maintenance as may be required and warranted. A construction (temporary) easement of suitable width shall also be provided prior to start of construction.

Maximum catch basin spacing shall be 200 feet on road grades up to 3 percent, 300 feet when the road grade is 3 percent or greater, with a 400-foot maximum spacing on main storm drains between access structures, whether catch basins or manholes. No surface water shall cross any roadway, unless approved by the City. In addition, catch basins shall be placed whenever the length of surface drainage exceeds 300 feet, extending either direction from crest or sag vertical curves.

Through-curb inlets shall be provided in all low spots, where possible. Otherwise, a combination of two inlets and one catch basin may be used in low spots in lieu of a through-curb inlet. Vaned grates shall be installed on all catch basins located within the street, gutter, or shoulder. Herringbone grates may be used in high pedestrian areas, including parking lots and crosswalks. Catch basin grates shall be non-locking when located within the public right-of-way, and locking when located outside the public right-of-way. Catch basins or manholes that do not collect runoff, and also control structures, shall use solid locking covers.

5.04 Manholes, Catch Basins, and Connections

All manholes and catch basins shall be constructed from precast concrete bases and risers. Cast-in-place concrete bases shall only be used for “straddle” of existing systems and shall be watertight.

In areas of new and existing pavement, the grate rim elevation shall be set to promote drainage flow. In unimproved areas, the rim elevations shall be set 2-inches above finished grade unless otherwise shown on the Plans.

Connection of new storm drain pipe into an existing main storm drain shall be made only with a new structure. Where piping is to be connected to existing structures, the opening(s) shall be core-drilled in the structure. The use of jackhammers and/or sledgehammers to knock out the hole shall not be allowed.

Where pipes of dissimilar materials are connected, a coupling device specifically manufactured for that purpose shall be used. Where pipe of differing sizes are installed at a structure, the crown of laterals and smaller mains shall match the crown of the larger, exiting main.

Unless otherwise approved, drain pipe shall be connected to manholes and Type 2 catch basins as follows:

<u>Pipe Type</u>	<u>Connection System</u>
DI	Kor-N-Seal*
HDPE	Kor-N-Seal*
<u>Pipe Type</u>	<u>Connection System</u>
PVC	Kor-N-Seal*
Corrugated Polyethylene	Per Manufacturer's Recommendation
*Or City approved equal.	

If the angle of a storm drain pipe entering a Type 1 or Type 1-L catch basin is such that the standard knockout must be enlarged by hammering and removing portions of the basin wall, then a larger structure shall be used. Spacing between pipes entering the same structure shall be in accordance with the manufacturer's recommendations.

5.05 Trench Excavation

Installation of storm drains shall be performed in accordance with WSDOT Section 7-08 of the Standard Specifications. This is supplemented by the following:

- A. Clearing and grubbing where required shall be performed within the easement or public right-of-way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of in accordance with the terms of all applicable permits.
- B. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench. The Contractor shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out. Disposal of the water shall be in such a manner as not to cause a nuisance or menace to the public. The dewatering system shall be installed and operated so that the groundwater level outside the excavation is not reduced to the extent that would damage or endanger adjacent structures or property.
- C. The contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below storm line grade. Where materials are

removed from below the pipeline grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted.

- D. Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without specific written approval of the City, and shall be in conformance with Washington Industrial Safety and Health Administration (WISHA) and Office of Safety and Health Administration (OSHA) Safety Standard.
- E. The bedding course shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to facilitate the construction of pipe joints.

5.06 Bedding

Generally, bedding for storm sewer pipes shall be “pea gravel” meeting the specifications for a relatively round, processed, washed rock with:

100%	passing the 3/8-inch screen
0%	passing the #4 screen

If necessary on steep pipe runs, the pipe trench shall be constructed with trench dams of clay or CDF to prevent the migration of water through the pea gravel. Water collected in the trench shall be piped to a suitable discharge location.

For convenience, crushed rock bedding conforming to Section 9-03.9(3) Crushed Surfacing Top Course of the Standard Specification may also be used as bedding material for pipe. Native Material shall not be used for bedding, unless approved by the director.

Selected bedding material shall be placed and compacted around and under the storm drain by hand tools. Special precautions should be provided to protect the pipe to a point 12 inches above the crown of the pipe.

5.07 Backfilling

Backfilling and surface restoration shall closely follow installation of pipe so that not more than 100 lineal feet of trench is left exposed during construction hours. Above the pipe bedding, the remaining backfill shall be compacted to 95 percent of the maximum density in traveled areas, 90 percent outside driveway, roadways, shoulders, parking, or other traveled areas.

Typically, trench sections crossing existing roadways, or beneath traffic bearing areas shall be backfilled and compacted with Crushed Surfacing Base Course per Section 9-03.9(3) of the Standard Specifications. Due to localized conditions, the City may allow/permit the backfill of the trench section with suitable excavated material, as determined by the City, or if this material is not available from trenching operations, the City may order the placing and compaction of Gravel Borrow per Section 9-03.14(1) of the Standard Specifications (WSDOT) for backfilling the trench. All excess material shall be loaded and hauled to waste.

The top 4 feet of longitudinal trenches in paved areas shall be backfilled with Crushed Surfacing Base Course per Section 9-03.9(3) of the Standard Specifications.

5.08 Testing

Materials testing, trench backfill compaction testing, and low-pressure air tests shall be required for storm drainage systems.

5.09 Street Patching and Restoration

See Section 4 for requirements regarding street patching and trench restoration.

5.10 Adjustment of New and Existing Utility Structures to Grade

This work consists of constructing and/or adjusting all new and existing utility structures encountered on the project to finished grade. All utility castings and monuments within the existing and/or new pavement area shall be referenced by the Contractor prior to any pavement removal or planing. The Contractor shall keep a record of such references, and submit a copy to the City.

Existing structures and new structures shall be adjusted to the finished grade as shown on the Details and as further specified herein. Existing boxes, rings, grates, covers, and lids shall be reset in a careful and workmanlike manner to conform to the required grades.

The new and existing utility castings and monuments shall be adjusted to grade in the following manner:

As soon as the street has been paved past each structure or casting, the asphalt concrete mat shall be scored around the location of the structure or casting. After rolling has been completed and the mat has cooled, it shall be cut along the scored lines. The structure or casting shall then be raised to finished pavement grade and the annular spaces filled. The pavement shall be installed to give a smooth finished appearance. All covers, lids, frames, and grates shall be thoroughly cleaned.

After pavement is in place, all new pavement joints shall be sealed with a 6-inch-wide strip of hot asphalt sealer. A sand blanket shall be applied to the surface of the hot asphalt sealer immediately after the placement of the sealer to help alleviate the tracking of the asphalt. The sealer shall meet the requirements of Section 9-04.2(1) of the Standard Specifications.

5.11 Finishing and Cleanup

After all other work on the project is completed and before final acceptance, the entire roadway, including the roadbed, planting, sidewalk areas, shoulders, driveways, alley, and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades and cross sections of a new roadway consistent with the original section, and as hereinafter specified.

Slopes, sidewalk areas, planting areas and roadway shall be smoothed and finished to the required cross section and grade by means of a grading machine insofar as it is possible to do so without damaging existing improvements, trees and shrubs. Machine dressing shall be supplemented by hand work to meet requirements outlined herein, to the satisfaction of the director.

All excavated material at the outer lateral limits of the project shall be removed entirely. Trash of all kinds resulting from clearing and grubbing or grading operations shall be removed and not placed in areas adjacent to the project. Where machine operations have broken down brush and trees beyond the lateral limits of the project, the Developer shall remove and dispose of same and restore said disturbed areas at his own expense.

Drainage facilities such as inlets, catch basins, culverts, and open ditches shall be cleaned of all debris which is the result of the Developer operations.

All pavements, whether new or old, shall be thoroughly cleaned. Existing improvements such as Portland cement concrete curbs, curb and gutters, walls, sidewalks, and other facilities which have been sprayed by the asphalt cement shall be cleaned to the satisfaction of the director.

Upon completion of the cleaning and dressing, the project shall appear uniform in all respects. All graded areas shall be true to line and grade. Where the existing surface is below sidewalk and curb, the area shall be filled and dressed out to the walk. Wherever fill material is required in the planting area, the finished grade shall be elevated to allow for final settlement, but nevertheless, the raised surface shall present a uniform appearance.

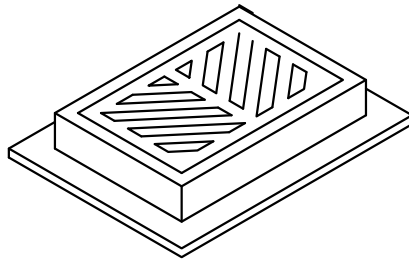
APPENDIX 5-1**STORM DRAINAGE STANDARD DETAILS**

CATCH BASIN – TYPE 1	SD-1
CATCH BASIN – TYPE IL	SD-2
CATCH BASIN – TYPE 2 48", 54", 60", 72" AND 96"	SD-3
SOLID STORM DRAIN COVER	SD-4
PARKING LOT AREA GRATE	SD-5
STANDARD FRAME INSTALLATION	SD-6
VANED GRATE	SD-7
THROUGH CURB INLET FRAME & GRATE WITH VERTICAL CURB.....	SD-8
THROUGH CURB INLET FRAME	SD-9
CLEANOUT TO GRADE.....	SD-10
STORM SEWER STUB.....	SD-11
CASING INSTALLATION.....	SD-12
BEEHIVE GRATE.....	SD-13
PIPE BEDDING DETAIL.....	SD-14
TRASH RACK DEBRIS BARRIER	SD-15
DEBRIS CAGE.....	SD-16
BEVELED END PIPE SECTION	SD-17
FLOW RESTRICTOR - TEE TYPE.....	SD-18
TEE SECTION SHEAR GATE DETAIL	SD-19
24" LOCKING MANHOLE COVER	SD-20
24" LOCKING MANHOLE FRAME.....	SD-21
TYPE 45 AREA DRAIN.....	SD-22
STEEL BOLLARD POST.....	SD-23A
STEEL BOLLARD DETAILS	SD-23B

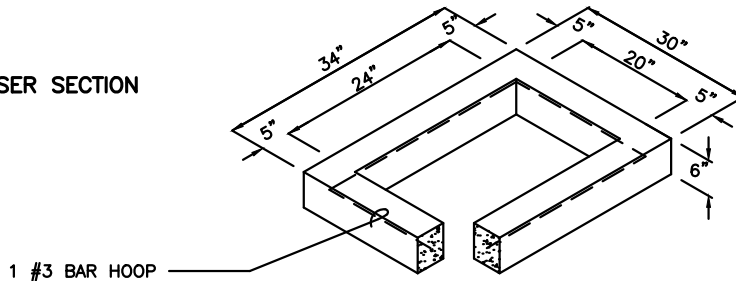
REMOVABLE WOODEN BOLLARDSD-24

PERMANENT WOODEN BOLLARDSD-25

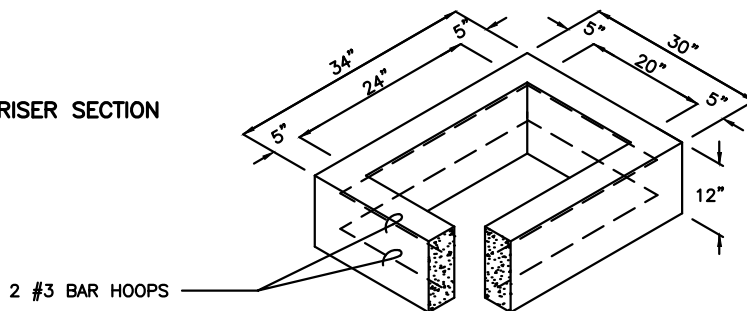
FRAME AND GRATE SEE
WSDOT SEC. 7.05 AND
APPLICABLE DWGS.



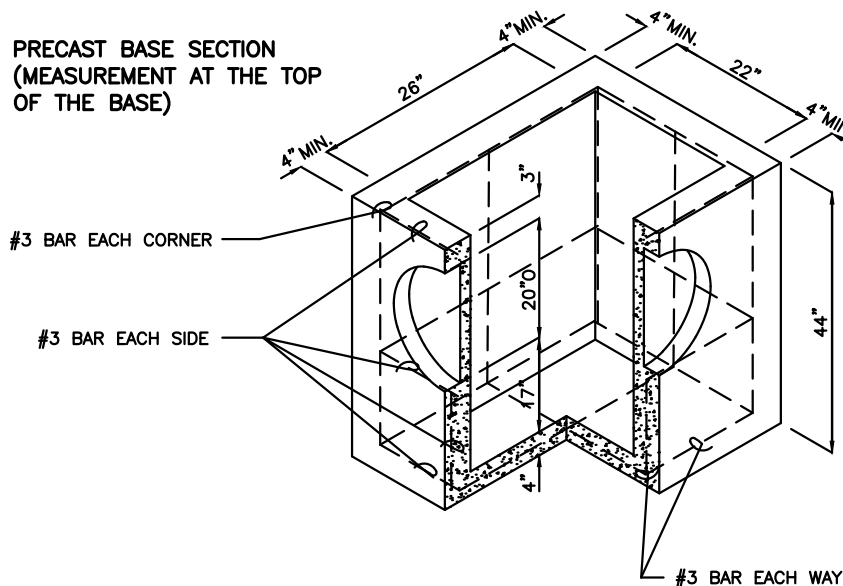
6" RISER SECTION



12" RISER SECTION



PRECAST BASE SECTION
(MEASUREMENT AT THE TOP
OF THE BASE)



NOTES:

1. CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (AASHTO M 199) & C890 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE WSDOT/APWA STANDARD SPECIFICATIONS.
2. AS AN ACCEPTABLE ALTERNATIVE TO REBAR, WELDED WIRE FABRIC HAVING A MIN. AREA OF 0.12 SQUARE INCHES PER FOOT MAY BE USED. WELDED WIRE FABRIC SHALL COMPLY TO ASTM A497 (AASHTO M 221). WIRE FABRIC SHALL NOT BE PLACED IN KNOCKOUTS.
3. ALL REINFORCED CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000.
4. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MIN. ALL PIPE SHALL BE INSTALLED IN FACTORY PROVIDED KNOCKOUTS. UNUSED KNOCKOUTS NEED NOT BE GROUTED IF WALL IS LEFT INTACT.
5. KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIAM. PLUS CATCH BASIN WALL THICKNESS.
6. ROUND KNOCKOUTS MAY BE ON ALL 4 SIDES, WITH MAX. DIAM. OF 20". KNOCKOUTS MAY BE EITHER ROUND OR "D" SHAPE.
7. THE MAX. DEPTH FROM THE FINISHED GRADE TO THE PIPE INVERT IS 5'-0".
8. THE TAPER ON THE SIDES OF THE PRECAST BASE SECTION AND RISER SECTION SHALL NOT EXCEED 1/2"/FT.
9. CATCH BASIN FRAME AND GRATE SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND MEET THE STRENGTH REQUIREMENTS OF FEDERAL SPECIFICATION RR-F-62ID. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
10. FRAME AND GRATE MAY BE INSTALLED WITH FLANGE DOWN OR CAST INTO RISER.
11. FOR CATCH BASINS IN PARKING LOTS REFER TO WSDOT/APWA STANDARD DWG. B-5.60-02.
12. EDGE OF RISER OR BRICK SHALL NOT BE MORE THAN 2" FROM VERTICAL EDGE OF CATCH BASIN WALL.



CITY OF NORTH BEND

CATCH BASIN - TYPE 1

APPROVED:

MARK RIGOS, P.E.

BY CITY

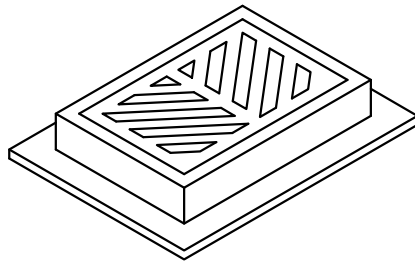
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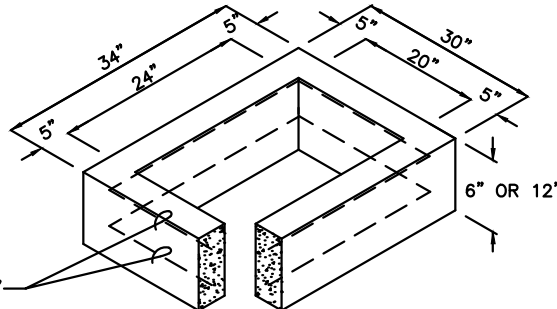
SD-1

FRAME AND GRATE
SEE WSDOT
SEC. 7.05 AND
APPLICABLE DWGS.



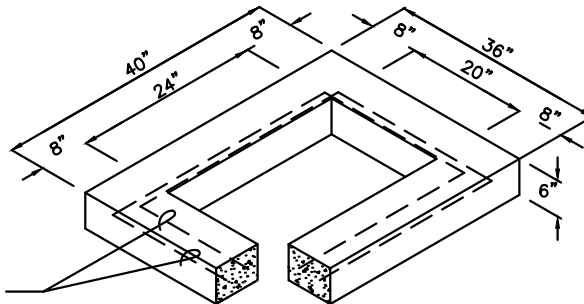
RISER SECTION

- 1 #3 BAR HOOP FOR 6"
- 2 #3 BAR HOOP FOR 12"



6" REDUCING SECTION

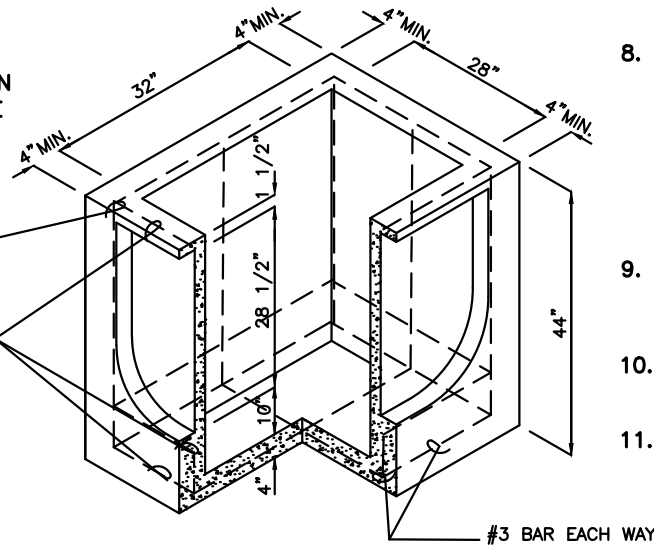
- 2 #3 BAR HOOP



PRECAST BASE SECTION (MEASUREMENT AT THE TOP OF THE BASE)

#3 BAR EACH CORNER

#3 BAR EACH SIDE



NOTES:

1. CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (AASHTO M 199) & C890 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE WSDOT/APWA STANDARD SPECIFICATIONS.
2. AS AN ACCEPTABLE ALTERNATIVE TO REBAR, WELDED WIRE FABRIC HAVING A MIN. AREA OF 0.12 SQUARE INCHES PER FOOT MAY BE USED. WELDED WIRE FABRIC SHALL COMPLY TO ASTM A497 (AASHTO M 221). WIRE FABRIC SHALL NOT BE PLACED IN KNOCKOUTS.
3. ALL REINFORCED CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000.
4. PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE A WALL THICKNESS OF 2" MIN. ALL PIPE SHALL BE INSTALLED IN FACTORY PROVIDED KNOCKOUTS. UNUSED KNOCKOUTS NEED NOT BE GROUTED IF WALL IS LEFT INTACT.
5. KNOCKOUT OR CUTOUT HOLE SIZE IS EQUAL TO PIPE OUTER DIAM. PLUS CATCH BASIN WALL THICKNESS.
6. KNOCKOUTS MAY BE ON ALL 4 SIDES WITH MAX. DIAM. OF 28". KNOCKOUTS MAY BE EITHER ROUND OR "D" SHAPE.
7. THE TAPER ON THE SIDES OF THE PRECAST BASE SECTION AND RISER SECTION SHALL NOT EXCEED 1/2"/FT.
8. CATCH BASIN FRAME AND GRATE SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATIONS AND MEET THE STRENGTH REQUIREMENTS OF FEDERAL SPECIFICATION RR-F-62ID. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
9. FRAME AND GRATE MAY BE INSTALLED WITH FLANGE DOWN OR CAST INTO RISER.
10. MAX. DEPTH FROM FINISHED GRADE TO PIPE INVERT SHALL BE 5'-0".
11. EDGE OF REDUCING SECTION OR BRICK SHALL NOT BE MORE THAN 2" FROM VERTICAL EDGE OF CATCH BASIN WALL.



CITY OF NORTH BEND

CATCH BASIN - TYPE 1L

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

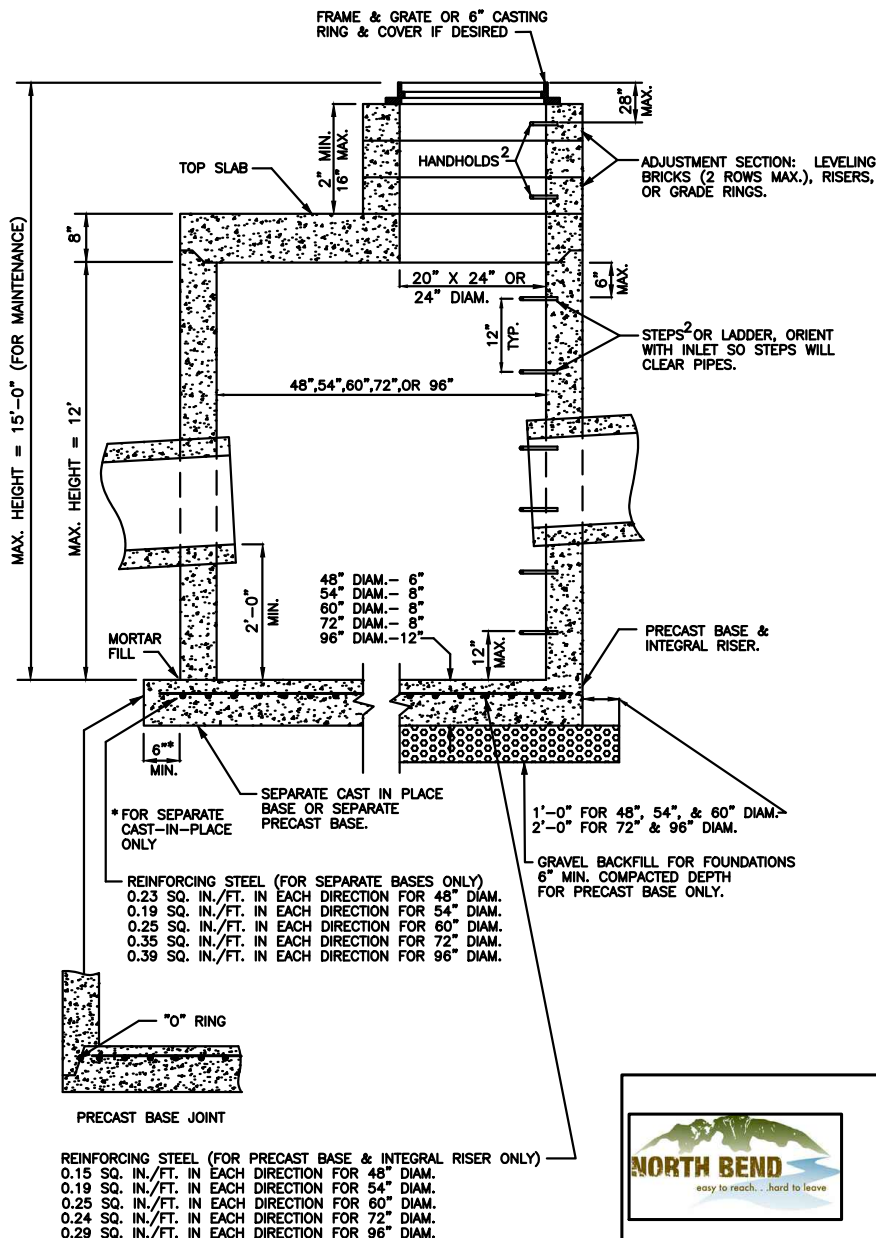
DATE

DWG. NO.

SD-2

NOTES:

- CATCH BASINS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C478 (AASHTO M199) AND ASTM C890 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE STANDARD SPECIFICATIONS.
- HANDHOLDS IN ADJUSTMENT SECTION SHALL HAVE 3" MIN. CLEARANCE. STEPS IN CATCH BASIN SHALL HAVE 6" MIN. CLEARANCE. HANDHOLDS SHALL BE PLACED IN ALTERNATING GRADE RINGS OR LEVELING BRICK COURSE WITH A MIN. OF ONE HANDHOLD BETWEEN THE LAST STEP AND FINISHED GRADE. ALL STEPS AND HANDHOLDS SHALL BE MADE OF POLY PROPYLENE.
- ALL REINFORCED CAST-IN-PLACE CONCRETE SHALL BE CLASS 4000. ALL PRECAST CONCRETE SHALL BE CLASS 4000.
- PRECAST BASES SHALL BE FURNISHED WITH CUTOUTS OR KNOCKOUTS. KNOCKOUTS SHALL HAVE WALL THICKNESS OF 2" MIN. UNUSED KNOCKOUTS NEED NOT BE GROUTED IF WALL IS LEFT INTACT. PIPES SHALL BE INSTALLED ONLY IN FACTORY KNOCKOUTS UNLESS OTHERWISE APPROVED BY THE ENGINEER.
- KNOCKOUT OR CUTOUT HOLE SIZE SHALL EQUAL PIPE OUTER DIAM. PLUS CATCH BASIN WALL THICKNESS. MAX. HOLE SIZE SHALL BE 36" FOR 48" CATCH BASIN, 42" FOR 54" C.B., 48" FOR 60" C.B., 60" FOR 72" C.B., 84" FOR 96" C.B. MIN. DISTANCE BETWEEN HOLES SHALL BE 8" FOR 48", 54", AND 60" C.B.; 12" FOR 72" AND 96" C.B.
- CATCH BASIN FRAMES AND GRATES OR COVERS SHALL BE IN ACCORDANCE WITH SEC. 7.05 OF THE WSDOT STANDARD SPECIFICATIONS. MATING SURFACES SHALL BE FINISHED TO ASSURE NON-ROCKING FIT WITH ANY COVER POSITION.
- ALL BASE REINFORCING STEEL SHALL HAVE A MIN. YIELD STRENGTH OF 60,000 PSI AND BE PLACED IN THE UPPER HALF OF THE BASE WITH 1" MIN. CLEARANCE.
- MIN. SOIL BEARING VALUE SHALL EQUAL 3,300 POUNDS PER SQUARE FOOT.
- FOR DETAILS SHOWING LADDER, STEPS, HANDRAILS AND TOP SLABS, SEE OTHER STANDARD DETAILS.
- SEE THE WSDOT STANDARD SPECIFICATIONS SEC. 7-05.3 FOR JOINT REQUIREMENTS.



CITY OF NORTH BEND



CATCH BASIN - TYPE 2
48", 54", 60", 72", & 96"

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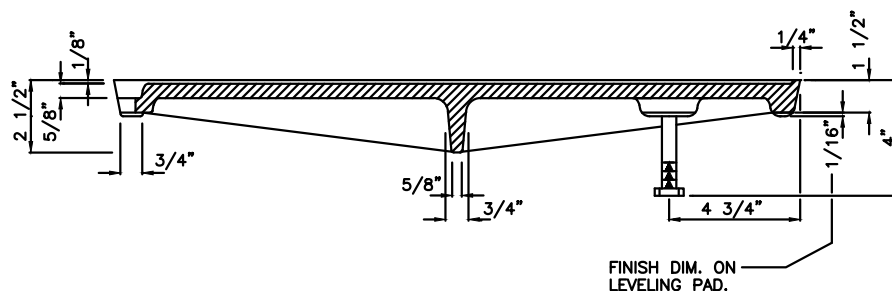
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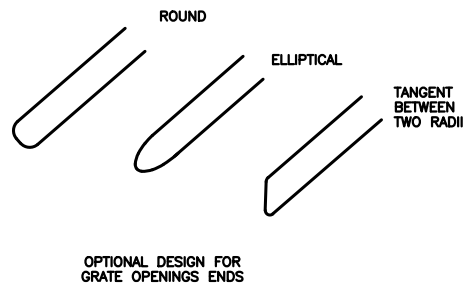
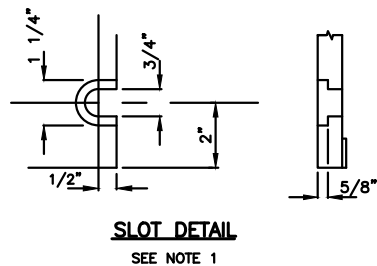
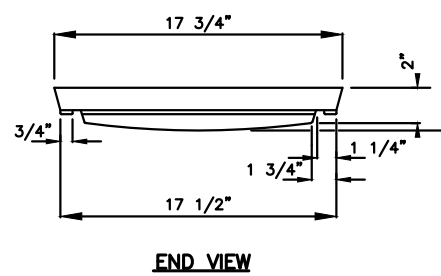
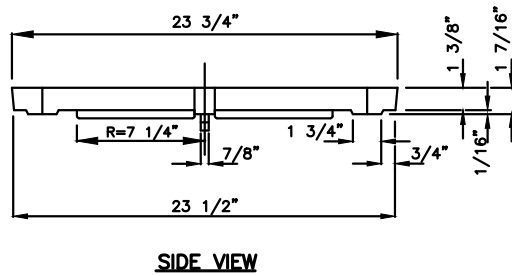
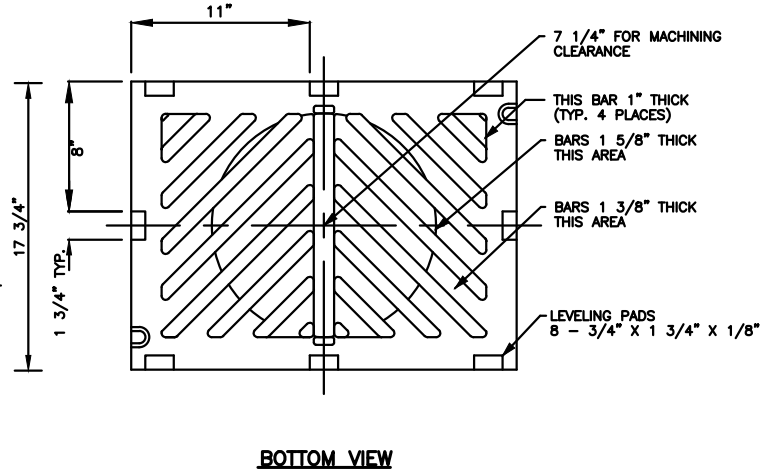
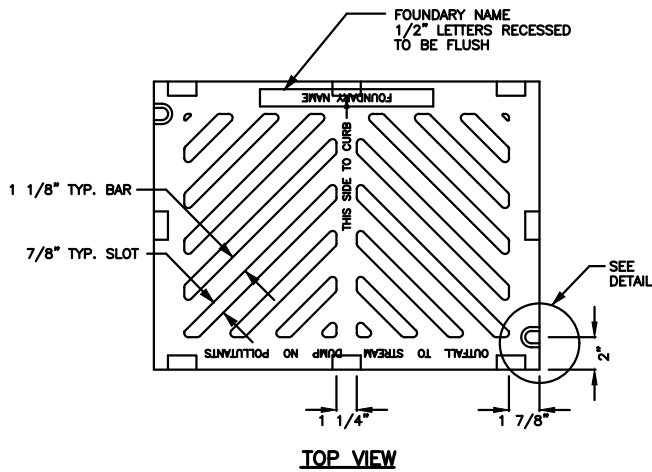
SD-3



1. USE WITH FRAME DRILLED AND TAPPED FOR LOCKING BOLTS.
2. USE WITH TWO LOCKING BOLTS 5/8"-11 NC STAINLESS STEEL TYPE 304 STEEL SOCKET HEAD (ALLEN HEAD) BOLTS, 2" LONG.
3. COVER MATERIAL IS CAST IRON PER ASTM A48 CLASS 30.
4. SHALL CONFORM TO SEC. 7.05 OF THE WSDOT STANDARD SPECIFICATIONS.
5. COVER SHALL HAVE THE WORD "DRAIN" IN 2-INCH RAISED LETTERS.
6. ALL LIDS TO BE LOCKING UNLESS OTHERWISE SPECIFIED IN PLANS.

CITY OF NORTH BEND
SOLID STORM DRAIN COVER

SD-4



NOTES:

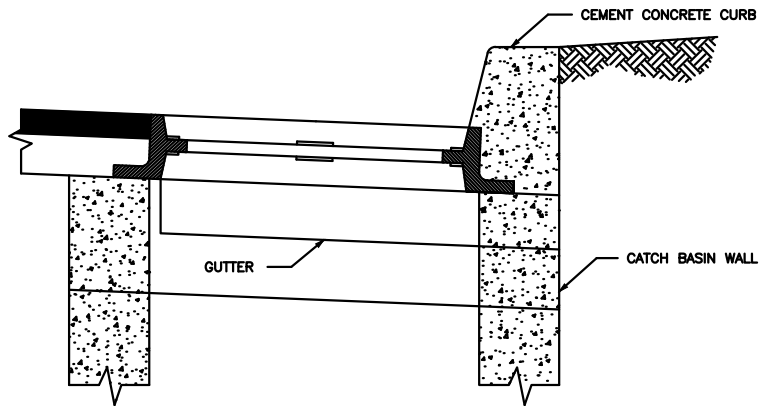
1. SLOT FORMED AND RECESSED FOR 5/8"-11 NC X 2" SOCKET HEAD (ALLEN HEAD) BOLT.
2. GRATE SHALL BE DUCTILE IRON.
3. SHALL CONFORM TO SEC. 9-05.15 OF THE WSDOT STANDARD SPECIFICATIONS.
4. USE VANED GRATE IN CURB LINE.
5. USE FRAME SHOWN IN STANDARD DETAIL SD-6.
6. ALL LIDS TO BE LOCKING UNLESS OTHERWISE SPECIFIED IN PLANS.



CITY OF NORTH BEND
PARKING LOT AREA GRATE

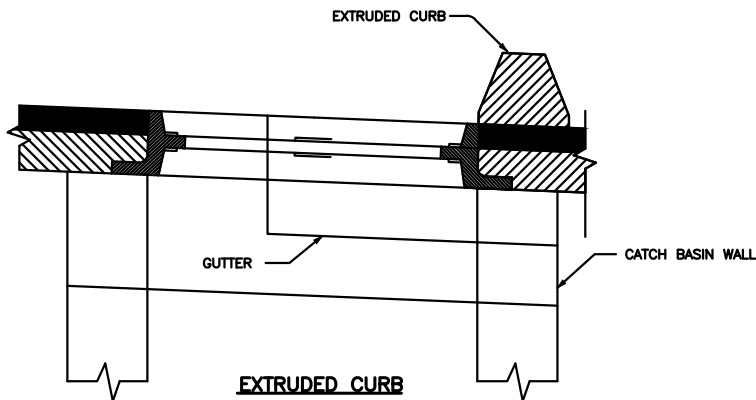
APPROVED:
MARK RIGOS, P.E. MAY 2018
BY CITY DATE

DWG. NO.
SD-5

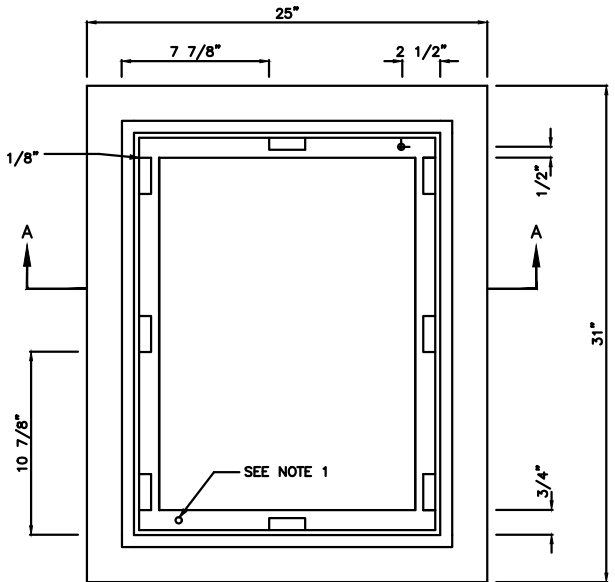


VERTICAL CURB

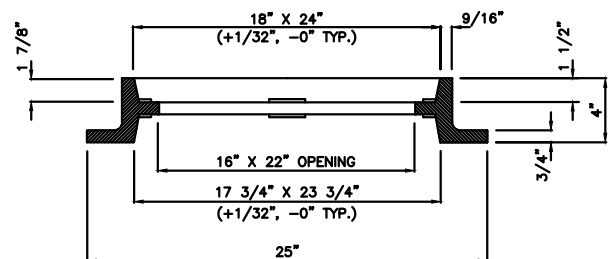
LEVEL PAD 16 - 3/4" X 2 1/4" X 1/8"



EXTRUDED CURB



PLAN



SECTION A-A

NOTES:

1. DRILL AND TAP FOR, AND PROVIDE, TWO LOCKING BOLTS 5/8"-11 NC STAINLESS TYPE 304 STEEL SOCKET HEAD (ALLEN HEAD) BOLTS, 2" LONG, WHERE REQUIRED.
2. FRAME MATERIAL IS CAST IRON PER ASTM A48 CLASS 30 OR BETTER.
3. SET FRAME TO GRADE AND CONSTRUCT ROAD AND GUTTER TO BE FLUSH WITH FRAME.
4. ALL LIDS TO BE LOCKING UNLESS OTHERWISE SPECIFIED IN PLANS.



CITY OF NORTH BEND
STANDARD FRAME INSTALLATION

APPROVED:

MARK RIGOS, P.E.

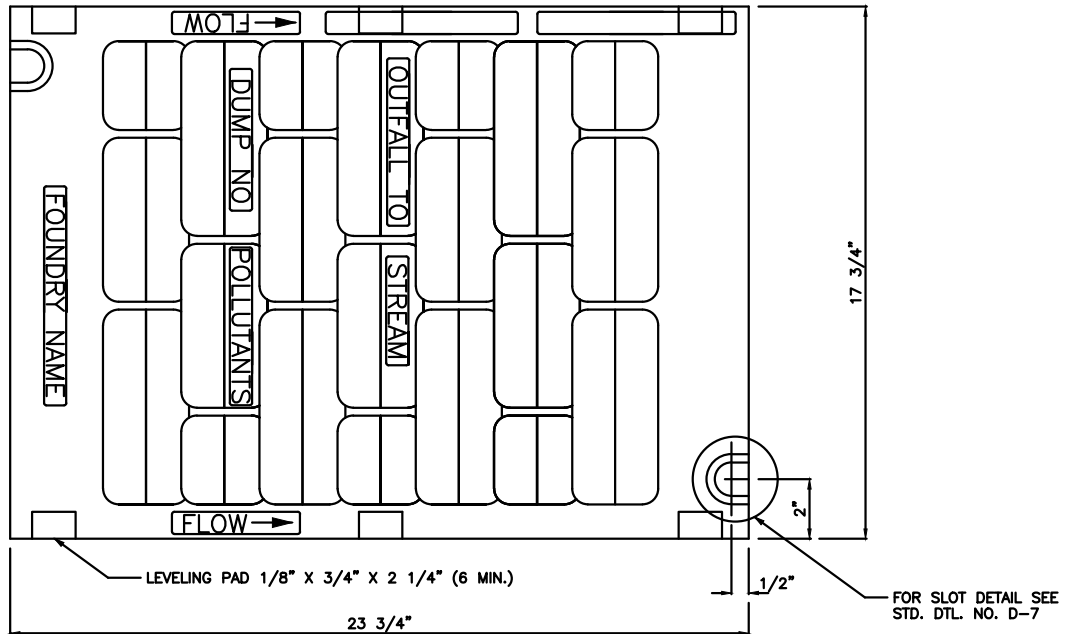
BY CITY

MAY 2018

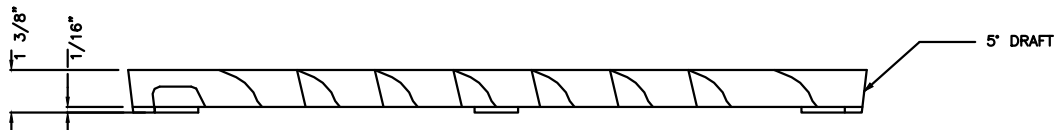
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DWG. NO.

SD-6



PLAN



ELEVATION

NOTES:

1. SELF-LOCK VANED GRATE MANUFACTURER SUBJECT TO APPROVAL BY ENGINEER.
2. USE WITH TWO LOCKING BOLTS 5/8"-11 NC STAINLESS TYPE 304 STEEL SOCKET HEAD (ALLEN HEAD) BOLTS, 2" LONG. NOTE SLOT DETAIL. PROVIDE WHERE REQUIRED.
3. MATERIAL IS DUCTILE IRON ASTM A536 GRADE 80-55-06.
4. "OUTFALL TO STREAM DUMP NO POLLUTANTS" IN RAISED LETTERS SHALL BE LOCATED ON GRATE AS SHOWN, OR ON BORDER AREA.
5. SHALL CONFORM TO SEC. 7.05 OF THE WSDOT STANDARD SPECIFICATIONS.
6. WELDING IS NOT PERMITTED.
7. EDGES SHALL HAVE 0.125" RADIUS, 0.125" CHAMBER OR COMPLETE DEBURRING.
8. USE A BI-DIRECTIONAL VANED GRATE IN SAG VERTICAL CURVES.
9. ALL LIDS TO BE LOCKING UNLESS OTHERWISE SPECIFIED IN PLANS.



CITY OF NORTH BEND

VANED GRATE

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MARK RIGOS, P.E.

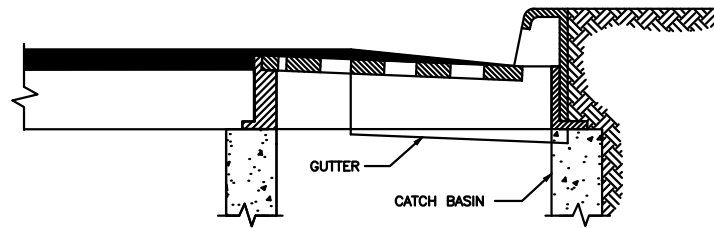
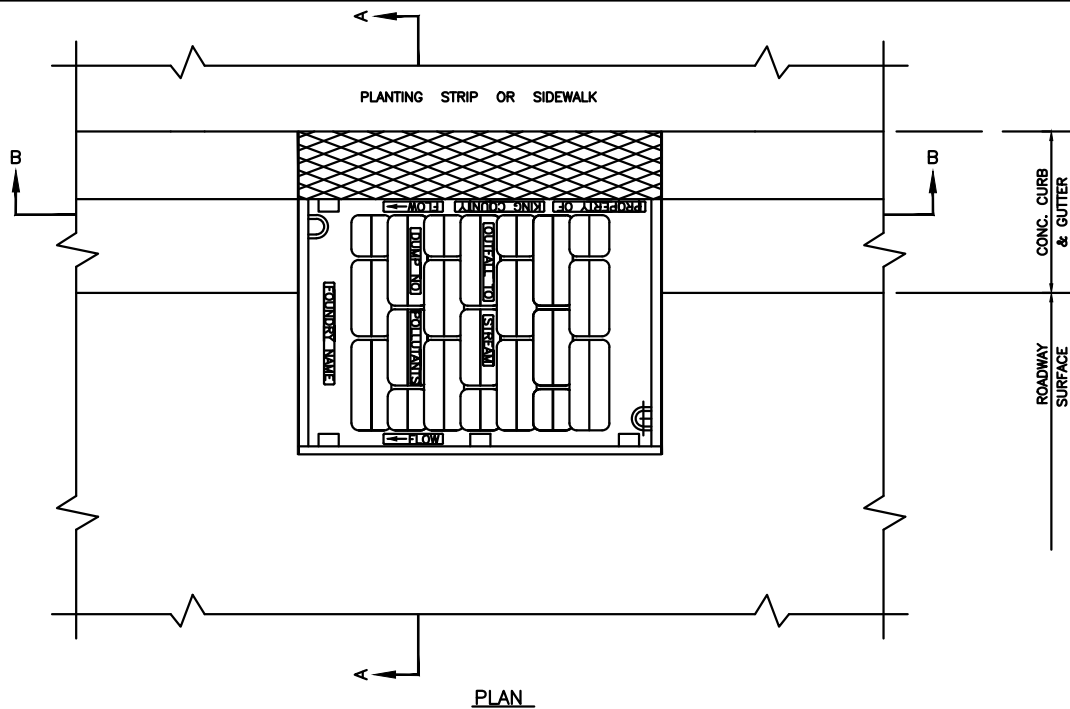
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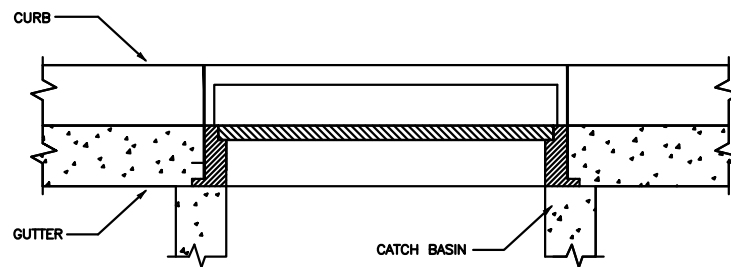
DWG. NO.

SD-7



NOTES:

1. SET TO GRADE AND CONSTRUCT ROAD AND GUTTER TO BE FLUSH WITH FRAME.
2. THROUGH CURB INLET TO BE USED IN SAG CURVES.



NOTE:

1. ALL LIDS TO BE LOCKING UNLESS OTHERWISE SPECIFIED IN PLANS.



CITY OF NORTH BEND
THROUGH CURB INLET FRAME
& GRATE WITH VERTICAL CURB

APPROVED:

MARK RIGOS, P.E.

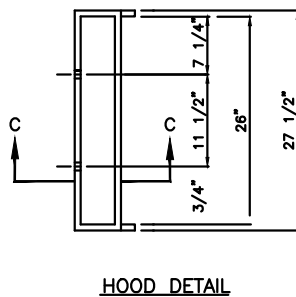
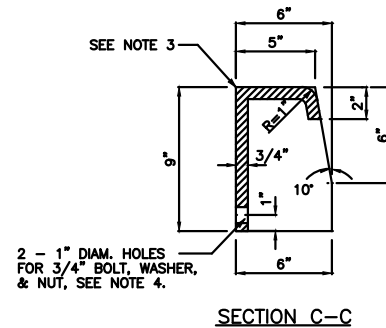
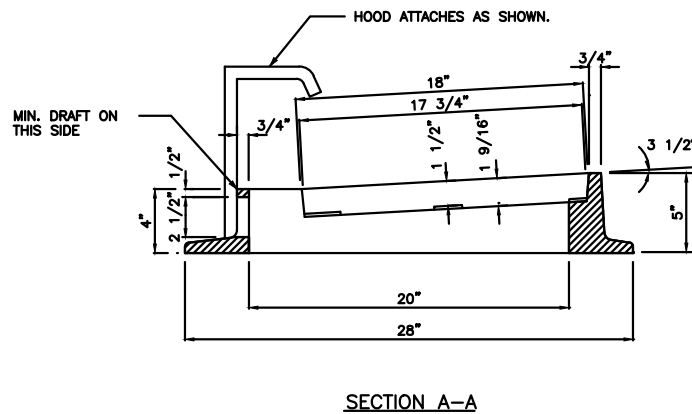
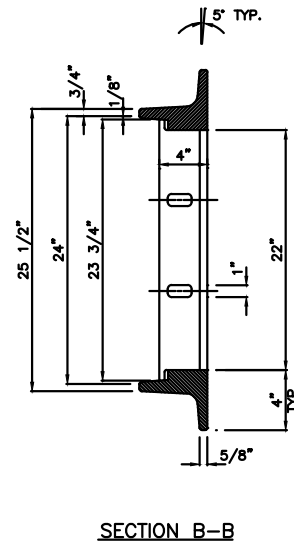
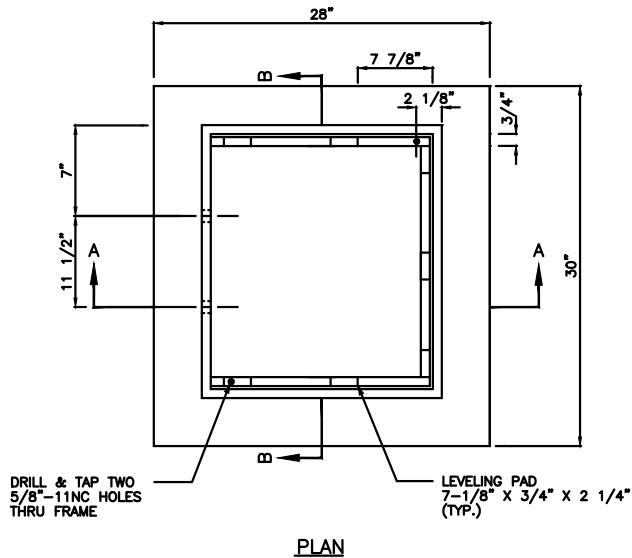
BY CITY

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DWG. NO.

SD-8



NOTES:

1. MATERIAL SHALL CONFORM TO SECTION 9-05.15(2) OF THE WSDOT STANDARD SPECIFICATIONS.
2. PATTERN ON TOP SURFACE OF HOOD SHALL BE 3/16" NON-SKID DIAMOND.
3. BOLT, WASHER, AND NUT SHALL BE GALVANIZED OR CORROSION RESISTANT.
4. ALL LIDS TO BE LOCKING UNLESS OTHERWISE SPECIFIED IN PLANS.



CITY OF NORTH BEND THROUGH CURB INLET FRAME

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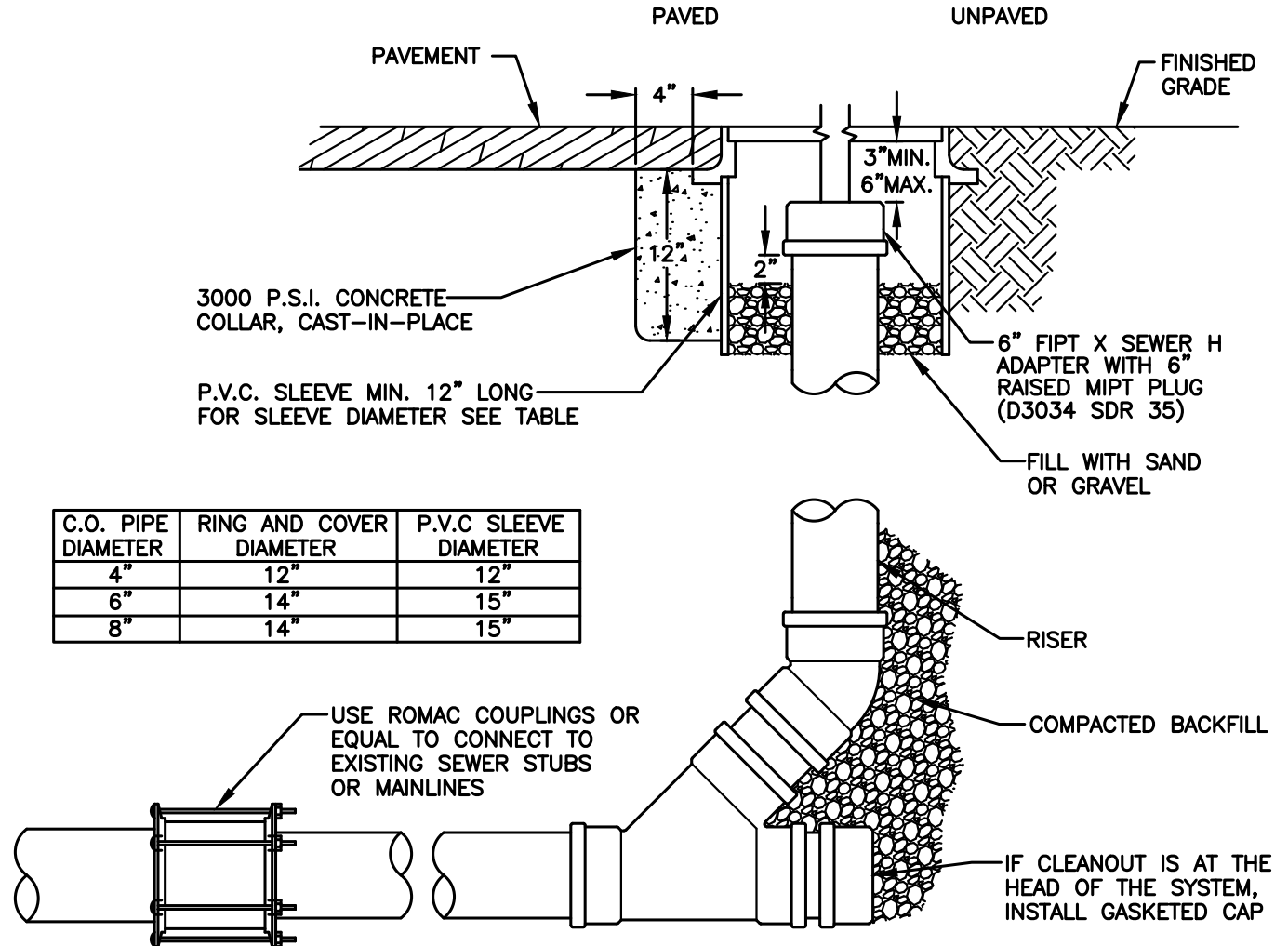
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MAY 2018

DATE

DWG. NO.

SD-9



NOTES:

1. BOLT-LOCKING CAST IRON RING AND COVER SHALL BE USED IN RIGHT-OF-WAY AND EASEMENTS AND MUST BE RATED HS-20 IF USED IN PAVED AREAS. SEE TABLE FOR SIZES.
2. MID-STATES PLASTIC BOX OR EQUAL MAY BE USED IF C.O. IS OUTSIDE OF RIGHT-OF-WAY OR EASEMENT. SEE TABLE FOR SIZES. THE COVER FOR THE PLASTIC BOX SHALL BE DUCTILE IRON AND READ "SEWER" OR BE BLANK (NO LABEL).
3. CAST IRON COVER SHALL READ "STORM".
4. 14" BOLT-LOCKING CAST IRON COVER SHALL BE EQUAL TO OLYMPIC FOUNDRY PART NUMBER M1060.
5. SPECIAL "DECORATIVE" CASTING MAY BE USED IF PRE-APPROVED BY CITY.



CITY OF NORTH BEND

CLEANOUT TO GRADE

APPROVED:

MARK RIGOS, P.E.

BY CITY

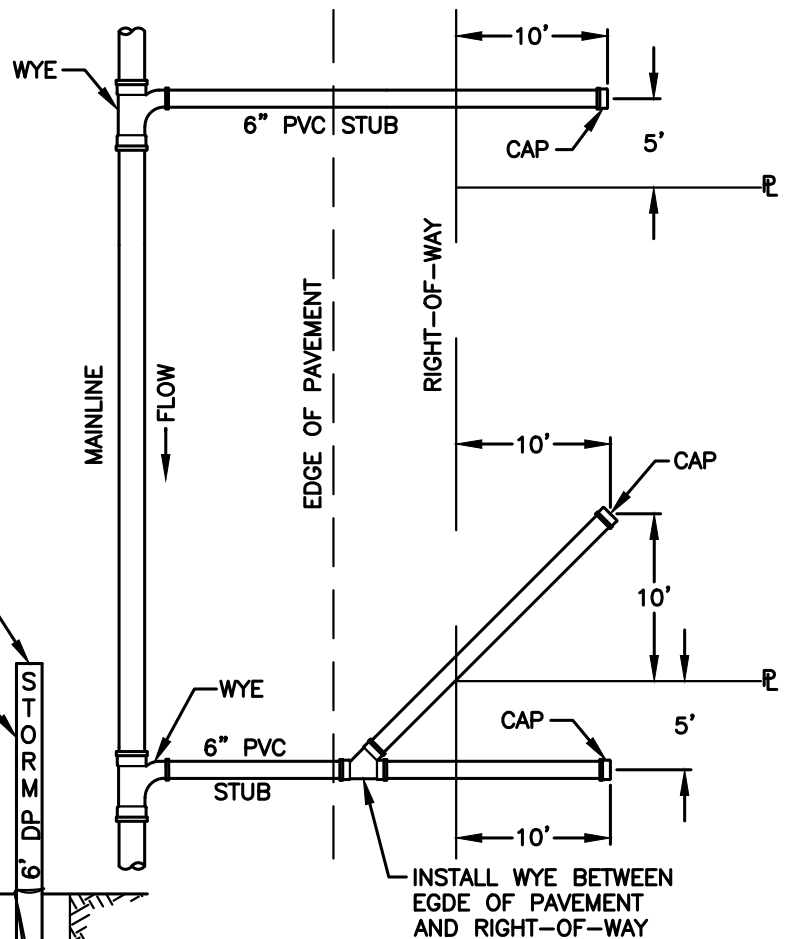
MAY 2018

DATE

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SD-10

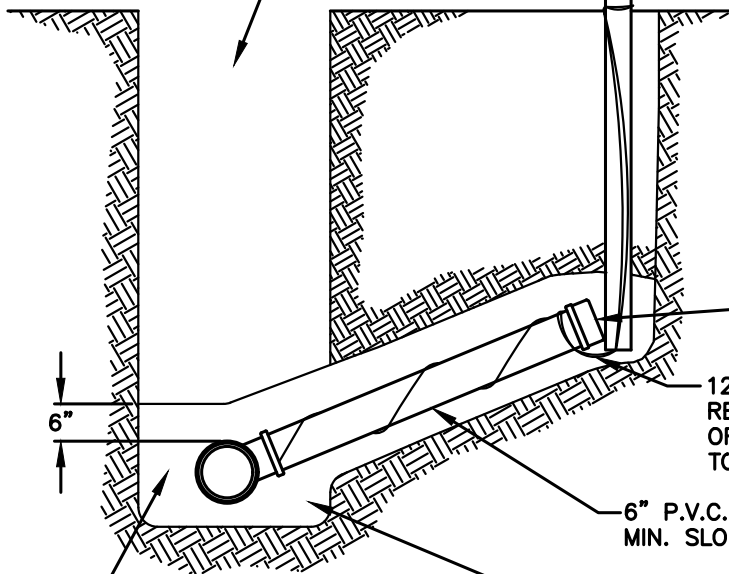
SINGLE SERVICE



2"x 4" STAKE BURIED AT DEPTH OF PIPE INVERT, PAINTED WHITE ABOVE GROUND. EXTEND A MINIMUM OF 3 FEET ABOVE GRADE.

MARK 2"x 4" STAKE WITH "STORM", DEPTH FROM PIPE INVERT TO FINAL GRADE, AND DISTANCE FROM MAIN TO END OF STUB.

FOR TRENCH SPECS. SEE NBPWS DETAIL S-14



FOR PIPE BEDDING SPECS. SEE NBPWS DETAIL S-15

JOINT USE SERVICE

CITY OF NORTH BEND

STORM SEWER STUB

NOTES:

1. UNLESS OTHERWISE INDICATED ON PLAN, SIDE SEWER SHALL BE MINIMUM OF 5 FEET DEEP AT PROPERTY LINE, OR 5 FEET LOWER THAN THE LOWEST ELEVATION, WHICHEVER IS LOWER.
2. PIPE CAN BE REDUCED TO 4" DIAMETER ON PRIVATE PROPERTY.
3. CLEANOUT SHALL BE INSTALLED WITHIN 25 FEET OF WYES.



APPROVED:

MARK RIGOS, P.E.

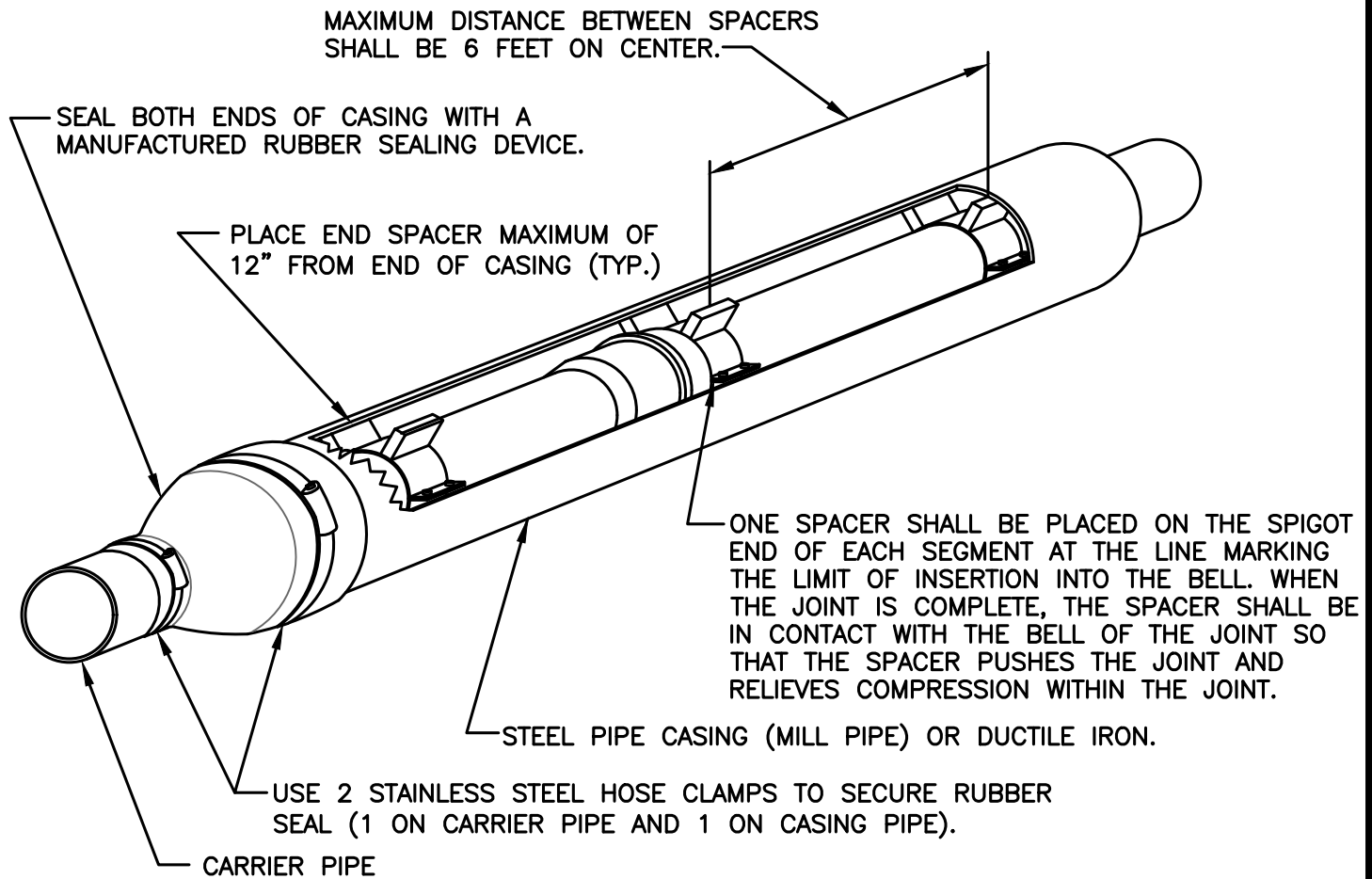
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MAY 2018

DATE

DWG. NO.

SD-11



CARRIER PIPE DIAMETER	4"	6"	8"	10"	12"
CASING DIAMETER	10"	12"	14"	16"	20"
STEEL CASING THICKNESS	0.25"	0.25"	0.25"	0.25"	0.25"
SPACER BAND WIDTH	8"	8"	8"	8"	8"

NOTES:

1. RUNNER HEIGHT SHALL BE SIZED TO PROVIDE:
 - A. MIN. 0.75" BETWEEN CARRIER PIPE BELL AND CASING PIPE WALL AT ALL TIMES.
 - B. MIN. 1.00" CLEARANCE BETWEEN RUNNERS AND TOP OF CASING WALL TO PREVENT JAMMING DURING UNSTALLATION.
2. MINIMUM RUNNER WIDTH SHALL BE 2 INCHES.
3. STEEL CASING DIAMETERS ARE "OUTSIDE DIAMETER" FOR 16" AND LARGER. .
4. SPACER BAND WIDTH SHALL BE 12" FOR CARRIER PIPES THAT ARE 36" DIAMETER OR GREATER.
5. FOR STEEL CASING, PROVIDE SHOP-APPLIED ANTI-CORROSIVE COATING ON CASING EXTERIOR CONFORMING TO AWWA 210. MINIMUM COATING 16 MILS DFT (DO NOT EXCEED MANUFACTURER'S MAXIMUM THICKNESS). PRODUCT SHALL BE EQUAL TO TNEMEC HI-BUILD TNEME-TAR SERIES 46H-413.



CITY OF NORTH BEND

CASING INSTALLATION

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

SD-12

OLYMPIC SM60BH

OLYMPIC MH25BH

NOTES:

1. MATERIAL: DUCTILE IRON ASTM A536, CL80-55-06.
2. PROVIDE 2-5/8" DIAMETER STAINLESS STEEL ALLEN TYPE BOLTS
COUNTER SUNK FLUSH WITH COVER.
3. ALL LIDS TO BE LOCKING UNLESS OTHERWISE SPECIFIED IN PLANS.

NOTES:

1. MATERIAL: CAST IRON ASTM A48, CL 30.
2. PROVIDE 2-5/8" DIAMETER STAINLESS STEEL ALLEN TYPE BOLTS
COUNTER SUNK FLUSH WITH COVER.
3. ALL LIDS TO BE LOCKING UNLESS OTHERWISE SPECIFIED IN PLANS.



CITY OF NORTH BEND

BEEHIVE GRATE

APPROVED:

MARK RIGOS, P.E.

BY CITY

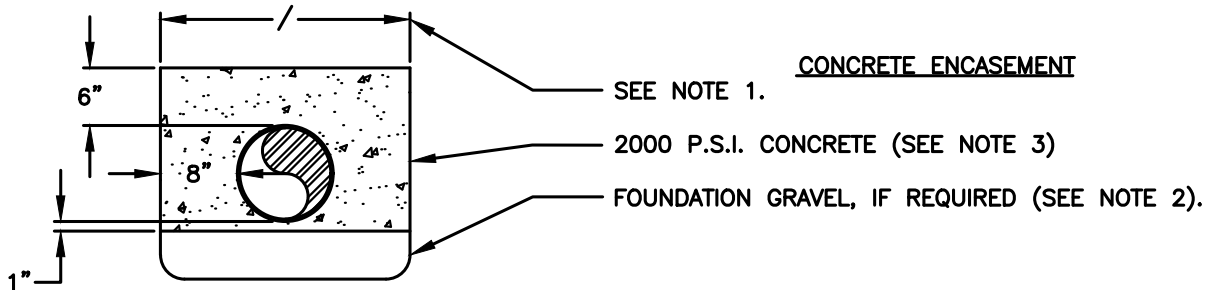
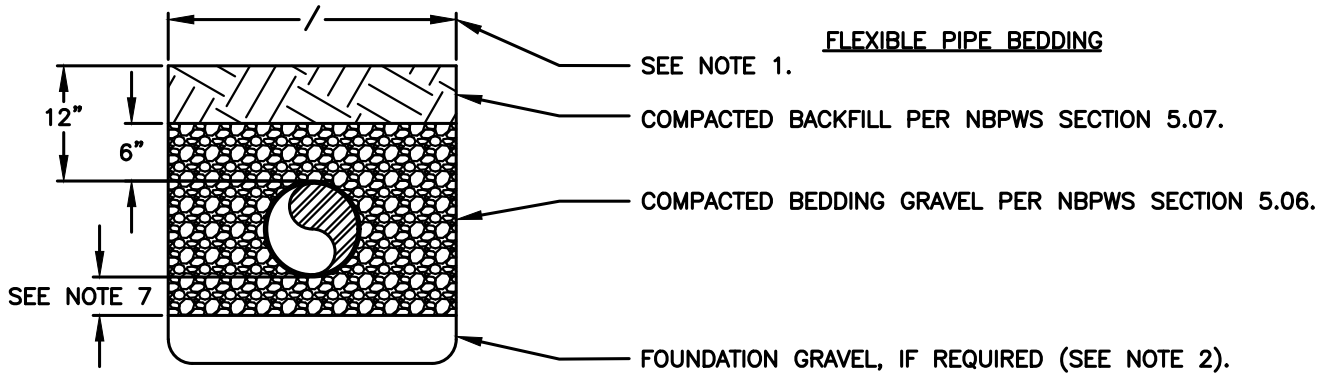
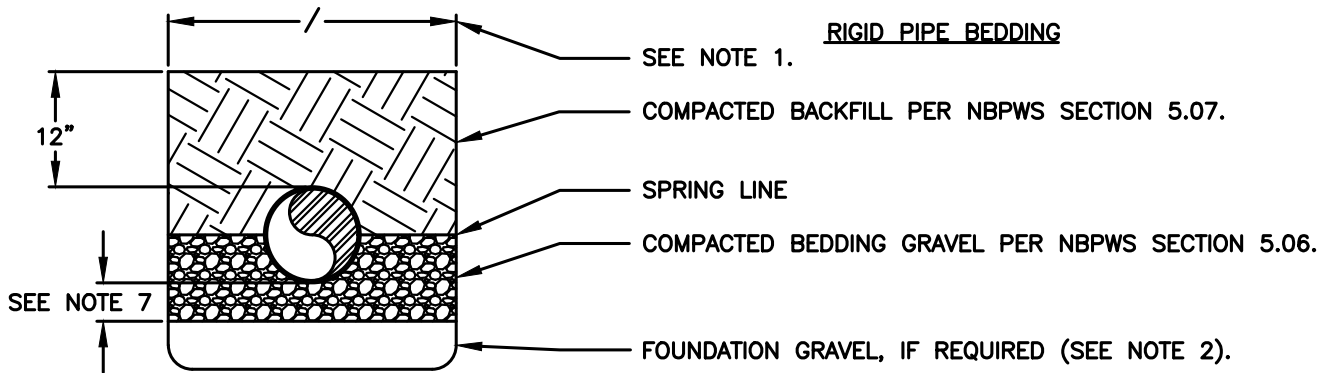
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SD-13

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NOTES:

1. FOR PIPES 15-INCHES AND UNDER, TRENCH WIDTH=I.D. + 30-INCHES. FOR PIPES 18-INCHES AND OVER, TRENCH WIDTH=(1.5 x I.D.)+18-INCHES. PER SECTION 2-09.4, "MEASUREMENT", OF THE WSDOT STANDARD SPECIFICATIONS.
2. EXCAVATE UNSTABLE MATERIAL DOWN TO FIRM SOIL AND REPLACE WITH FOUNDATION GRAVEL PER SECTION 9-03.9(1), "BALLAST", OF THE STANDARD SPECIFICATIONS.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANCHORING PIPE TO PREVENT FLOTATION DURING CONCRETE PLACEMENT.
4. WHEN THE DESIGN OF TANKS OR PIPES DOES NOT TAKE INTO ACCOUNT BUOYANCY, UNDERDRAINS SHALL BE PROVIDED.
5. PROVIDE CLEANOUTS ON UNDERDRAIN PIPE, EVERY 100 FEET, AND AT BENDS OR JUNCTIONS.
6. SEE WSDOT SECTION 9-03.9 FOR ADDITIONAL REQUIREMENTS.
7. 4-INCHES FOR PIPE 18-INCH DIAMETER AND LESS; 6-INCHES FOR PIPE GREATER THAN 18-INCH DIAMETER.
8. COMPACTED CRUSHED SURFACING TOP COURSE CAN ALSO BE USED AS BEDDING GRAVEL.



CITY OF NORTH BEND

PIPE BEDDING DETAIL

APPROVED:

MARK RIGOS, P.E.

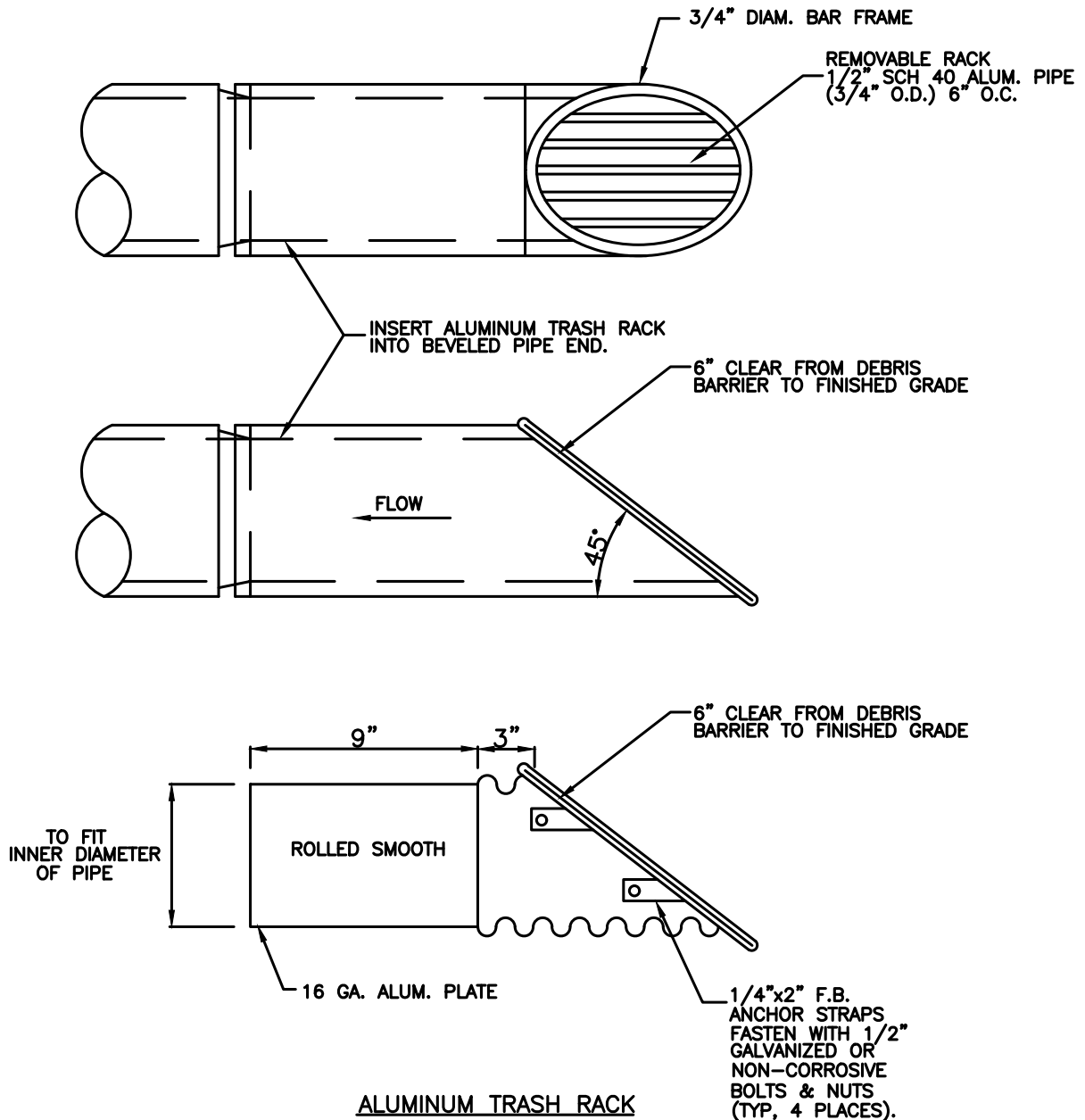
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DWG. NO.

SD-14



NOTES:

1. ALL STEEL PARTS MUST BE GALVANIZED & ASPHALT COATED (TREATMENT 1 OR BETTER).
2. CONTRACTOR TO VERIFY DIMENSIONS.
3. REQUIRED ON ALL PIPE ENDS 18" OR GREATER PER KCSWDM 4-12, 2016 VERSION.



CITY OF NORTH BEND

TRASH RACK DEBRIS BARRIER

APPROVED:

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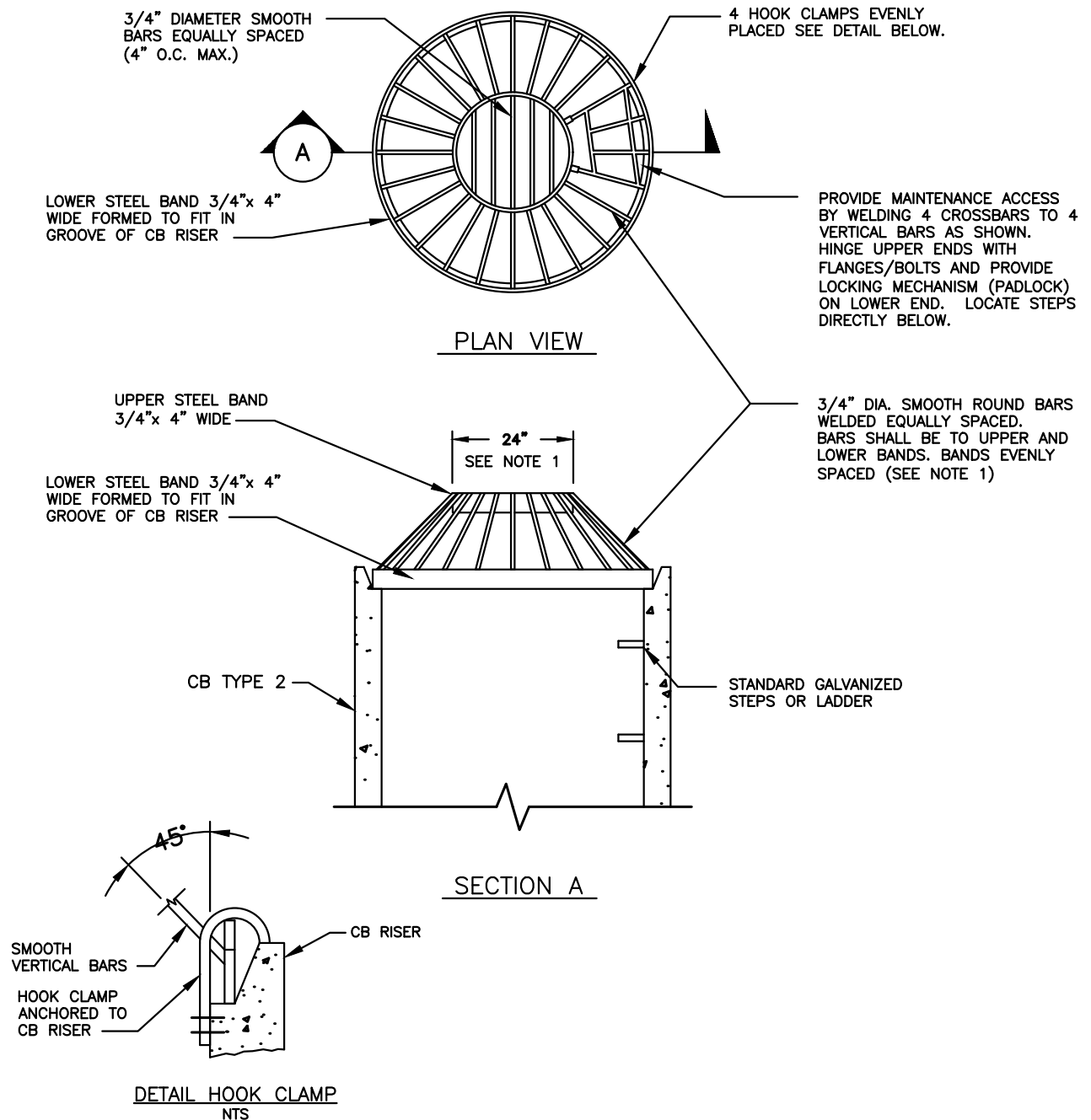
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DATE

DWG. NO.

SD-15



NOTES:

1. DIMENSIONS ARE FOR ILLUSTRATION ON 54 IN. DIAMETER CB. FOR DIFFERENT DIAMETER CB'S, ADJUST TO MAINTAIN 45 DEGREE ANGLE ON "VERTICAL" BARS AND 7 IN. O.C. MAXIMUM SPACING OF BARS AROUND LOWER STEEL BAND.
2. METAL PARTS MUST BE CORROSION RESISTANT, STEEL BARS MUST BE GALVANIZED.
3. THIS DEBRIS BARRIER IS ALSO RECOMMENDED FOR USE ON THE INLET TO ROADWAY CROSS-CULVERTS WITH HEIGHT POTENTIAL FOR DEBRIS COLLECTION
4. USE OF THIS STRUCTURE WITHIN THE ROAD RIGHT-OF-WAY SHALL MEET THE MINIMUM CLEAR ZONE REQUIREMENTS.
5. SEE THE WSDOT/APWA STANDARD SPECIFICATIONS SECTION 9-05.15 FOR METAL CASTINGS REQUIREMENTS.



CITY OF NORTH BEND

DEBRIS CAGE

APPROVED:

MARK RIGOS, P.E.

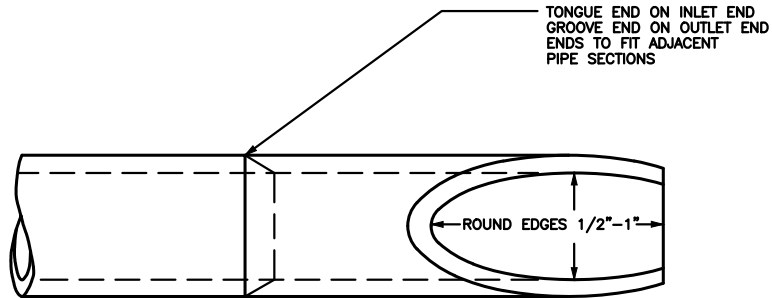
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MAY 2018

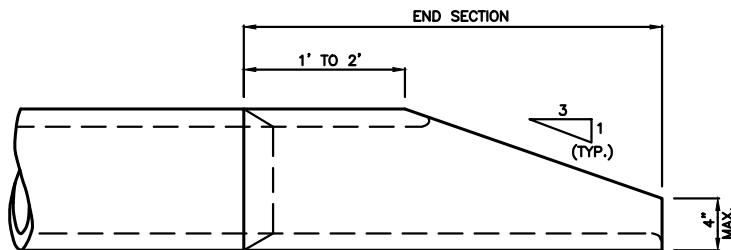
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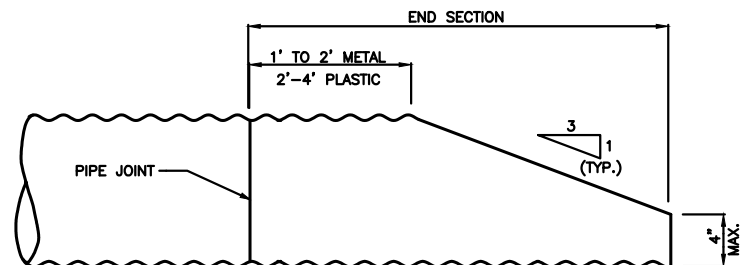


PLAN



ELEVATION

CONCRETE PIPE



METAL & THERMO-PLASTIC PIPE

NOTE:

1. SIDE SLOPE SHALL BE WARPED TO MATCH THE BEVELED PIPE END. WHEN CULVERT IS ON SKEW, BEVELED END SHALL BE ROTATED TO CONFORM TO SLOPE. IF SLOPE DIFFERS FROM 3:1, PIPE SHALL BE BEVELED TO MATCH SLOPE.
2. REFER TO WSDOT STANDARD PLAN B-70.20.00 FOR ADDITIONAL DETAILS.
3. FOR PIPES UNDER 18" DIAMETER.



CITY OF NORTH BEND

BEVELED END PIPE SECTION

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MARK RIGOS, P.E.

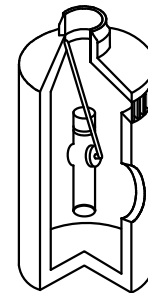
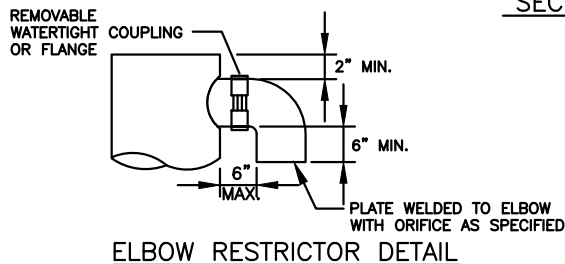
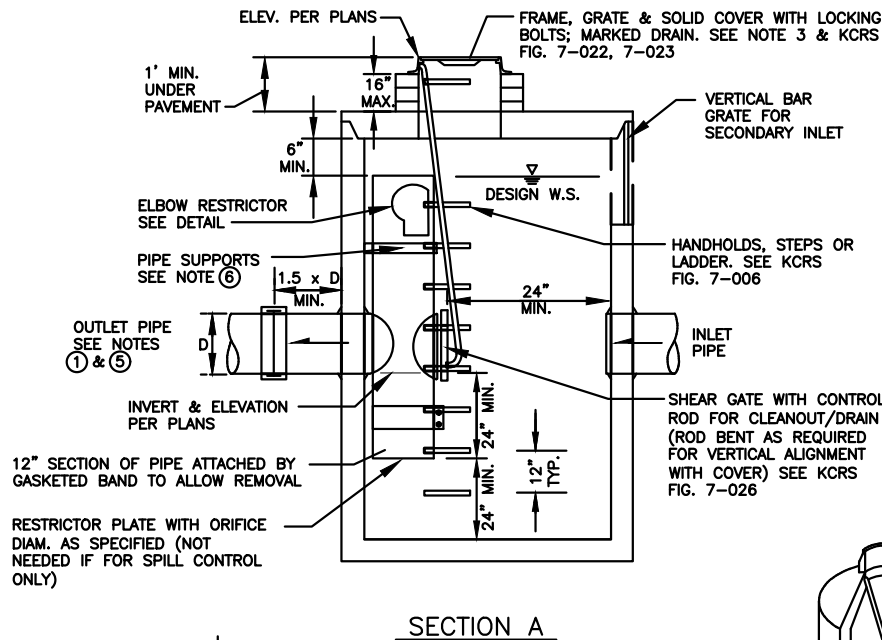
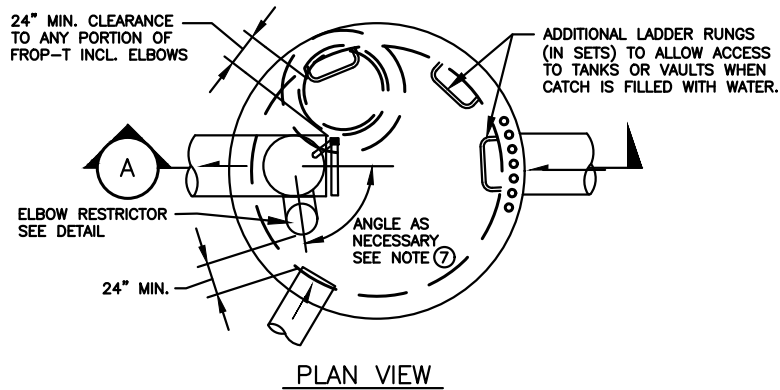
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DWG. NO.

SD-17



NOTES:

- ① USE A MINIMUM 54 IN. DIAM. TYPE 2 CATCH BASIN.
- ② OUTLET CAPACITY: 100-YEAR DEVELOPED PEAK FLOW.
3. METAL PARTS: CORROSION RESISTANT. NON-GALVANIZED PARTS PREFERRED. GALVANIZED PIPE PARTS TO HAVE ASPHALT TREATMENT 1.
4. FRAME AND LADDER OR STEPS OFFSET SO:
 - A. CLEANOUT GATE IS VISIBLE FROM TOP;
 - B. CLIMB-DOWN SPACE IS CLEAR OF RISER AND CLEANOUT GATE;
 - C. FRAME IS CLEAR OF CURB.
- ⑤ IF METAL OUTLET CONNECTS TO CEMENT CONCRETE PIPE, OUTLET PIPE TO HAVE SMOOTH O.D. EQUAL TO CONCRETE PIPE I.D. LESS 1/4 IN.
- ⑥ PROVIDE AT LEAST ONE 3 X 0.090 GAUGE SUPPORT BRACKET ANCHORED TO CONCRETE WALL WITH 5/8 IN. STAINLESS STEEL EXPANSION BOLTS OR EMBEDDED SUPPORTS 2 IN. INTO M/H WALL (VERTICAL SPACING).
- ⑦ LOCATE ELBOW RESTRICTOR(S) AS NECESSARY TO PROVIDE MIN. CLEARANCE AS SHOWN.
8. LOCATE ADDITIONAL LADDER RUNGS IN STRUCTURES USED AS ACCESS TO TANKS OR VAULTS TO ALLOW ACCESS WHEN CATCH BASIN IS FILLED WITH WATER.
9. SEE THE WSDOT/APWA STANDARD SPECIFICATIONS SECTION 9-05.15 FOR METAL CASTINGS REQUIREMENTS.



CITY OF NORTH BEND

FLOW RESTRICTOR TEE TYPE

APPROVED:

MARK RIGOS, P.E.

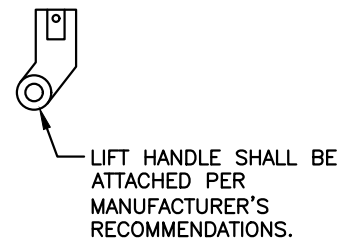
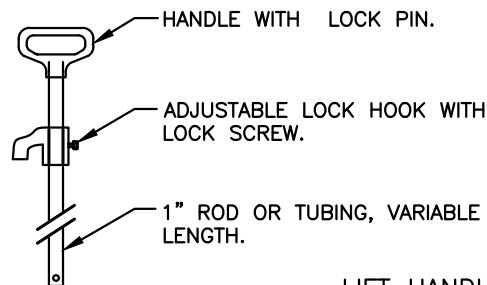
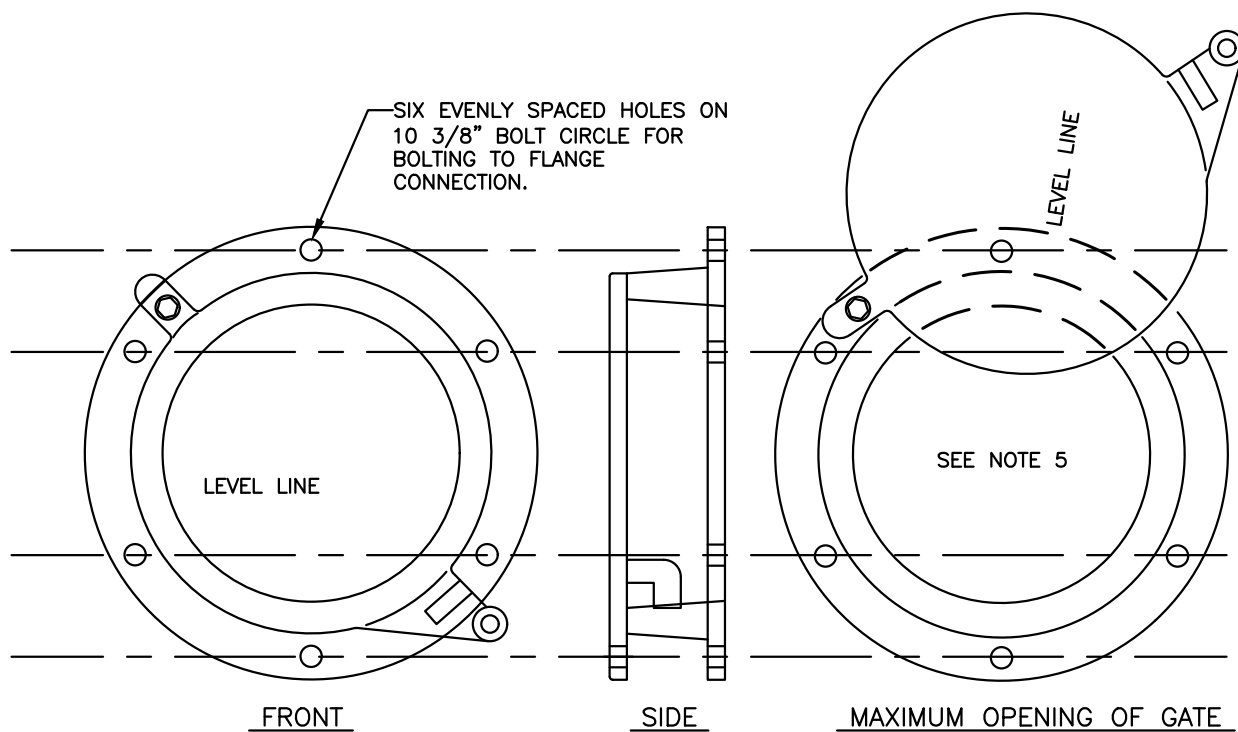
BY CITY

MAY 2018

DATE

DWG. NO.

SD-18



NOTES:

1. SHEAR GATE SHALL BE ALUMINUM ALLOY PER ASTM B-26-ZG-32a OR CAST IRON ASTM A48 CLASS 30B AS REQUIRED.
2. GATE SHALL BE 8 IN. DIAM. UNLESS OTHERWISE SPECIFIED.
3. GATE SHALL BE JOINED TO TEE SECTION BY BOLTING (THROUGH FLANGE), WELDING, OR OTHER SECURE MEANS.
4. LIFT ROD: AS SPECIFIED BY MFR. WITH HANDLE EXTENDING TO WITHIN ONE FOOT OF COVER AND ADJUSTABLE HOOK LOCK FASTENED TO FRAME OR UPPER HANDHOLD.
5. GATE SHALL NOT OPEN BEYOND THE CLEAR OPENING BY LIMITED HINGE MOVEMENT, STOP TAB, OR SOME OTHER DEVICE.
6. NEOPRENE RUBBER GASKET REQUIRED BETWEEN RISER MOUNTING FLANGE AND GATE FLANGE.
7. MATING SURFACES OF LID AND BODY TO BE MACHINED FOR PROPER FIT.
8. FLANGE MOUNTING BOLTS SHALL BE 3/8 IN. DIAM. STAINLESS STEEL.
9. ALTERNATE CLEANOUT/SHEAR GATES TO THE DESIGN SHOWN ARE ACCEPTABLE, PROVIDED THEY MEET THE MATERIAL SPECIFICATIONS ABOVE AND HAVE A SIX BOLT, 10 3/8 IN. BOLT CIRCLE FOR BOLTING TO THE FLANGE CONNECTION.
10. SEE THE WSDOT/APWA STANDARD SPECIFICATIONS SECTION 9-05.15 FOR METAL CASTINGS REQUIREMENTS.



CITY OF NORTH BEND

TEE SECTION
SHEAR GATE DETAIL

APPROVED:

MARK RIGOS, P.E.

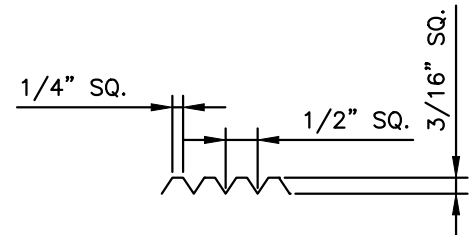
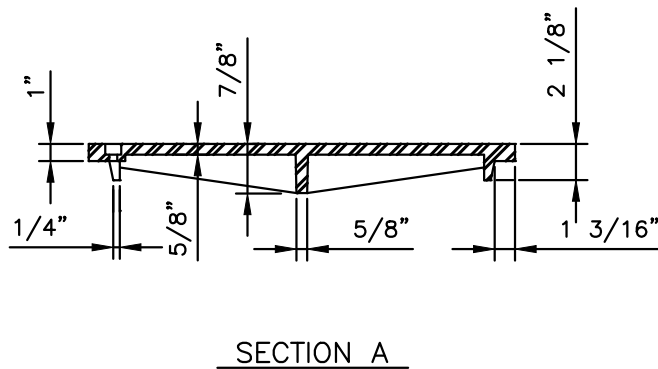
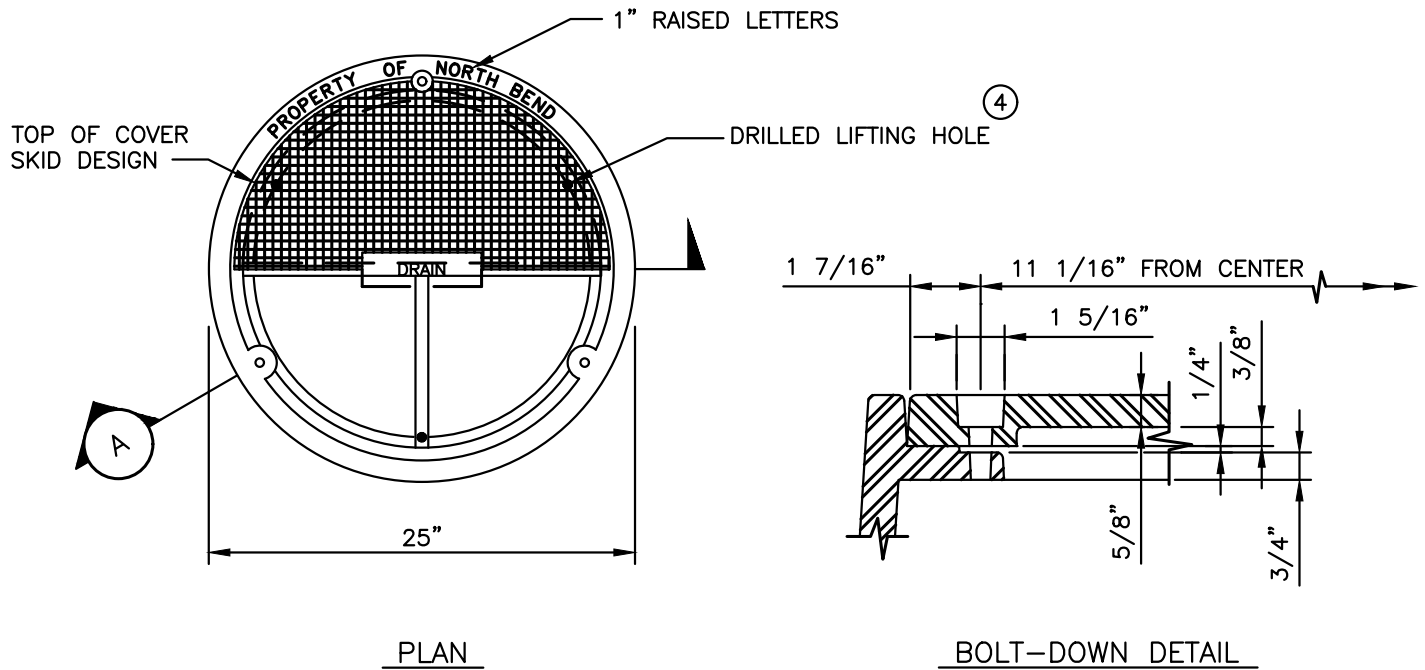
BY CITY

MAY 2018

DATE

DWG. NO.

SD-19



NOTES:

1. USE WITH THREE LOCKING BOLTS 5/8 IN.-11 NC STAINLESS TYPE 304 STEEL SOCKET HEAD (ALLEN HEAD) CAP SCREWS 2 IN. LONG. DRILL HOLES SPACED 120° AT 11 1/16 IN. RADIUS.
2. MATERIAL IS DUCTILE IRON ASTM A536 GRADE 80-55-06.
3. SEE SEC. 7.05.
- ④ DRILL THREE 1 IN. HOLES SPACED AT 120° AND 9 1/2 IN. RADIUS.
5. SEE THE WSDOT/APWA STANDARD SPECIFICATIONS SECTION 9-05.15 FOR METAL CASTINGS REQUIREMENTS.
- 6 ALL LIDS TO BE LOCKING UNLESS APPROVED OTHERWISE.



CITY OF NORTH BEND

24" LOCKING MANHOLE COVER

APPROVED:

MARK RIGOS, P.E.

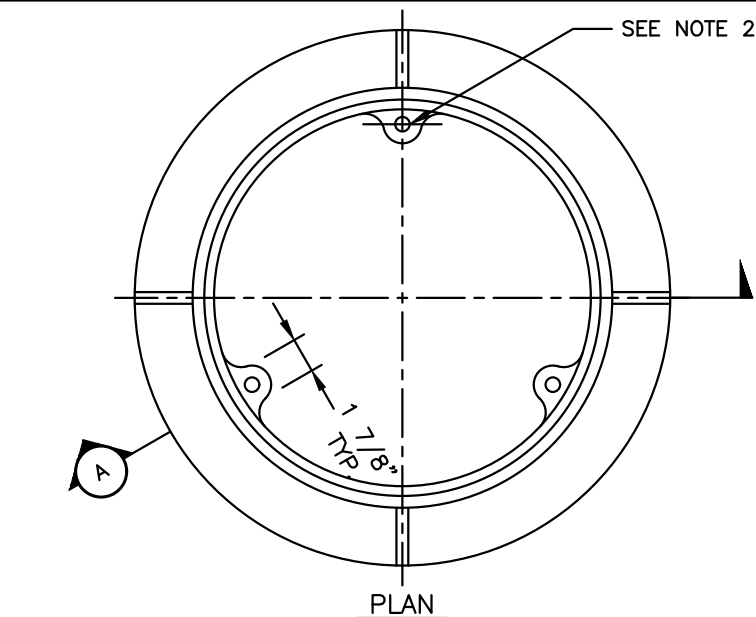
BY CITY

MAY 2018

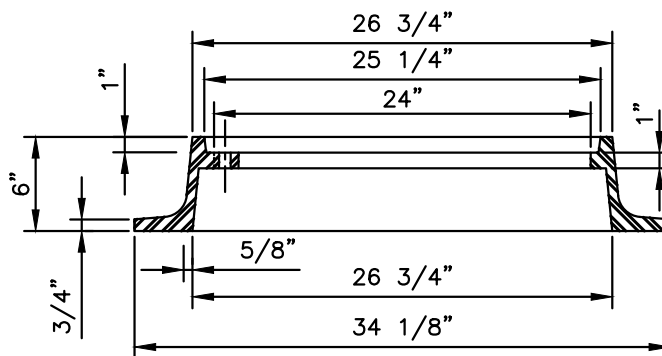
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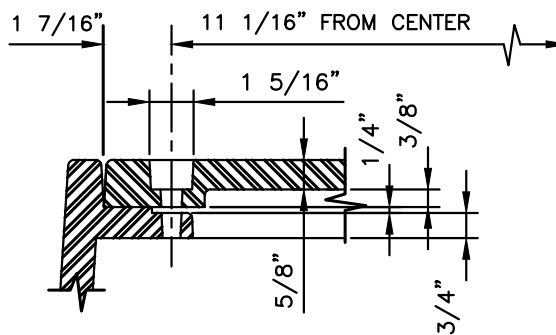
SD-20



PLAN



SECTION A



BOLT-DOWN DETAIL

NOTES:

1. MATERIAL IS CAST IRON ASTM A48 CLASS 30.
2. DRILL AND TAP THREE 5/8 IN.-11 NC HOLES THROUGH FRAME AT 120° AND 11 1/16 IN. RADIUS.
3. SEE SEC. 7.05.
4. SEE THE WSDOT/APWA STANDARD SPECIFICATIONS SECTION 9-05.15 FOR METAL CASTINGS REQUIREMENTS.



CITY OF NORTH BEND

24" LOCKING MANHOLE FRAME

APPROVED:

MARK RIGOS, P.E.

BY CITY

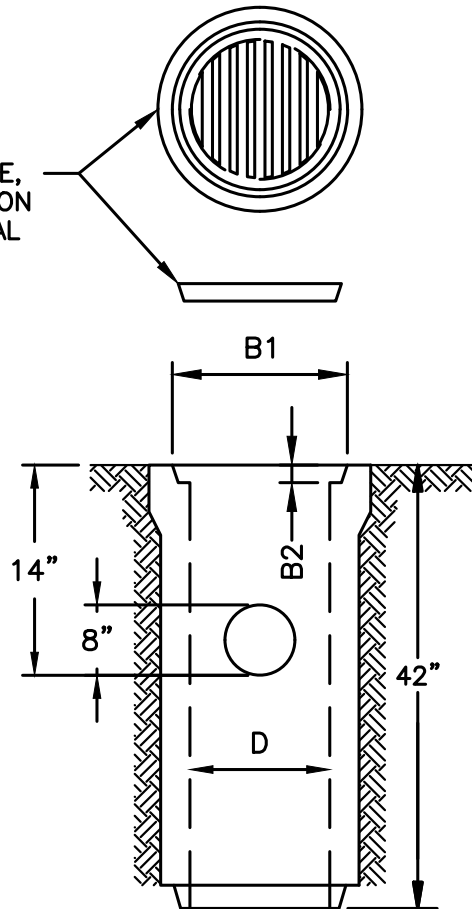
MAY 2018

DATE

DWG. NO.

SD-21

CAST IRON GRATE,
EAST JORDAN IRON
WORKS OR EQUAL



D	B1	B2	FLAT GRATE
12"	16"	3.563"	6012M
15"	19.5"	3.563"	6015M
18"	23"	3.75"	6018M

NOTES:

1. GRATE SHOWN IS FLAT. BEEHIVE GRATE IS OPTIONAL.
2. PLACE CEMENT CONCRETE IN BOTTOM TO FORM FLOOR, IF DESIRED.
3. AREA DRAIN BODY IS MODIFIED CAST CONCRETE BELL/SPIGOT PIPE.
4. 18" CPEP, BASE WITH AN OLYMPIC FOUNDRY LID (PART NO. 10-1800) CAN BE USED AS AN ALTERNATIVE, WITH CITY OF NORTH BEND APPROVAL.



CITY OF NORTH BEND

TYPE 45 AREA DRAIN

APPROVED:

MARK RIGOS, P.E.

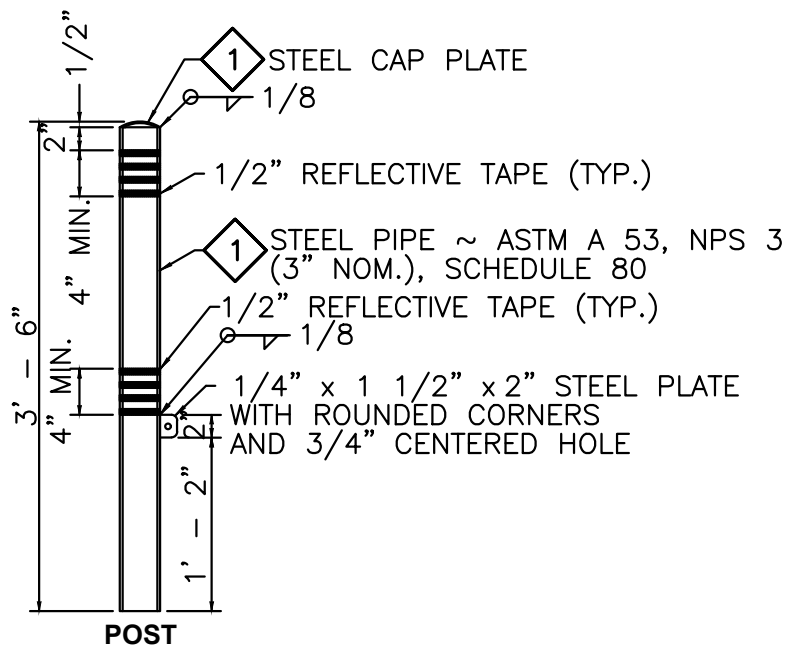
BY CITY

MAY 2018

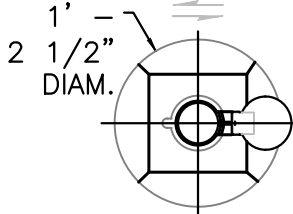
DATE

DWG. NO.

SD-22

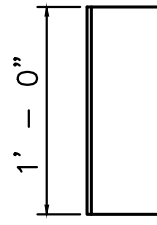


DIRECTION OF PEDESTRIAN/
BICYCLE TRAFFIC

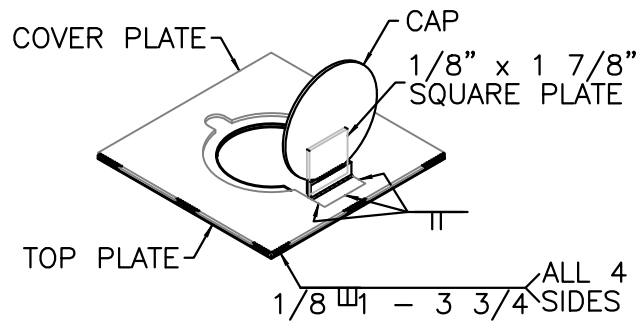
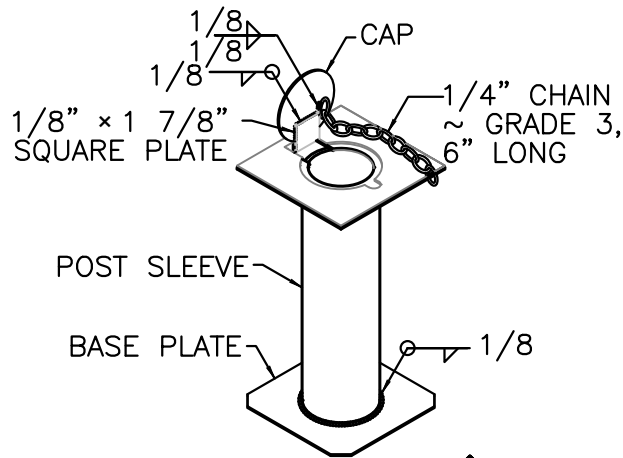


ROUND FOOTING

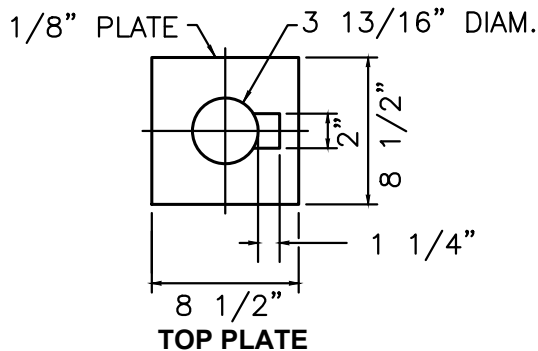
STEEL PIPE ~ ASTM A
53, NPS 4 (4" NOM.),
SCHEDULE 40 ~ WELD
TO TOP PLATE



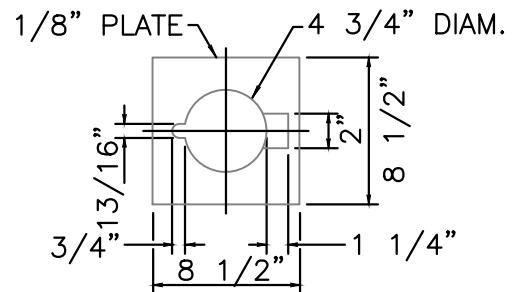
POST SLEEVE



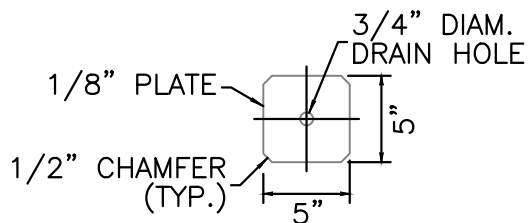
1 BASE ASSEMBLY



TOP PLATE



COVER PLATE



BASE PLATE

NOTES:

1. SEE DETAIL SD-23A FOR POST DETAILS.
2. PLANS TO SPECIFY TYPE AND STYLE USED.

1 PAINT ASSEMBLY WITH A "HIGHLY VISIBLE" COLOR. (SAFETY YELLOW IS ACCEPTABLE)

1 1/4" x 2", FULL SURFACE,
HEAVY DUTY, WELD-ON HINGE



CAP AND HINGE



CITY OF NORTH BEND

STEEL BOLLARD DETAILS

APPROVED:

MARK RIGOS, P.E.

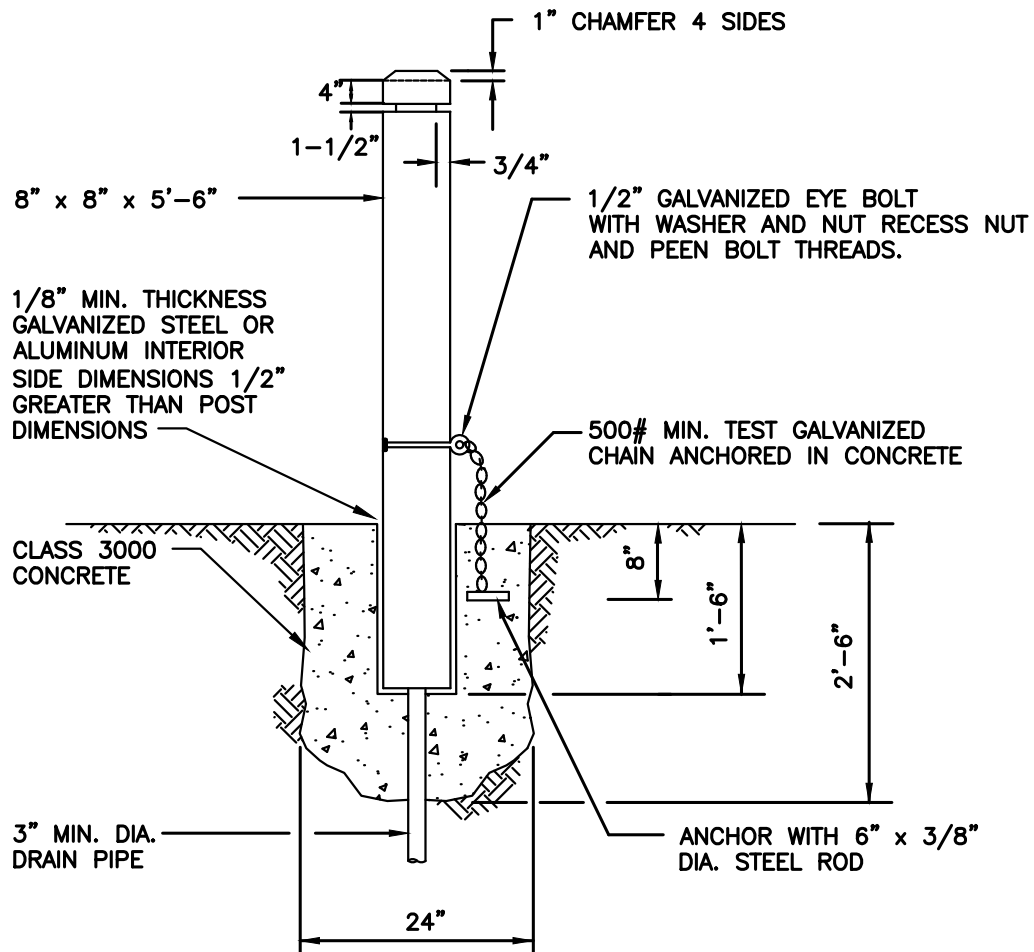
BY CITY

MAY 2018

DATE

DWG. NO.

SD-23B



NOTES:

1. TIMBER SHALL BE DOUGLAS FIR, DENSE CONSTRUCTION GRADE, AND SHALL BE TREATED PER WSDOT 9-09.3.
2. STEEL TUBE SHALL CONFORM TO ASTM 453 OR ASTM A53 GRADE A.
3. NUTS, BOLTS & WASHERS SHALL CONFORM TO WSDOT STANDARD.
4. ALL STEEL PARTS SHALL BE GALVANIZED.
5. PLANS TO SPECIFY TYPE AND STYLE USED.



CITY OF NORTH BEND

REMOVABLE WOODEN BOLLARD

APPROVED:

MARK RIGOS, P.E.

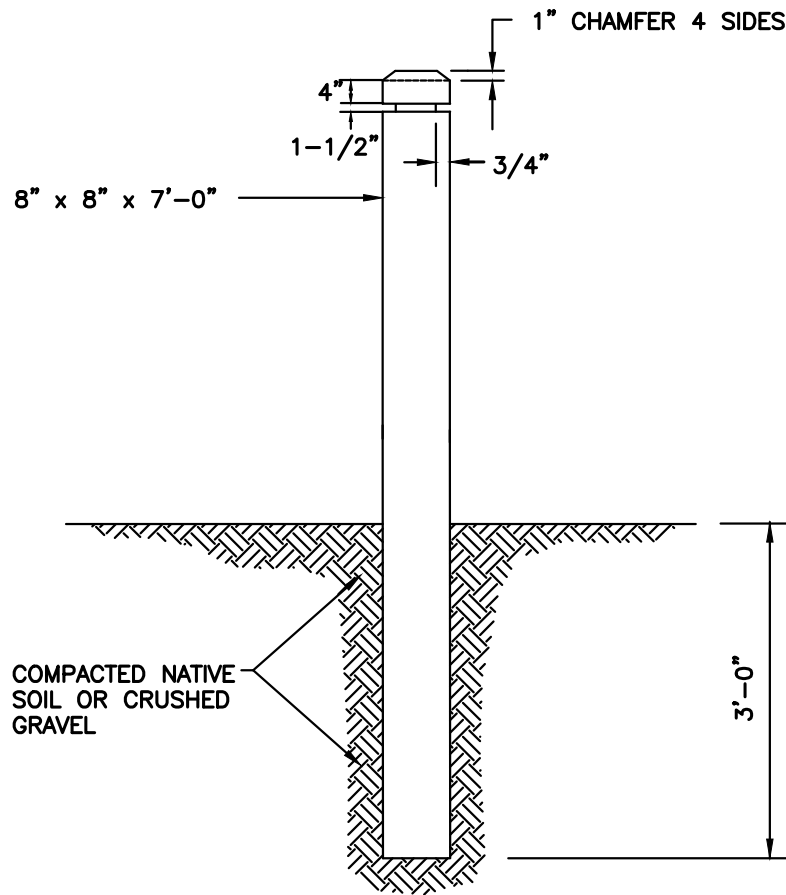
BY CITY

MAY 2018

DATE

DWG. NO.

SD-24



NOTES:

1. TIMBER SHALL BE DOUGLAS FIR, DENSE CONSTRUCTION GRADE, AND SHALL BE TREATED PER WSDOT 9-09.3.
2. PLANS TO SPECIFY TYPE AND STYLE USED.



CITY OF NORTH BEND

PERMANENT WOODEN BOLLARD

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

SD-25

SECTION 6 WATER

Planning, Designing,
and Constructing



Water Systems for
the Production,
Transmission, and

Distribution of Clean
Water ...



SECTION 6 WATER

6.01 General Requirements

A. General

These Engineering Standards set forth minimum standards for the planning, design, and construction of water facilities.

These standards do not include design of special facilities, such as Pump Stations or Reservoirs. These special facilities require unique design requirements and will be subject to individual review by the City.

Although these standards are intended to apply to physical development within the City, the Standards will not apply for all situations. Compliance with these Standards does not relieve the designer of the responsibility to apply conservative and sound professional judgment. These are minimum standards and are intended to assist, but not substitute for competent work by design professionals. The City may at its sole discretion due to special conditions and/or environmental constraints, require more stringent requirements than would normally be required under these Standards.

B. References

Wherever references are made to the standards, specifications, or other published data of the various national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only. As a guide to the user, the following acronyms or abbreviations which may appear shall have the meanings indicated herein:

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute, Inc.
WSDOT	Washington State Department of Transportation
APWA	American Public Works Association
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
DOE	Washington State Department of Ecology
DOH	Washington State Department of Health
UPC	Uniform Plumbing Code
WAC	Washington Administrative Code

C. Governmental Agency Requirements

All construction on City, County or State roads or right-of-way shall be done in accordance with the agency's standards and requirements and in accordance with the franchise and/or permit requirements. The Contractor is responsible to determine these requirements prior to construction.

Where conflict exists between these Standards and permit requirements, the more stringent requirements as determined by the City shall take precedence.

Metal lids, hatches, and manhole covers located in sidewalks, crosswalks, or other pedestrian areas must comply with ADA requirements and have a slip resistant surface.

D. The Reduction of Lead in Drinking Water Act

New USEPA Regulations Regarding Lead-Free Water System Materials

Effective January 4, 2014

The *Reduction of Lead in Drinking Water Act* was enacted on January 4, 2011, to amend Section 1417 of the *Safe Drinking Water Act*, which covers the use and introduction into commerce of lead pipes, plumbing fittings or fixtures, solder and flux. The *Reduction of Lead in Drinking Water Act* changes the *Safe Drinking Water Act* definition of “lead free.” All water system materials installed under these Standards shall comply with the revised Act. The Contractor shall provide Manufacturer’s Certificate of Compliance in accordance with the current edition of the Washington State Standard Specifications for all water system materials to be used. The Certificate must clearly state that the materials furnished comply with “lead-free” requirements of the revised *Safe Drinking Water Act*.

6.02 Plan Submittal

A. General

A submittal checklist is included in the appendices of these standards. Following the standards in accordance with the submittal checklist will help ensure a timely review of the proposed project and keep review costs to a minimum.

B. Water General Plan Notes

A listing of General Notes that must be incorporated on the first water plan sheet is contained in the Appendix. All the notes on the list may not pertain to every project. The Developer should include only those notes that are relevant to the project and may omit non-relevant notes. However, do not renumber the remaining General Notes. If additional notes are needed for specific aspects, they should be added after the General Notes.

C. As-Built Documentation

For all water projects the Developer or City Department responsible for the project shall provide as-built plans at completion of the project, in accordance with Section 3.20.

6.03 Water Planning and Design Standards

A. Planning Criteria

- (1) Serve to Extreme of Property: Ensure adjacent properties can be provided water service (extend to extreme of property with adequate capacity and pressure).
- (2) Demand Projections

Demand projections shall be taken from City of North Bend Water System Plan.

(3) System Parameters

- (a) Water velocity in mains - velocities shall not exceed 8 feet per second during highest demand and fire flow.

- (b) Distribution System Pressures (Measured at Building Elevation):

Desirable	-	Minimum	60 psi
Maximum			80 psi

Allowable	-	Minimum	50 psi
Maximum			100 psi

Minimum 30 psi is allowed for existing systems.

Individual pressure reducing valves are required on all services when water pressure exceeds 80 psi.

- (c) Reservoir Replenishment - Facilities (i.e., transmission mains, pump stations) shall be sized to enable storage facilities to be refilled within 72 hours after an emergency or major fire.

(4) Fire Flow Requirements

Fire flow requirements shall be as determined by City of North Bend Fire Marshal.

- (a) The City will determine available fire flow using its computer model.
- (b) The distribution system shall maintain a minimum pressure of 20 psi throughout the system, under maximum day demand (MDD) during fire flow conditions.

B. General Design Standards

- (1) Each fitting/valve shall have attachment type listed (e.g. FL, MJ, FL x MJ, etc.).
- (2) List pipe length (from center-of-fitting to center-of-fitting), size, and material along side of each pipe, e.g., 150 LF – 8-INCH D.I. Pipe material can be listed in a general note in lieu of listing along each pipe run.
- (3) Indicate type of pavement restoration required by right-of-way authority having jurisdiction (if working in existing streets).
- (4) Dimension existing and new main locations from right-of-way line and/or property line, or label stations and offsets.
- (5) Blocking: Reference Standard Details
- (a) At vertical bends, pipe shall be restrained a minimum of 36 feet (two joints) from each side of bend. Reduced-size concrete blocks shall be installed at bends per Standard Detail W-2. No change in pipe direction or diameter shall occur within 36 feet of the vertical bend. In addition, bends, tees, reducers, etc., beyond the

36-foot limit, shall be restrained with standard blocking per Standard Detail W-1 and W-3. Where these criteria cannot be met, plans should call for vertical blocking without joint restraint per Standard Detail W-3, or a restraint method should be designed and detailed on the plan.

- (b) Check if special blocking or joint restraint designs are necessary (e.g., poor soil, conflicting utility, etc.).
 - (c) Show all blocking on any detail drawing that shows vertical bends.
 - (d) See Appendix 6-2 – Approved Materials List for joint restraint methods, other than concrete blocking.
- (6) Check if system may require additional looping (i.e., eliminate dead end lines).
- (7) To assure compatibility with existing system, check with Public Works Department to determine hydraulic gradients.
- (8) Drawings shall reference distance to nearest existing valve and/or hydrant from new point of connection to existing water main.
- (9) Check with local jurisdiction for necessary permitting requirements.
- (10) Provide temporary 2-inch blow off assemblies for testing and disinfection of new water mains (where hydrants are not available). Place blowoff at high end of line, where possible.
- (11) Cap end of existing water lines to be abandoned as follows:
 - (a) Asbestos cement lines: use end cap coupling.
 - (b) Cast or ductile iron lines: use MJ cap or plug.
- (12) Minimum water main size
 - (a) 8 inch minimum when serving fire hydrants.
 - (b) 6 inch minimum may be used in localized conditions where fire hydrants are served by looped lines, subject to approval.
 - (c) 4 inch minimum shall be used to serve water to end of cul-de-sac when no future extension is required.
- (13) Pressure reducing station plans shall show location of pressure relief discharge pipe and discharge point of floor drain piping (drain to daylight). Pressure relief discharge pipe shall be shown at a location that will not be subject to damage or erosion during discharge of water.

- (14) All water vaults (water service, backflow assembly, pressure reducing station, etc.) shall include designs for floor drain piping draining to daylight, or if daylight is not feasible, to the storm system. Discharge point of vault floor drains shall be shown on the plan. Where vault floor drain cannot drain to daylight or the storm system, consult with the City during project design review to determine the best alternative.

Exception: Outside-installed Reduced Pressure Backflow Assemblies (RPBA) shall be installed in above-ground enclosures. The following drain requirements shall apply to enclosures. RPBA shall not be installed in vaults. Each enclosure design shall be as approved by the City. Floor drains for RPBA shall not connect to closed storm drain systems. All RPBA enclosures shall be provided with a bore sighted daylight drain. This bore sighted drain to daylight shall be clearly visible end to end, sized to meet the flow requirements of the RPBA relief vent.

- (15) Placement of surface appurtenances (manhole lids, water valve lids, etc.) in tire track of traffic lanes shall be avoided whenever possible. Meter vaults shall be located outside the sidewalk whenever possible.
- (16) Service connections or water utility distribution system piping shall not be used for grounding of electrical systems or for the maintenance, integrity or continuity of any grounding attachment or connection.
- (17) Manufacturer's certification of testing and accuracy shall be provided for all commercial meter installations.

C. Valving

- (1) 600 foot maximum distance between valves on distribution mains, except, in the Central Business District (CBD), maximum valve spacing shall be 200 feet.
- (2) Provide a valve at each end of an easement.
- (3) At water main intersections, valves shall be placed on four out of four legs at each cross, and three out of three legs at each tee (unless tapping an existing water main).
- (4) For all fire service connections greater than 3 inches in diameter, isolation valves shall be installed on all three legs of the tee. Tapping tees are not allowed for fire service connections greater than 2 inches in diameter.
- (5) For all domestic water service connections greater than 2 inches in diameter, isolation valves shall be installed on all legs of the tee. Tapping tees are not to be used for domestic service connections greater than 2 inches in diameter.
- (6) Additional valving may be required for area isolation.
- (7) Air/vacuum relief valves shall be installed at local high points in water main.

D. Fire Hydrants

The following information is provided as a guideline to be used during design. The final number of hydrants and their location shall be approved by the City Fire Marshal. All fire hydrants shall be pressure tested prior to issuance of building permits.

- (1) Guard posts are to be used only in parking lots when no curbs are present or in exposed areas in parking lots.
- (2) Fire line/hydrant run over 50 feet in length must be 8 inches (terminate with tee, plug and hydrant assembly).
- (3) Fire hydrant location:
 - (a) Single-family residential: Spacing = 500 feet apart. Coverage = 250 feet from front property line of the main body of a lot.
 - (b) Multi-family/commercial: As determined by the Fire Marshall.
 - (c) Exception: On arterial streets without residential access (through traffic only), maximum hydrant spacing shall be 1,000 feet.
 - (d) On dead-end streets, reduce single-family residential spacing shall be 400 feet.
- (4) 3-feet minimum clearance shall be provided around outside of hydrant for operation. Provide 5-foot horizontal clearance from the outside of the hydrant to concrete walls, structures, utility poles and above-ground electrical enclosures.
- (5) Where feasible, fire hydrants shall be installed on the same side of the street as the water main.
- (6) Private Fire Hydrants and Fire Protection Waterline:
 - (a) When a fire hydrant is to be installed on commercial, multi-family and institutional property, outside of the right-of-way or designated public water utility easements, and the fire hydrant is intended to provide fire protection for only that property, the fire hydrant and the waterline serving the fire hydrant shall be privately owned and maintained by the benefitting property owner. Such water line and fire hydrant are considered to part of the benefitting property's fire protection system and shall be designated on the approved construction drawings and the City's as-built drawings as "PRIVATE" or "PVT."
 - (b) The private water line that serves the private fire hydrant and/or the fire sprinkler system shall be owned by the benefitting property owner beginning immediately downstream of the valve where the private water line connects to the public water main. Connection shall include, at a minimum, a Double Check Valve Assembly (DCVA).
 - (c) The private fire hydrant and private water line (fire protection system) shall be designed and constructed in accordance with the fire hydrant and water main standards herein. No domestic, irrigation, or industrial water services shall be

connected to the fire protection system.

- (d) The benefitting property owner shall have the responsibility for all maintenance, repair, annual testing and flushing of the fire protection system in accordance with the fire system maintenance standards set forth by the Fire Marshall. At the time of permit issuance, the property owner/applicant shall execute an agreement acknowledging that the property owner/applicant shall be responsible for the proper maintenance and repair of the fire protection system.
- (e) If the fire protection system is contributing to a water quality issue, the property owner/applicant may be required to conduct more frequent flushing of the fire protection system or install a backflow assembly, at the discretion of the City.

E. Pipe Class, Protection, and Cover

- (1) Pipe shall be ductile iron, class 52.
- (2) Ductile iron pipe shall be encased in a steel or ductile iron casing when crossing under improvements where the ability to remove and replace pipe without disturbance to the improvement is needed. Casings are required when:
 - (a) Crossing under rockeries over 4-feet high.
 - (b) Crossing under retaining wall footings over 4-feet wide.
 - (c) Crossing under reinforced earth retaining walls (both wall and reinforcing material).

Casings shall extend a minimum of 5 feet past each edge of the improvement, or a distance equal to the depth of pipe whichever is greater. The carrier pipe shall be supported by casing spacers, where casing length exceeds 10 feet.

Minimum clearance between bottom of rockery and top of pipe or casing shall be 2 feet. The trench shall be backfilled with crushed rock.

- (3) Water main depth of cover:
 - (a) 3 feet minimum from final grade (see exception in 6.03 E.(4)(d) below).
 - (b) 6 feet maximum from final grade.
- (4) Building setback requirements:
 - (a) 5 feet minimum from covered parking to water main.
 - (b) 10 feet minimum from building (and retaining walls) to water main.
 - (c) 20 feet minimum easement shall be provided between buildings.
 - (d) When passing between buildings which are 25 feet apart or less, ductile iron pipe shall be installed with 2 feet of pipe cover (5 feet beyond the limits of each

building).

- (5) All pipe, fittings and hardware immersed inside water reservoirs shall be stainless steel.

F. Clearances/Other Utilities

- (1) All clearances listed below are from edge-to-edge of each pipe.
- (2) Water services and sewer stubs shall have at least 5-foot horizontal separation.
- (3) Check for crossing or parallel utilities. Maintain minimum vertical and horizontal clearances. Avoid crossing at highly acute angles (smallest angle measure between utilities should be between 45 and 90 degrees).
- (4) At points where thrust blocking is required, minimum clearance between the concrete blocking and other buried utilities or structures shall be 5'.

- (5) Horizontal clearances from water main:

• Cable TV	5 feet
• Gas	5 feet
• Power	5 feet
• Storm	5 feet
• Sanitary	10 feet
• Telephone, Fiber Optics	5 feet

- (6) Vertical clearances from water main:

• Cable TV	1 foot
• Gas	1 foot
• Power	1 foot
• Storm	1 foot
• Sanitary	2 feet
• Telephone, Fiber Optics	1 foot

- (7) Where water main crosses above or below sanitary sewer, one full length of water pipe shall be used with the pipes centered for maximum joint separation. Washington Department of Ecology criteria will also apply.
- (8) Send letter and preliminary plan to existing utilities to inform them of new construction. Request as-built information and incorporate into plans. At minimum the following utilities should be contacted:

• Cable Television
• Natural Gas
• Power
• Sanitary Sewer
• Storm Drainage
• Telephone, Fiber Optics

- (9) Draft plans shall be sent to the above listed utilities to allow coordination of projects.

G. Slopes

- (1) Vertical bends shall be used when joint deflection would exceed one-half of pipe manufacturer's recommended maximum deflection.
- (2) Pipe joints shall be restrained where slopes are 20 percent or greater. Joint restraint on slopes shall be "megalug" restrainer for mechanical joint fittings and tie rod/retainer clamp assemblies for DI push-on joints, or other methods from approved materials list.
- (3) Where pipe are proposed on hills or steep slopes, the Director shall determine if the pipe location and configuration will be allowed. If allowed, the Developer's engineer shall propose design details reasonably acceptable to the Director for permanently securing and anchoring the pipe.

H. Connections to Existing System

- (1) When authorized by the City, water mains shall be tapped using stainless steel, full-bodied cast iron Mueller-type tapping tee, or ductile iron mechanical joint tapping tees with outlet flange.
- (2) Connections to existing mains 8 inches and larger shall be via a wet tap unless otherwise approved by the City. If a wet tap is authorized, it shall be a minimum of one pipe size smaller than the existing main.
- (3) Size-on-size tapping tees are not allowed, unless a shell cutter, one size smaller than the existing main, is used.
- (4) Connections to existing mains smaller than 8-inch diameter shall be made by cutting in a tee, unless otherwise approved by the City.
- (5) Where cut-in connection is made for all commercial, multi-family, institutional and school connections, always install two in-line gate valves.
- (6) In the Central Business District (CBD), 3-inch, 4-inch and 6-inch domestic service and fire sprinkler lines shall connect to the existing water main with 8-inch pipe and 8-inch gate valve sizes. Extend 8-inch pipe from water main to vault before reducing to service/fire line size. No tapping tees or sleeves are allowed.
- (7) Any property owner who plans to demolish or remove any structure connected to the public water system shall notify the City and complete a Utility Abandonment form prior to the commencement of such work. The City will determine whether the water service can be reused (if sufficiently sized for the new use). If the City determines that the water service cannot be reused, the property owner must pay for abandonment or upgrade of the water service through a water service application or through a water system extension agreement for new site improvements.
- (8) Do not connect water system to private sewer pump stations.

I. Easements

- (1) Show easements on plans and identify width.
- (2) Show easements on all private property. If easement is defined as a constant width on each side of water main, then show a segment of the easement and label as “Typical” (typ).
- (3) All easements shall be a minimum of 15 feet in width, unless otherwise approved or required by the City.
- (4) A 20-foot minimum easement shall be provided between buildings.
- (5) Also see Section 6.03 E(4). “Building Setback Requirements.”
- (6) Easement Documentation Requirements:
 - (a) All easements shall be shown on the project plans and identified as “private” or “public”, together with the width dimension and utility use, (e.g., 20-foot Public Water Easement).
 - (b) All documents for public easements shall conform to these Standards, will be provided on the City’s easement template and shall comply with King County Recorder’s Office formatting requirements. Include the King County tax parcel number(s), site address, owner names and site legal description. All pages must be numbered.
 - (c) Easements shall be dedicated to and approved by the City prior to acceptance of a public water system. The Grantee shall be the “City of North Bend, a Washington municipal corporation, its heirs, successors and assigns”. The City may require indemnification agreements to hold the City harmless where maintenance access across private property is deemed necessary.
 - (d) The description contained within the easement document shall be prepared and stamped by a land surveyor licensed in the State of Washington. The description shall be identified as an Exhibit, together with the title of the utility use, (e.g., Permanent Public Water Utility Easement). The description shall be clearly written and referenced to the underlying property. The description shall be accompanied by an additional graphic Exhibit which depicts a scaled drawing of the easement location relative to the subject parcel.
 - (e) Off-site easements shall be delivered to the City prior to issuing a Notification to Proceed with construction. Submittal of on-site easements may be delayed until completion of construction requirements.
 - (f) Bill of Sale for all utility facilities appurtenant to public easements or tracts shall be given to the City.

J. Services

- (1) Minimum allowable service size shall be 1" x 1". Check that minimum pressure can be maintained when service is flowing at anticipated maximum levels. If friction losses will cause pressure at building to drop below minimum, increase service line size as necessary to raise pressure.
- (2) Show location of water services on plan and indicate size. Sizes shall be determined by the Developer per the Uniform Plumbing Code. **Minimum service size for all commercial and multi-family customers is 1" x 1".**
- (3) Fire and irrigation lines shall be by separate water main connection and service. Single family domestic services are not required to have separate water main connections.
- (4) Static service pressures at ground floor elevation shall be determined at all lots/buildings to ensure compliance with system pressure standards.
- (5) Plan shall identify lots/buildings where builder/owner should install individual pressure reducing valves. PRVs are required on customer side of service lines (after water meter box) when service pressures exceed 80 psi.
- (6) 3-inch through 8-inch service installations shall include full-size bypass per Standard Details.
- (7) For commercial and multi-family customers, domestic services, 1-1/2 inch and larger, that connect to an existing water main with a cut-in tee, shall include a gate valve on each leg of the tee. If the building is served by a second full-size service, that can remain in service while the water main supplying the other service is shut down, only one mainline and one branch-line valve will be required with the cut-in tee connection.
- (8) All new mixed-use buildings shall have separate meters for the multi-family portion and the commercial portion of the building.
- (9) If a customer needs a larger size service, the customer is responsible for up size, up-size charges, and abandonment of existing connection.

K. Backflow Prevention

Per 13.16 NBMC, irrigation systems, fire sprinkler systems, and other water uses which may or will cause the contamination of the potable water supply by backflow, shall be required to install approved backflow prevention assemblies, and/or otherwise meet the requirements of the WAC 246-290-490 "Cross Connection Control Regulation in Washington State," and the recommendations of the PNWS-AWWA Cross Connection Control Manual, latest edition. Requirements may include premise isolation, point of use protection, or a combination. All backflow prevention assemblies installed shall be on the Washington State DOH list of approved backflow prevention assemblies, most recent edition at the time of installation, and shall be installed as approved by Washington State Dept. of Health and as shown in the Standard Details.

Reduced Pressure Principle Backflow Assembly (RPBA) installations that differ from the Standard Details W-46, W-47, and W-48 must be approved by the Director, and will be reviewed on a case-by-case basis to ensure current minimum requirements for installation and freeze point

protection are met.

Satisfactory testing shall be completed upon installation, repair, or relocation of all backflow assemblies, and annually thereafter. A completed test report must be submitted to the City or plumbing inspector of record prior to final acceptance.

Fire sprinkler system connections to the City's water system shall be owned and maintained by the property owner, beginning immediately downstream of the gate valve where the system connects to the City's water main.

The backflow prevention assembly on fire system connections shall be located as close to the serving water main as possible, no more than 50 feet from the water main without prior City approval, either on the owner's property or an easement dedicated to the owner's property. A Double Check Detector Assembly is required on all fire lines, other than privately owned fire hydrants, that are 3 inches and larger (applies to both interior and exterior assemblies).

Interior backflow prevention, when permitted, must meet the Uniform Plumbing Code requirements as administered by the Building Division. Such backflow prevention must also meet the requirements of the Public Works Department.

Multi-family projects that have eight or more units and that require a double check valve assembly are strongly recommended to provide a bypass with equal backflow prevention to avoid loss of service during maintenance and repair.

Premise isolation at the water meter by an approved air gap or a reduced pressure backflow assembly (RPBA) is required for all sites utilizing an auxiliary supply (i.e., on-site well, pond, etc.) regardless of whether there is a cross connection between the auxiliary and public water system.

All multiple use buildings are required to have a reduced pressure backflow assembly (RPBA) for premise isolation.

6.04 Water Materials

A. General

All materials shall be new and undamaged. The same manufacturer of each item shall be used throughout the work.

Where reference is made to other specifications, it shall be the latest revision at the time of construction, except as noted on the plans or herein.

All materials not specifically referenced shall comply with applicable sections of ANSI, ASTM, AWWA or the APWA/WSDOT Standard Specifications.

Approved manufacturers and model numbers of various materials are listed in Appendix 6-2 of these Engineering Standards. When specific manufacturers or models are listed, no substitutions will be allowed without prior approval by the City.

B. Water Pipe

Water pipe shall be ductile iron pipe, minimum thickness Class 52, cement-lined unless otherwise specified and shall conform to ANSI/AWWA C151/A21.51 or as shown on plans.

Rubber gasket pipe joints to be push-on-joint (Tyton) or mechanical joint (M.J.) in accordance with ANSI/AWWA C111/A21.11, unless otherwise specified.

Flanged joints shall conform to ANSI B16.1, class 125 drilling pattern, rated for 250 psi working pressure.

Standard thickness cement lining shall be in accordance with ANSI/AWWA C104/A21.4.

The Contractor shall furnish certification from the manufacturer of the pipe and gasket being supplied that the inspection and all of the specified tests have been made and the results thereof comply with the requirements of the above referenced standards.

C. Polyethylene Encasement

Polyethylene encasement shall be eight mil tube or sheet and shall be furnished with all ductile iron pipe when corrosive soil conditions are present. Materials shall comply with ANSI/AWWA C105/A21.5.

D. Fittings

All water main fittings shall be ductile iron, short body, cement lined, and for pressure rating of 350 psi for mechanical joint fittings and 250 psi for flange joint fittings, unless otherwise noted. Metal thickness and manufacturing process shall conform to applicable portions of ANSI/AWWA C110/A21.10. Mechanical joint, ductile iron, compact fittings 24 inches and less shall be in accordance with ANSI/AWWA C153/A21.53. Flanged fittings, cast or ductile iron, shall conform to ANSI B16.1, class 125 drilling pattern.

Standard cement lining shall be in accordance with ANSI/AWWA C104/A21.4.

Rubber gaskets for push-on-joints (Tyton) or mechanical joint (M.J.) shall be in accordance with ANSI/AWWA C111/A21.11.

Gasket material for flanges shall be neoprene, Buna N, chlorinated butyl, or cloth-inserted rubber.

Type of connections shall be specified as push-on joint (Tyton), mechanical joint (M.J.), plain end (P.E.), flanged (FL), and threaded.

E. Galvanized Iron Pipe

Where galvanized iron pipe is specified, the pipe shall be standard weight, Schedule 40, steel pipe per Standard Specification for black and hot-dipped, zinc-coated (galvanized) welded and seamless steel pipe for ordinary uses (ASTM A-120). Fittings shall be screwed malleable iron galvanized per ANSI B16.3. Galvanized pipe shall be used only for dry pipe in pressure relief vacuum breaker assemblies.

F. Couplings

Flexible coupling and transition coupling cast components shall be ductile iron. Center rings and end rings shall be ductile iron in accordance with ASTM 536-80, Grade 65-45-12.

Gasket material shall be virgin SBR in accordance with ASTM D2000 MBA 710.

Bolts shall be high strength, low alloy steel trackhead bolts with national course rolled thread and heavy hex nuts. Steel shall meet ANSI/AWWA C111/A21.11 composition specifications.

G. Adapters

All flange by mechanical joint (FL x MJ) adapters shall be ductile iron.

H. Bolts in Piping

Bolts shall be malleable iron, Cor-ten, or stainless steel.

Bolts and nuts for flanged pipe and fittings shall conform in size and length with ANSI/AWWA C115/A21.15. T-bolts shall be malleable iron or Cor-ten in accordance with ANSI/AWWA C111/A21.11. Stainless steel bolts shall meet the requirements of ASTM A-307, Grade A. Shackle rods shall be stainless steel all thread 316SS.

Stainless steel nuts, bolts and washers shall be type 316SS.

I. Flange Gaskets

Gasket Material shall be neoprene, Buna N, chlorinated butyl, or cloth inserted rubber.

J. Gate Valve

The minimum requirements for all gate valves shall, in design, material and workmanship, conform to the following Standards:

- 2" to 12" Cast Iron: AWWA C-509
- 4" to 12" Ductile Iron: AWWA C-515
- 14" to 24" Ductile Iron: AWWA C-515
- 30" to 36" Ductile Iron: AWWA C-515
- 42" to 48" Ductile Iron: AWWA C-515

Buried gate valves shall be iron body, bronze mounted, resilient seat, and non-rising stem, suitable for installation with the type and class of pipe being installed. Ends to be as specified. Operating stems shall be equipped with standard 2-inch operation nut, and O-ring stem seals. Valves not buried shall be as specified.

K. Valve Box

Valve Box shall be cast iron, two-piece, 8-inch or 18-inch slip type top section with flange located within 3 inches of top, with 24-inch bottom section (and extension, if required), equal to RICH - Seattle Type. Valve box lid shall be cast iron, 3-inches deep, with recessed lifting handle,

and the word “WATER” or “WW” cast into it.

Valve box paving risers shall be cast iron suitable for H-20 traffic loading. The riser shall have four lugs or a flange around the perimeter, and be sized to fit into a RICH - Seattle Type valve box top.

Valve box adjusting sleeves (for use in unimproved areas) shall be cast iron, 12" long.

All castings shall be coated with asphaltic varnish.

L. Valve Operating Nut Extension

Use where valves are installed more than 3 feet below finished grade. Extensions are to be a minimum of 1 foot with only one extension per valve. See Standard Detail.

M. Butterfly Valve

Butterfly valves shall conform to ANSI/AWWA C504, Class 150B. Valves in chambers shall have a manual handwheel operation. Buried valves shall have a stem extension with AWWA 2-inch operating nut and suitable valve box. Butterfly valves will be required for all lines 12 inches or larger.

N. Check Valve

Check valves shall be for 150 psi working pressure, unless otherwise specified. Valve shall have adjustable tension lever and spring to provide non-slamming action under all conditions unless otherwise specified.

O. Air and Vacuum Release Valve

Combination Air Valves shall be of the single housing style that combines the operating features of both an Air/Vacuum and Air Release Valve.

The Air/Vacuum portion shall automatically exhaust air during the filling of the pipeline and automatically allow air to re-enter the pipeline when the internal pressure of the pipeline approaches a negative value due to column separation, draining of the pipeline, power outage, pipeline break, etc.

The Air Release portion shall automatically release small pockets of air from the pipeline while the pipeline is in operation and under pressure, and during filling of the pipeline.

The Combination Air Valve shall have minimum 1-inch NPT inlet and outlet connections and be able to withstand a working pressure of 300 psi.

The valve body and cover shall be cast iron with stainless steel float.

P. Pressure Reducing Station

Unless otherwise shown on the construction plans, a standard pressure reducing station shall have a 6-inch pressure reducing valve with flanged ends and a bypass with a 2-inch pressure reducing valve with threaded ends. Pressure reducing valves shall have opening/closing speed controls,

epoxy coated body, and valve position indicator. Pressure reducing valves and pressure relief valves shall be equipped with stainless steel trim (seat, stem, and cover bearing). Pilot controls shall be on the side of the pressure reducing valve facing vault interior. Each pressure reducing valve shall include two 3/8-inch test cocks located on the opposite side of valve body from the pilot controls (one at inlet and one at outlet end of valve).

Strainers shall be installed on the inlet side of each pressure reducing valve with bronze ball valve sized to correspond with the strainer blowoff outlet size. A 2-inch pressure relief valve with threaded ends shall be installed on the discharge side of the 2-inch pressure reducing valve line and vented to atmosphere as shown on the plans.

The pressure reducing valve shall maintain a constant downstream pressure regardless of varying inlet pressure. The valve shall be a hydraulically operated diaphragm-actuated, globe valve. The pilot control shall be a direct-acting, adjustable, spring loaded, normally open, diaphragm valve, designed to permit flow when controlled pressure is less than the spring setting. The control system shall include a fixed orifice.

The pressure relief valve shall maintain constant upstream pressure by by-passing or relieving excess pressure, and shall maintain close pressure limits without causing surges. The main valve shall be hydraulically operated, diaphragm-actuated, globe valve. The pilot control shall be a direct acting, adjustable, spring loaded, diaphragm valve, designed to permit flow when controlling pressure exceeds spring setting. The pilot control system shall operate such that as excess line pressure is dissipated the main valve shall gradually close to a positive, drip-tight seating.

All diaphragm-actuated valves shall contain a resilient, synthetic rubber disc, having a rectangular cross-section, contained on three and one-half sides by a disc retainer and forming a tight seal against a single removable seat insert. The diaphragm assembly containing a valve stem shall be fully guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. This diaphragm assembly shall be the only moving part and shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. The diaphragm shall consist of nylon fabric bonded with synthetic rubber and shall not be used as a seating surface. Packing glands and/or stuffing boxes are not permitted and there shall be no pistons operating the valve or pilot controls. All necessary repairs shall be possible without removing the valve from the line.

Strainers 2 inches and smaller shall be iron bodied "Y" type equal in size to corresponding pressure reducing valve. Strainers 3 inches and larger shall be Cla-Val X43H "H" style strainers. Strainer shall feature bolted cover machined to hold screen securely in place and tapped F.I.P.T. for blowoff outlet. Screens 2 inches and smaller shall be constructed from perforated stainless steel. Main-line strainer shall have flanged-ends and bypass strainer shall have threaded ends.

The vault shall be equal to Utility Vault Co. model 777-LA with cover as specified in the Standard Detail. Vault exterior shall be coated with a single component, moisture curing urethane with micaceous iron oxide applied at 5 to 7 micron dry film thickness per coat, two coats minimum, Sherwin-Williams Corothane 1-Coal Tar, or equal. Vault interior shall not be coated.

Q. Lids, Hatches, and Covers – Slip Resistance

Metal lids, hatches and access covers shall be constructed with a non-slip treatment having a coefficient of friction between 0.6 and 1.0 wet, as determined by ASTM C1028-89. Lids, hatches and access covers located on slopes of 4 percent or greater shall have a coefficient of friction

between 0.8 and 1.0 wet, as determined by ASTM C1028-89. Prior to installation, the Contractor shall supply the Engineer with a shop drawing of the appurtenance, specifying a coefficient of friction meeting or exceeding the above requirement.

R. Fire Hydrant

Fire Hydrants shall have a minimum valve opening of 5-1/4-inch "O" ring stem seal, two 2-1/2-inch N.S.T. hose nozzle connections, and one 4-inch pumper connection with City of Seattle standard threads. The shoe connection, foot valve connection, and all joints between shall be six-inch mechanical joint with lugs. The operating and port cap nuts are 1-1/4-inch pentagonal. Hydrants shall be as shown in the approved materials list, with no exceptions unless approved by the Engineer. All hydrants shall be of the "Traffic Model" type with approved break-away features and brass to brass sub-seat. Shackle rods are not permitted on hydrants.

The portion of the public fire hydrant that is above ground shall be painted with two coats of Rust-Oleum, Krylon, or Sherwin-Williams Safety Yellow paint as set forth by the City of North Bend Fire Marshall.

The portion of the private fire hydrant that is above ground shall be painted with two coats of Rust-Oleum, Krylon, or Sherwin-Williams Red paint as set forth by the City of North Bend Fire Marshall.

S. Hydrant Guard Posts

Hydrant guard posts shall be 6-inch-diameter concrete filled ductile iron pipe class 52, 6-feet long. Pipe shall be painted with two coats of Rust-Oleum, Krylon, or Sherwin Williams Safety Yellow paint.

T. Meter Setter

Meter setters shall have double purpose couplings, unless otherwise specified, and angle meter valve with drilled wings for padlock, 12-inches high. The angle copper setter for the size meter to be installed, see Standard Details.

1-1/2-inch meter setters shall have vertical inlet and outlet tees with 1-inch lateral bypass, flanged ball meter valves on inlet and outlet, ball valve on bypass, and padlock wings on all valves, see Standard Details.

2-inch meter setters shall have vertical inlet and outlet tees with 1-inch lateral bypass, flanged ball meter valve on inlet, flanged key meter valve on outlet, ball valve on bypass, and padlock wings on all valves, see Standard Details.

U. Corporation Stop

Corporation stops shall be brass in accordance with AWWA Standard C800 with AWWA tapered thread (CC) inlet by compression fitting for copper outlet, complete with coupling nut for copper service.

Corporation stops for 1-inch, 1-1/2-inch, and 2-inch tap shall be the ball valve type.

V. Meter Box

Cast iron, steel and plastic composite meter boxes with non-slip ductile iron lid as specified in the Standard Details. Meters shall be centered in box.

W. Plastic Service Pipe

All joints with plastic pipe shall be made utilizing stainless steel inserts along with couplings or adapters.

Materials: Pipe shall meet the requirements of the standard specifications of Section 9-30.6(3)B and shall be Pure Blue Core as manufactured by JM Eagle or equal. Pipe shall be manufactured from ultrahigh molecular weight, high density polyethylene resin PE 3408. It shall meet the requirements of AWWA C901 and ASTM D-2239 or ASTM D-3727.

Marking: Pipe shall be permanently imprinted with manufacturer's brand name, pipe size, product standard (pipe only), identification of the NSF approval, ASTM specification, recommended working pressure, and production code. Letters shall be at least 3/16-inch high and should appear on the pipe at intervals no less than every 24 inches.

Dimensions: Pipe dimensions and tolerances shall correspond with the values listed in ASTM-D-2239 for flexible plastic pipe with a standard dimension ratio (SDR) of 7. I.P.S.

Working Pressure: Pipe shall have working pressure of 200 psi at 73.4 degrees F.

X. Pipe Insulation

All pipe for above ground service shall have 2-inch-thick foam insulation with an aluminum jacket. Foam insulation and aluminum jacket shall conform to the following:

Foam insulation shall be closed cell polystyrene foam manufactured by extrusion process. Foam insulation shall be odorless, chemically inert, with no food value and shall be resistant to ground chemicals and microorganism. Foam insulation shall conform to the following properties:

PROPERTIES	ASTM TEST	AVERAGE
Thermal Conductivity "K" Factor BTU HR./SQ. FT./+F/IN. Mean Temp. 40+	C518-70 & C177-63	0.23
Moisture Resistance Water Absorption % By Volume	D2842-69	0.8
Water Vapor Transmission (Perm-Inch)	C355-64	0.9
Physical Density (lb./cu. ft.)	C303-56	1.8
Compressive Strength (PSI) Perpendicular to Board Face (5% Deflection or Yield)	D1621-64	40

Aluminum jacketing shall be manufactured from Type 3003 or 5005 alloy; temper of H-14 gauge 0.016.

Y. Concrete Bedding and Blocking

Bedding, blocking, encasement, or slope anchor concrete shall be mixed from materials acceptable to the Engineer and shall have a 30-day compressive strength of not less than 2,500 psi. The mix shall contain five sacks of cement per cubic yard and shall be of such consistency that the slump is between 1 inch and 5 inches. All concrete shall be mechanically mixed. Blocks shall be left open for inspection.

Z. Joint Restraint

Joint restraint methods shall be as per the Approved Materials list. Where shackle restraint is used, all parts shall be stainless steel (All Thread 316SS), along with 316SS stainless steel hardware. Stainless steel shackle restraints do not require painting.

AA. Reduced Pressure Backflow Assembly

All Reduced Pressure Backflow Assemblies shall be as listed on the most current copy of "Backflow Prevention Assemblies Approved for Installation in Washington State," published by Washington State Department of Health (D.O.H.). The assembly shall include a tightly closing resilient seated shut-off valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks. All other appurtenances shall be as shown in the Standard Detail.

BB. Reduced Pressure Detector Assembly

This assembly shall include a line-sized D.O.H. approved (listed on the most current copy of "Backflow Prevention Assemblies Approved for Installation in Washington State" published by Washington State D.O.H.) Reduced Pressure Backflow Assembly with a parallel 3/4-inch meter and 3/4-inch D.O.H. approved Reduced Pressure Backflow Assembly. Each assembly shall include a tightly closing resilient seated shutoff valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks. All other appurtenances shall be as shown in the Standard Detail.

CC. Double Check Valve Assembly

All Double Check Valve Assemblies shall be as listed on the most current copy of "Backflow Prevention Assemblies Approved for Installation in Washington State" published by Washington State D.O.H. The assembly shall include a tightly closing resilient seated shutoff valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test cocks. All other appurtenances shall be as shown in the Standard Detail.

DD. Double Check Detector Assembly

This assembly shall include a line sized D.O.H. approved (listed on the most current copy of "Backflow Prevention Assemblies Approved for Installation in Washington State" published by Washington State D.O.H.) Double Check Valve Assembly with a parallel 3/4-inch meter and 3/4-inch D.O.H. approved double check Valve Assembly. Each assembly shall include a tightly closing resilient seated shutoff valve on each end of the body and each assembly shall be fitted with four properly located resilient seated test-cocks. All other appurtenances shall be as shown in the Standard Detail.

EE. Backflow Assembly Resilient Seated Shut-Off Valves

Each valve shall be marked with model number with designation of resilient seat; such as “RS” or “R,” which must be cast, molded, or affixed onto the body or bonnet of the valve. All ferrous-bodied valves shall be coated with a minimum of 4 mils of epoxy or equivalent polymerized coating. 2 inch and smaller R.P.B.A.s and D.C.V.A.s shall use ball valves, and all 2-1/2 inch and larger R.P.B.A.s and D.C.V.A.s shall use resilient seated gate valves for domestic supply and resilient seated O.S. and Y. valves for fire lines.

The minimum requirements for all resilient seated gate valves shall, in design, material and workmanship, conform to the standards of AWWA C509.

FF. Barrier Fence

Barrier Mesh shall be manufactured from Low Density Polyethylene, stabilized against UV degradation, and with a special selection of pigments to ensure optimum visual performance under harsh weather conditions. Barrier Mesh shall be corrosion-free and resistant to salt water and most chemicals.

Barrier Mesh shall present a visual target area of approximately 0.5 square meter per square meter of mesh.

GG. Bedding and Backfill**(1) Pipe Bedding Materials**

For PVC and Ductile Iron pipe, bedding for water mains shall be “pea gravel” meeting the specifications for a relatively round, processed, washed rock with:

100%	passing the 3/8-inch screen
0%	passing the #4 screen

If necessary on steep pipe runs, the pipe trench shall be constructed with trench dams of clay or CDF to prevent the migration of water through the pea gravel. Water collected in the trench shall be piped to a suitable discharge location.

For convenience, crushed rock bedding conforming to crushed surfacing top course material of Section 9-03.9(3) Crushed Surfacing Top Course of the Standard Specifications may also be used as bedding material for pipe.

(2) Trench Backfill Materials

For transverse trenches (perpendicular to the roadway centerline) in paved areas, trench backfill conforming to Section 9-03.9(3) Crushed Surfacing Base Course of the Standard Specifications shall be used. In paved areas, if a full pavement restoration is not being constructed, trench shall be backfilled with CDF to within 12 inches of the finished surface. The remaining 12 inches shall be restored with crushed surfacing and HMA.

For longitudinal trenches (trenches parallel to the centerline of the roadway) in paved areas, backfill material (4 feet and deeper below finished grade) shall conform to Section 9-03.14(1) Gravel Borrow of the Standard Specifications. The Contractor may request to

use excavated material as trench backfill and must demonstrate to the Engineer that the suitable excavated material conforms to Section 9-03.14(1) Gravel Borrow of the Standard Specifications and proper compaction levels can be achieved. Admixtures and/or additives may not be used to modify the moisture content in order to meet compaction specifications.

The top 4 feet of longitudinal trenches in paved areas shall be backfilled with crushed rock conforming to Section 9-03.9(3) Crushed Surfacing Base Course of the Standard Specifications.

In unpaved areas, trench backfill material shall conform to Section 9-03.14(1) Gravel Borrow of the Standard Specifications. The Contractor may request to use excavated material as trench backfill when it has been determined by the Engineer to be suitable and conforms to Section 9-03.14(1) Gravel Borrow of the Standard Specifications and proper compaction levels can be achieved.

(3) Structure Backfill Materials

In paved areas, backfill material (4 feet and deeper below finished grade) shall conform to Section 9-03.14(1) Gravel Borrow of the Standard Specifications. The Contractor may request to use excavated material as trench backfill when it has been determined by the Engineer to be suitable and conforms to Section 9-03.14(1) Gravel Borrow of the Standard Specifications and proper compaction levels can be achieved.

The top 4 feet around structures shall be backfilled with crushed rock conforming to Section 9-03.9(3) Crushed Surfacing - Top Course of the Standard Specifications.

In unpaved areas, structure backfill material shall conform to Section 9-03.14(1) Gravel Borrow of the Standard Specifications. The Contractor may request to use excavated material as structure backfill when it has been determined by the Engineer to be suitable and conforms to Section 9-03.14(1) Gravel Borrow of the Standard Specifications and proper compaction levels can be achieved.

(4) Foundation Gravel Materials

Foundation gravel for structures shall consist of one of the following aggregates as set forth in the Standard Specifications:

- | | | |
|---|--|------------|
| · | Ballast | 9-03.9(1) |
| · | Permeable Ballast | 9-03.9(2) |
| · | Gravel Backfill for Foundations (Class A or B) | 9-03.12(1) |
| · | Foundation Material Class A and Class B | 9-03.17 |

(5) Controlled Density Fill Materials

Controlled density fill (CDF, aka flowable fill) shall be a mixture of Portland Cement, admixture (optional), Fly Ash, aggregates and water. It shall be proportioned to provide a grouty, non-segregating, free flowing, self-consolidating and excavatable material that will result in a non-settling fill which has measurable unconfined compressive strength. CDF shall meet the standard specifications of Section 2-09.3(1)E.

HH. Steel Casing

Steel casing shall be black steel pipe conforming to ASTM A53. Before installation, coat casing exterior with shop-applied anticorrosive coating conforming to AWWA C210. Minimum coating thickness shall be 16 mils dry film thickness (DFT); however, thickness shall not exceed manufacturer's recommended thickness. Coating type shall be a polyamide epoxy-coal tar equal to Tnemec Hi-Build Tnemec-Tar, Series 46H-413.

Casing wall thickness shall be 0.250 inch for casings 24 inches or less in diameter and 0.375 inch for casings over 24 inches in diameter.

Carrier pipe for water shall be Ductile Iron, Class 52.

II. Casing Spacer

Casing spacer shell shall be manufactured in two pieces from heavy gauge T-304 stainless steel or 14-gauge hot rolled pickled steel joined with ribbed flanges. The shell shall be lined with a PVC liner 0.090 inch thick with 85-90 durometer.

Carbon steel casing spacer shell and risers shall be coated with a heat fused PolyVinyl chloride coating, or hot-dip galvanized.

PolyVinyl Chloride Coating Specifications:

•	Durometer - Shore A2 (10 Sec.) (ASTM D1706-61T)	-	80
•	Max. operating temperature (constant)	-	150° (65°C)
•	Electrical properties (ASTM D149-61)(short time .010")	-	1380 V/Mil
•	Resistance:		
○	Salt spray (ASTM B117)	-	Excellent
○	Acids	-	Good
○	Alkalies	-	Good

All nuts and bolts shall be 18-8 stainless steel.

Runners shall be supported by risers made from heavy gauge T-304 stainless steel or 12 gauge hot rolled pickled steel. Runners shall be ultra high molecular weight polymer with high resistance to abrasion and sliding wear.

TYPICAL DATA			
PROPERTY	ASTM METHOD	UNITS	VALUE
Specific Gravity	D-792	gm/cc	.934
Tensile Strength (Break)	D-638	PSI	3500
Elongation (Break)	D-638	%	380
Izod Impact	D-256	Ft.lbs/in. of notch	No break
Hardness	D-2240	Shore D	67
Coefficient of Friction	D-1894	-	0.11 - 0.13
Heat Distortion Temp. 66 psi	D-648	C	88
Coefficient of Thermal Expansion	D-696	F-1	5.5 x 10-5
ABRASION CHARACTERISTICS			
Taber Abrasion	D-1044	Mg/loss	N
Sand Slurry*			7

*Sand slurry condition - 7 hours in one part sand/ one part water slurry at 1,725 rpm.

Carbon steel - 100, Hifax - 15. The lower the value, the more resistant to abrasion.

Casing spacers shall be “center positioning” type. Height of risers and runners combined shall be sufficient to keep the carrier pipe bell, couplings, or fittings at least 0.75 inch from the casing pipe wall at all times and provide at least 1-inch clearance between runners and top of casing wall, to prevent jamming during installation.

6.05 Water Methods of Construction

A. General Construction Requirements

The improvements shall be constructed as shown on the plans and in accordance with these Standards, Standard Details, and Standard Specifications. Manufacturer’s equipment shall be installed in compliance with specifications of the manufacturer, except where a higher quality of workmanship is required by the plans and specifications. All materials and work shall be in strict accordance with any applicable regulations of the State, County and local authorities. The Contractor shall arrange for such inspection by these agencies as may be required and shall submit evidence of their approval, if requested by the Engineer.

(1) Alignment & Staking

All work done under a Project shall be to the lines and grades shown on the plans or to approved revisions.

(2) Inspections & Tests

- (a) The Engineer shall, at all times, have access to the work for the purpose of inspecting and testing, and the Contractor shall provide proper facilities for such access and such inspection and testing.
- (b) If any work is covered up without approval or consent of the Engineer, it must, if required by the Engineer, be uncovered for inspection.

- (c) Before a performance test is to be observed by the Engineer the Contractor shall make whatever preliminary tests are necessary to assure that the material and/or equipment are in accordance with the plans and specifications.
- (d) Written notice of deficiencies, adequately describing the same, shall be given to the Contractor upon completion of each inspection and the Contractor shall correct such deficiencies within seven days of the notice and before final inspection will be made by the Engineer, unless otherwise approved.

B. Surface Water Quality

The Contractor is required to implement water pollution controls and maintain these until the project is accepted by the City. The Contractor shall familiarize himself with the requirement of the King County Surface Water Design Manual (KCSWDM).

The following list of requirements is a summary of the construction activity requirements of the KCSWDM and is provided as a guide to the Contractor. The City may have additional requirements with which the Contractor shall comply.

(1) Chlorine Residual from Water Main Testing or Disinfection

Water with chlorine residual shall be disposed of through sanitary sewers, storing and aerating or percolation into the ground. Water containing a chlorine residual shall not be disposed of into the storm drainage system or any waterway.

(2) Oil and Chemical Storage and Handling

Storage area shall be diked. No disposal of oil products or waste on the site, including oil filters. The Contractor shall provide a waste oil disposal tank, if needed.

C. Laying Ductile Iron Pipe

Work shall be accomplished in accordance with AWWA Standard C600 and the manufacturer's recommendation.

The bottom of the trench shall be finished to grade in such a manner that the pipe will have bearing along the entire length of the barrel. Bolts on mechanical pipe and fittings shall be tightened uniformly with a "Torque" wrench which measures the torque for mechanical joints shall be as follows:

2" - 3" pipe sizes 5/8" Bolts	40 - 60 ft-lbs torque
4" - 24" pipe size 3/4" Bolts	60 - 90 ft-lbs torque

Installation of push-on joint (Tyton) pipe shall be in accordance with the manufacturer's instructions. All buried ductile iron pipe and adjacent valves and fittings shall be encased with 8-mil polyethylene.

Pipe shall not be located below soil nails. If the pipe is located above a soil nail, a minimum of 5 feet of clearance is required.

D. Laying Galvanized Iron Pipe

The galvanized iron pipe, valves and fittings shall be threaded.

Joints shall be made in accordance with good plumbing practice. Threads shall be coated with Teflon tape before connecting.

Pipe shall not be located below soil nails. If the pipe is located above a soil nail, a minimum of 5 feet of clearance is required.

E. Fire Hydrant Installation

Fire hydrants shall be set as shown in the Standard Details and AWWA Standard C600. Hydrant and the gate valve must have lugs. The tee on the main line shall not be considered as part of the assembly. The hydrant run shall be restrained with MEGALUG restrainer at M.J. end on hydrant and gate valve. If more than one pipe is required on hydrant run, connect pipes with mechanical joint sleeve and MEGALUG restrainers.

When fire hydrants are located in parking lots, or other areas where permitted speed limits do not exceed 5 miles per hour, hydrant guard posts shall be installed as follows:

Hydrant guard post shall be installed in areas where the hydrant is not protected by a cement concrete curb on all sides where vehicles may have access. Guard posts shall be installed according to the minimum dimensions shown in the Standard Details.

Where a hydrant is being installed, reset, moved or reconnected, a blue raised pavement marker (Type 2) shall be installed perpendicular to each hydrant in the interior channelization of the outside lane, unless one already exists. Install the lane marker 1 foot off of the channelization line, toward the hydrant.

F. Valve Installation

Before installation, valves shall be cleaned of all foreign material. Such blocking as the Engineer may deem necessary shall be provided. The valve and valve box shall be set plumb with the valve box centered on the valve. The top of the valve box shall be set with all valves except auxiliary valves for hydrants. Where valve operating nut is more than three feet below finished grade, a stem extension conforming to the Standard Detail must be installed. Tapping valves shall be water tested prior to tapping water main.

The top of the valve box base section shall be located a minimum of 6 inches and maximum of 9 inches below finished grade. A polyethylene sheet, 8-mils thick, shall be placed between the top and base valve box sections to prevent metal to metal contact where the sections overlap.

Valve box top sections shall be adjusted flush with the finished pavement and, in those areas to be excavated for future roadway grades, enough adjustment shall be provided in the valve box to allow the top of the box to be adjusted to the required grade.

G. Air Vacuum Installation

Installation shall be as shown on the Standard Detail.

Iron Piping and fittings shall be galvanized. Location of the air release valves as shown on the plans is approximate. The installation shall be set at the high point of the line. The water line must be constructed so the air release valve may be installed in a convenient location.

H. Valve Box Marker Installation

Concrete marker posts, painted with two coats Rust-Oleum No. 2766 Hi-Gloss white paint, shall be set for all valves, where needed. The marker shall be set on a line through the valve at right angles to the center line of the road. The marker shall generally be set on the property line unless the Engineer decides another location is safer or more conspicuous. Distance to the valves shall be neatly stenciled on the post with 2-inch numerals. Valve markers shall be installed only in unimproved or unpaved areas.

I. Service Lines

(1) New Service Installations

Service installation shall be as shown on the Standard Details.

Tapping of polyethylene encased ductile iron pipe shall be performed by wrapping three layers of polyethylene compatible adhesive tape completely around the pipe to cover the area where the direct tapping machine and chain will be mounted.

Where a saddle is used in lieu of direct tapping, make a cut in the taped area large enough to accommodate the gasket directly in contact with the ductile iron pipe. Make necessary repair for damaged encasement.

The existing polyethylene encasement shall be field cut and replaced after the tap is installed.

(2) Reconnecting Existing Services

Install service connections as shown on the Standard Detail and plans. Install services under paving by boring. Bore or tunnel under sidewalks and curbs. Damages shall be repaired by Contractor. Provide 30-inches minimum cover on service lines. Install service at 90 degrees horizontally to the main to intercept the existing meters. A deviation of not more than 3 degrees will be allowed. Blow off service prior to connection to meter.

Install meter setter and boxes as shown on the Standard Detail and where directed by the Engineer.

Service connections shall not be transferred to the new main until it has been successfully flushed, disinfected and tested. When transferring services from the existing main to the new main, the Contractor shall take sanitary precautions to protect the potable water supply in both the existing and new mains.

The Contractor shall submit for approval a sketch and a list of proposed bushings, adapters, etc. The sketch shall show proposed fittings, (by brand name) for single meter hookups, and connection to existing copper and plastic pipe of various diameters. Multi-meter hook-ups are not allowed, when existing multi-meter hook-ups are encountered,

the Contractor shall convert them to single meter hook-ups.

All new service line shall be soft annealed copper.

No reconnection to substandard service lines shall be allowed.

Substandard plastic service pipe is usually 80 psi polyethylene pipe. The Engineer shall decide if existing service lines are substandard.

J. Pressure Reducing Station

The pressure reducing valves, strainers, pressure relief, pipes and fittings shall be constructed in accordance with the applicable AWWA and uniform plumbing code requirements. Pressure reducing valves, 6 inches and larger, shall be supported by a pipe stanchion. Stanchion shall be bolted to vault floor.

Pressure relief discharge pipe shall be placed in location that will not be subject to damage or erosion during discharge of water.

K. Concrete Blocking

All bends and tees and valves shall be blocked in accordance with the Standard Details. All poured in place blocking shall have a minimum measurement of 12 inches between the pipe and the undisturbed bank. The Contractor shall install blocking which is adequate to withstand full test pressure, as well as, to continuously withstand operating pressures under all conditions of service. All concrete shall be mechanically mixed.

L. Connection to Existing Water Main

Points of connection to existing water mains shall be exposed prior to trenching of the new line, and not less than 48 hours prior to the anticipated connection time. The contractor shall request a shut-down from the City at least 7 calendar days excluding holidays in advance of the need of any water main shut-off or connection. Water main shut-offs shall not be scheduled to take place on Fridays, or on the 5 days before nor 1 day after a City holiday, unless otherwise approved by the City. The Contractor shall notify impacted water customers not less than 48 hours (2 calendar days excluding weekends and holidays) in advance of interruption of water service. The Contractor shall ensure that the existing fittings are in accordance with the Contract Plans and that the connection can be made in accordance with the Contract Plans. The Contractor shall immediately notify the Engineer if the connection cannot be made in accordance with the plans in order that the connection detail may be revised.

Connection to the existing main shall take place only after the new main is flushed, disinfected, and satisfactory bacteriological sample results are obtained. An approved backflow prevention assembly shall be installed between the existing and new water lines during disinfection and flushing of new main. All connections to the existing system and all testing of the new line must be with the authorization of, and in the presence of, the authorized representative of the City. Opening and closing of valves, and use of water from the City's system will be done only by the City. The backflow preventer and supply hose must be disconnected during hydrostatic pressure testing of new main.

The City priority is to install connections to existing water mains via cut-ins. Tapping tees are of second priority and may be installed upon approval by the City. Connections may be made to existing pipes under pressure with a tapping machine by determining the size and type of pipe and installing tapping tee to fit complete with tapping gate valve. Tapping tees shall be installed as shown on the Standard Details. Where cut-ins are permitted to be made in existing pipes, the work shall be conducted at such a time and in such a manner as to minimize the interruption of service. Cut-in time must be approved by the City. Necessary pipe, fittings and gate valves shall be assembled at the site ready for installation prior to the shutting-off of water in the existing main. Once the water has been shut off, the work shall be prosecuted vigorously and shall not be halted until the line is restored to service. The interiors of all pipe and fittings to be used in final connection shall be swabbed or sprayed with a 1 percent available chlorine solution.

All water main shutoffs shall be performed by City staff. Water main shut-offs shall occur during non-holiday weekdays unless otherwise specified herein or as agreed to by the Engineer. The Contractor shall request water main shut-offs at least seven calendar days in advance (not including holidays) of need. The Contractor shall notify all affected water users in writing at least 48 hours in advance (not including weekends and holidays) of any water shutoffs. The Engineer will provide the written notice to customers for the Contractor to distribute. Water main shut-offs shall not occur in the 5 weekdays preceding or the day after the major holidays listed below:

- Memorial Day
- Fourth of July
- Labor Day
- Thanksgiving
- Christmas
- New Year's Day

Due to the needs of various water customers in the project vicinity, water shut-off periods are limited to the times set forth below:

<u>Days</u>	<u>Hours</u>
Monday	8:30 AM to 3:00 PM
Tuesday	8:30 AM to 3:00 PM
Wednesday	8:30 AM to 3:00 PM
Thursday	8:30 AM to 3:00 PM
Friday	DO NOT SCHEDULE
Saturday	DO NOT SCHEDULE
Sunday	DO NOT SCHEDULE

The Engineer, at his sole discretion, may adjust these shutoff periods in order to address specific project circumstances and customer needs.

M. Order of Construction

Restoration of trenches shall closely follow installation and testing of pipe. The Engineer will inspect and observe the hydrostatic test of the pipe within 24 hours after notification by the Contractor that a section is ready for inspection and test. The Contractor shall contact the Engineer at least 24 hours in advance of the completion of sterilization and flushing and his representative shall be present when the Engineer takes water samples.

N. Hydrostatic Tests

Prior to the acceptance of the work, the installation shall be subjected to a hydrostatic pressure test per Standard Specifications Section 7-09.3(23) in the line and any leaks or imperfections developing under said pressure shall be remedied by the Contractor before final acceptance of the work. No air will be allowed in the lines. The mains shall be tested between valves. Insofar as possible, no hydrostatic pressure shall be placed against the opposite side of the valve being tested. Test pressure shall be maintained while the entire installation is inspected. The Contractor shall provide all necessary equipment and shall perform all work connected with the test. Tests shall be made after all valved connections have been made. At unvalved connection points, a temporary plug (or 2-inch blowoff assembly on lines without hydrants) shall be installed at the end of the new main. This shall include concrete blocking necessary to withstand pressures encountered during the hydrostatic test.

Fire Line testing shall be in accordance with the City's Fire Code and National Fire Prevention Association (NFPA) Standard #13 and #25, with no loss for two hours.

Once the new line is successfully tested and disinfected, the plug (blowoff) shall be removed and the connection to the existing main completed. Insofar as it is practical, tests shall be made with pipe joints, fittings and valves exposed for inspection. For approval, pressure shall not drop more than 10 psi for 15 minutes. The Contractor shall perform the test to assure that the equipment to be used for the test is adequate and in good operating condition, and the air in the line has been released before requesting the Engineer to witness the test. The Engineer shall witness the test; if the test does not pass inspection for any reason, additional trips required to witness the test shall be done at the Contractor's expense.

The contractor shall provide special plugs and blocking necessary in those locations where it would be necessary to test against butterfly valves to insure that the pressure ratings of these valves is not exceeded during testing.

O. Sterilization and Flushing of Water Mains

Sterilization of water mains shall be accomplished by the Contractor in accordance with the requirements of the Washington State Department of Health and in a manner satisfactory to the Engineer. The section to be sterilized shall be thoroughly flushed at maximum flow established by the Engineer prior to chlorination. Flushing period must be approved by the City. Sections will ordinarily be sterilized between adjacent valves unless, in the opinion of the Engineer, a longer section may be satisfactorily handled. Chlorine shall be applied by solution feed at one end of the section with a valve or hydrant at the opposite end open sufficiently to permit a flow through during chlorine application. The chlorine solution shall be fed into the pipeline already mixed by an automatically proportioning applicator so as to provide a steady application rate of not less than 60 ppm chlorine. Hydrants along the chlorinated section shall be open during application until the presence of chlorine has definitely been detected in each hydrant run. When a chlorine concentration of not less than 50 ppm has been established throughout the line, the valves shall be closed and the line left undisturbed for 24 hours.

As an alternative, the Contractor may use granulated chlorine for small systems if the flushing and testing can be completed within 1 week after placing the granulated chlorine. Granulated chlorine (dry calcium hypochlorite at 65 percent – 70 percent chlorine) shall be placed in the pipe to yield a dosage of not less than 50 ppm. The number of ounces of 65 percent test calcium

hypochlorite required for a 20-foot length of pipe equals $.00843ld$, in which "d" is the diameter in inches. The line shall then be thoroughly flushed and water samples taken for approval by the local health agency. Flushing period must be approved by the City. The Contractor shall exercise special care in flushing to avoid damage to surrounding property and to conform to Section 6.05 B Surface Water Quality.

Should the initial treatment result in an unsatisfactory bacteriological test, additional chlorination using the first procedure shall be repeated by the Contractor until satisfactory results are obtained. The Contractor shall be responsible for disposal of treated water flushed from mains and at no time shall chlorinated water from a new main be flushed into a body of fresh water. This is to include lakes, rivers, streams, storm drainage systems, and any and all other waters where fish or other natural water life can be expected. Disposal may be made to any available sanitary sewer provided the rate of disposal will not overload the sewer.

P. Preconstruction Photos for City Contracts

Before commencing any construction work as described in the plans and specifications, the Contractor shall provide photographs of pre-existing conditions of the area that will be disturbed during construction operations. Photographs will be obtained as follows:

- Every 25-foot interval in easements.
- Every 50-foot interval in paved areas.
- And any other location as directed by the Engineer.

The photographs shall be taken with a 35mm camera, developed in 4" x 6" color prints, contained in albums, cataloged, and cross-referenced.

Q. Trench Excavation

Before commencement of trenching provide sediment trap for all downhill storm drain catch basins per City of North Bend detail. Plastic sheeting must be available onsite. In case of rain any stockpiled material must be covered and secured.

Clearing and grubbing limits may be established by the Engineer for certain areas and the Contractor shall confine his operations within those limits. Debris resulting from the clearing and grubbing shall be disposed of by the Contractor.

Trenches shall be excavated to the line and grade designated by the Engineer and in accordance with the Standard Details. Trenches shall comply with OSHA and WISHA requirements regarding worker safety.

The trench shall be kept free from water until joining has been completed. Surface water shall be diverted so as not to enter the trench. The Contractor shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out. The Contractor shall perform all excavation of every description and of whatever substance encountered as part of his trench excavation cost. Unsuitable material below the depth of the bedding shall be removed and replaced with satisfactory materials as determined by the Engineer.

Trenching operations shall not proceed more than 100 feet in advance of pipe laying except with written approval of the Engineer.

Providing sheeting, shoring, cribbing, cofferdams, and all aspects involved therein shall be the sole responsibility of the Contractor. Such trench/excavation protection shall comply with the requirements of Section 2-09 Structure Excavation and Section 7-08.3(1)B Shoring of the Standard Specifications, Chapter 49.17 RCW of the Washington Safety and Health Act, and Part N – Excavation, Trenching and Shoring of Chapter 296-155 WAC.

When trenching operations take place in the public right-of-way, the pavement, and all other improvements, shall be restored as required by the Right-of-Way Use Permit.

R. Sheeting and Shoring

The Contractor shall provide and install sheeting and shoring as necessary to protect workmen, the work and existing utilities and other properties in compliance with OSHA and WISHA requirements. All sheeting and shoring above the pipe shall be removed prior to backfilling. Sheeting below the top of the pipe may be cut off and left in place.

All trenches and excavations more than 4 feet in depth shall be shored in compliance with applicable Federal and State regulations. Shoring shall be required in all street excavation. Sloping to the angle of repose will be permitted only in non-critical off-street areas.

Removal of the sheeting and shoring shall be accomplished in such a manner that there will be no damage to the work or to the other properties.

S. Trench Dewatering

When water is encountered to a degree that a successful trenching and pipe laying operation is hampered, dewatering will be the responsibility of the Contractor. Determination of the method to be used to dewater trenched areas will be the responsibility of the Contractor, but any method used must be in accordance with the specifications and requirements of the Washington State Department of Ecology and the Local Jurisdiction.

T. Bedding, Backfill, and Compaction

(1) Pipe Bedding Construction Requirements

Pipe bedding shall conform to Section 7-08.3(1)C Bedding the Pipes of the Standard Specifications as modified herein in order to provide uniform support along the entire pipe barrel, without load concentration at joint collars or bells.

Jetting is not an allowable method to compact the bedding materials.

(2) Trench and Structure Backfill Construction Requirements

Backfilling shall be accomplished in accordance with Section 2-09 Structure Excavation of the Standard Specifications as modified herein:

In paved areas, trench backfill material shall be compacted to 95% maximum dry density per Section 2-03.3(14)D Compaction and Moisture Control Tests of the Standard Specifications.

In unpaved areas, trench backfill material shall be compacted to 90% maximum dry density per Section 2-03.3(14)D Compaction and Moisture Control Tests of the Standard Specifications.

The Contractor shall arrange for compaction testing to be performed by a certified technician. The Contractor shall provide the Engineer with one copy of the compaction test report within 24 hours of the completion of the test.

Compaction tests shall be made at a maximum of 4-foot depth increments with a minimum of one test for any backfilling less than 4 feet in depth. The maximum space between tests shall not exceed 100 linear feet. At least one compaction test shall be performed at each backfilled structure or for every 50 CY of backfill placed. If the structure (e.g., manhole, catch basin or inlet) is part of a pipeline trench, then trench compaction testing frequency governs.

For mechanical compaction methods ("hoe pack," vibratory roller, static roller, etc.), the maximum backfill lift shall not exceed 2 feet between the application of compaction equipment.

For manual compaction methods (all walk-behind equipment, "jump jack," etc.), the maximum backfill lift shall not exceed 1 foot between the application of compaction methods.

Jetting is not an allowable method to compact the trench backfill.

Surface restoration shall be as specified in the Right-of-Way Use Permit and as shown on the approved plans.

(3) Foundation Gravel Construction Requirements

Foundation gravel under manholes, catch basins, inlets, vaults, and other precast concrete structures shall be placed in layers not more than 6-inches thick and compacted to provide a firm and level base on which to place the structure. Unless shown otherwise on the Contract Plans, the minimum thickness of foundation gravel under precast concrete structures is 6 inches.

(4) Controlled Density Fill Construction Requirements

Controlled Density Fill (CDF) can be proportioned to be flowable, non-segregating, or excavatable by hand or machine. Desired flowability shall be achieved with the following guidelines:

- Low Flowability below 6-inch slump
- Normal Flowability 6 - 8-inch slump
- High Flowability 8-inch slump or greater

CDF shall be placed by any reasonable means into the area to be filled.

CDF patching, mixing and placing may be started if weather conditions are favorable, when the temperature is at 34 degrees F and rising. At the time of placement, CDF must have a temperature of at least 40 degrees F. Mixing and placing shall stop when

temperature is 38 degrees F or less and falling. Each filling stage shall be as continuous an operation as is practicable. CDF shall not be placed on frozen ground.

Trench section to be filled with CDF shall be contained at either end of trench section by bulkhead or earth fill.

When used to support existing asbestos cement (AC) pipe, the flowable CDF shall be brought up uniformly to the bottom of the AC pipe, as shown on the plans, or as directed by the Engineer.

Contractor shall provide steel plates to span utility trenches and prevent traffic contact with CDF for at least 24 hours after placement or until CDF is compacted or hardened to prevent rutting by construction equipment or traffic.

U. Trenchless Excavation

The use of trenchless excavation methods such as pipe bursting and horizontal directional drilling shall be considered by the City on a case-by-case basis under the following conditions:

- (1) Romac 501 transition couplings are required at both ends.
- (2) The installed pipe must be electronically located and marked on the ground for measurement in order to draw the as-built schematics.
- (3) The pipe must be video-inspected following installation, with water running. The video inspection must be provided to the Inspector to approve the installation or require corrections.
- (4) Pipe bursting is not allowed on another person's property or public right-of-way without the appropriate permission, such as an easement, or right-of-way use permit.

V. Adjust Existing Structure to Grade

(1) Vault Cover Adjustment

Existing vault covers affected by a pavement overlay, or adjustment in surface grade, shall be adjusted to grade within 3 calendar days excluding weekends and holidays.

(2) Valve Box Adjustment - Pavement Overlays and Sidewalks

- (a) Raising the existing valve box cover less than 2 inches shall be accomplished by adjusting the existing top section of the valve box.
- (b) Raising the existing valve box cover 2 inches or more, shall be accomplished by either adjusting the existing top section or by inserting a valve box paving riser into the existing valve box top. The paving riser shall be epoxied to the valve box.
- (c) If the valve box base section needs to be extended, the contractor shall install a 4-inch-diameter cast iron soil pipe, with bell-end of the soil pipe inserted over the top of the existing valve box base section. The spigot-end of the soil pipe shall

be located a minimum of 6 inches and maximum of 9 inches below finished grade. The valve box top section shall be slipped over the soil pipe and adjusted to final grade. A polyethylene sheet, 8-mils thick, shall be placed between the valve box and soil pipe to prevent metal to metal contact where the sections overlap.

Final box adjustment shall leave the top of the valve box no higher than final grade, and no lower than 0.5 inch below final grade.

In asphalt concrete pavement overlay areas, excavation of the valve box to be raised shall be accomplished by sawcutting or neat-line jackhammering the pavement a minimum of 12 inches around the perimeter of the valve box.

Final adjustment of valve boxes shall be made within 20 calendar days following the final overlay.

(3) Valve Box Adjustment - Unimproved Areas

Adjustment of valve box covers located outside paved areas or sidewalks can be accomplished using a 12-inch valve box adjusting sleeve inserted into the existing valve box top section.

W. Abandoning Facilities

(1) Abandoning Pipe in Place

The Contractor shall plug the open ends of all pipes, fittings, etc., to be abandoned with end cap coupling on asbestos cement or steel pipe, with mechanical joint cap or plug on cast or ductile iron pipe.

(2) Abandoning Structures

Abandonment of structures shall be completed only after piped systems have been properly abandoned. Structures within the public right-of-way, a public easement or which are part of the publicly-owned and maintained system must be:

- Removed completely according to Section 2-02 of the current Standard Specifications; or
- Abandoned according to Section 7-05.3 of the current Standard Specifications provided no conflicts with new utilities or improvements arise.

(3) Abandoning Gate Valves in Place

Abandoned valves shall be removed and a blind flange installed on the tee. When an abandoned valve cannot be removed, as determined by the City, the valve shall be closed, a blind flange installed and a piece of 2-inch white PVC shall be placed over the operating nut.

X. Lawn Removal and Replacement

Any lawn damaged by the Contractor outside of limits shown on the plan shall be restored to conditions existing prior to construction. Contractor shall take care to limit the area of disturbance.

When lawn removal and replacement is called for, a sufficient width (at least 2 feet wider than outside width of backhoe wheels or tracks) of lawn turf shall be removed prior to beginning excavation so that heavy equipment does not run over the lawn.

The area of the sod to be removed shall be laid out in squares or strips of such size as to provide easy handling and matching. The sod shall then be carefully cut along these lines to a depth of 4 inches, taking care to keep cuts straight and strips of the same width. After the sod has been cut vertically, it shall be removed to a uniform depth of approximately 3 inches with an approved type of sod cutter.

This operation shall be performed in such manner as to ensure uniform thickness of sod throughout the operation.

Prior to installation of new sod, the scalped area shall be carefully shaped to proper grade and be thoroughly compacted. Wherever the construction operations have resulted in the placement of unsuitable or poorer soils in the area to be resodded, the surface shall be left low and covered with top soil.

The finished grade, after shaping and compacting the top soil, shall be thoroughly dampened prior to and immediately before replacing the sod. The sod shall be replaced to the required grade, taking care to butt each piece tightly against the adjacent one. Upon completion, the sod shall be dampened and rolled with a lawn roller.

All tools used shall be of the type specially designed for the work and be satisfactory to the Engineer. In no case shall sod be removed by the use of a mattock or other tool which will not meet requirements specified herein.

Sod shall be a 4-way blend of Ryegrasses.

Y. Boring Under Roots

Boring under the root systems of trees (and plants) shall be accomplished by excavating a trench or pit on each side of the tree and then hand digging or pushing the pipe through the soil under the tree. The pit walls shall be a minimum of 7 feet from the center of the tree and shall be sufficient depth to lay the pipe at the grade shown on the plan and profile.

Z. Highway and Railroad Crossings

Interstate, state, or county highway and railroad crossings require the placing of steel, cast iron or concrete pipe casing by jacking or tunneling and laying the carrier pipe within the casing.

AA. Boring and Jacking Steel Casing

The Contractor shall verify the vertical and horizontal location of existing utilities. If required to avoid conflicts and maintain minimum clearances, adjustment shall be made to the grade of the casing.

The pipe shall be bored and jacked where indicated. The Contractor shall remove or penetrate all obstructions encountered. If groundwater is found to be a problem during boring operations, the Contractor shall do all that is necessary to control the flow sufficiently to protect the excavation, pipe and equipment so that the work is not impaired. Any pipe damaged during the boring and jacking operation shall be repaired by the Contractor in a manner approved by the Engineer.

Special care shall be taken during the installation of the bored and jacked pipe to ensure that no settlement or caving be caused to the above surface. Any such caving caused by the placement of the pipe shall be the Contractor's responsibility and he shall repair any area so affected as directed by the Engineer.

During the jacking operations, particular care shall be exercised to prevent caving ahead of the pipe which will cause voids outside of the pipe. If voids exist, the Contractor shall drill through the wall of the pipe and fill the voids with a pumped cement grout. All voids shall be filled to the satisfaction of the Engineer.

The carrier pipe shall be installed in the casing as shown on the drawings. The Contractor shall support carrier pipe with casing spacers as shown in the Standard Detail. The casing pipe shall not be backfilled with sand and grout. The casing ends shall be sealed with asphaltic material 1 foot minimum on each end, or with manufactured rubber end seal device.

Boring pits shall be backfilled with select native material and compacted to 95 percent maximum dry density as determined by ASTM D-1557. The contractor shall provide sufficient select backfill material to make up for the rejected material.

All disturbed ground shall be restored to its original condition or better.

BB. Working with Asbestos Cement Pipe

When working with asbestos cement pipe, the Contractor is required to maintain workers' exposure to asbestos material at or below the exposure limit as prescribed in WAC 296-62-07705 State/Federal Guidelines and Certification.

CC. Asbestos Cement Water Main Crossing

Where new utility line crosses below an existing AC main, the AC pipe shall be replaced with DI pipe to 3 feet past each side of trench as shown on the Standard Detail. Alternatively, where directed by the Engineer, the trench shall be backfilled with controlled density fill (CDF, aka flowable fill) from bottom of trench to bottom of the AC main.

DD. Vault Installation

Vaults for water facilities (pressure reducing station, water service, backflow device, etc.) shall be constructed at the locations shown in the plan and as staked. It shall be constructed as shown in the plans, Standard Details and as directed by the Engineer.

The excavation shall have minimum 1-foot clearance between the vault outer surfaces and the earth bank. The vault shall be placed on firm soil. If the foundation material is inadequate, the contractor shall use foundation gravel or bedding concrete to support the vault. The vault shall be plumb and watertight. The access cover shall be seated properly to prevent rocking and shall be adjusted to match the finished grade. The vault shall have coal tar coating of 5 to 9 mils applied to the exterior.

Vault floor shall drain to daylight, or to location shown on the plan. Drain pipe shall be minimum 4-inch diameter.

Where knockout locations for pipe do not coincide with locations of pipe penetrations into the vault, the Contractor shall core drill openings for pipe.

EE. Clearances/Other Utilities

If the minimum vertical distance between utility pipes is less than 6 inches and such installation is approved by the City, a pad shall be placed between the pipes. The pad shall be O.D. x O.D. x 2.5-inches thick minimum or as required to protect the pipes. Above O.D. is equal to the outside diameter of the larger pipe. The pad shall be a polyethylene foam plank (Dow Plastics Ethafoam[™] 220), or approved equal. Additional measures may be necessary to ensure system integrity and may be required as evaluated by the City on a case by case basis.

6.06 Summary of Underground Fire System Installation Requirements for Commercial and Multi-Family Projects (for Services Greater than 2 Inches in Diameter)

A. General

Listed below is a summary of the requirements for the installation of underground fire lines in commercial and multi-family projects.

B. Permitting

Installation of a dedicated fire service line from the municipal water main to the building floor flange and underground fire sprinkler piping and appurtenances (e.g., FDCs) shall be accomplished under a Utility Developer Extension Agreement (UE).

C. Installation

Contractor must be a Level “U” or Level III licensed contractor in accordance with RCW 18-160 and WAC 212-80 to install any portion of the fire sprinkler underground piping. Developer shall submit proof of Contractor’s Certificate of Competency Holder and fire sprinkler system licensing prior to permit issuance. State law does not allow a licensed contractor to subcontract fire sprinkler system installation to an unlicensed contractor.

D. Inspections

Inspectors will inspect and test the underground fire lines:

- (1) DCVA Inside the Building – from the municipal water main to within 5 feet of the building foundation; and

- (2) DCVA Outside the Building – from the municipal water main to the downstream flange on the DCVA.

Wall-mounted PIVs and FDCs, as well as interior DCVAs and swing check valves will be inspected by the Fire Department under a separate permit.

Connections and fittings shall not be backfilled prior to inspection.

Pressure test – 225 psi for 2 hours, or 50 psi in excess of working pressures, whichever is greater, with no loss between the gate valve on the municipal water main and the floor flange.

Bag Flush – In the presence of the Fire Inspector, first charge the service line from a fire hydrant (Standard Detail W-9) through the FDC and flush out the floor flange. Next, flush the entire fire line out at the floor flange. The flush must be witnessed by the Fire Inspector. The fire line shall be flushed for a minimum of 15 minutes at scouring velocities unless otherwise directed by the Inspector. If debris is detected in the bag, additional test(s) shall be performed until the debris has been cleared from the line.

Disinfection and Purity Test – See Section 6.05 Q.

Inspection processes and approved materials may be different outside the North Bend city limits. New backflow assembly test reports from outside of North Bend city limits must be submitted to the Public Works Department.

E. Materials and Construction Requirements

(1) General

- Minimum depth of cover for all piping is 3 feet.
- Maximum depth of cover for all piping is 6 feet.

(2) Pipe

- Ductile Iron Pipe, Class 52, cement mortar lined or epoxy coated. See Section 6-04 B.
- Polyethylene encasement, 8 mil thickness minimum. See Section 6-04 C.
- All pipe shall have restrained joints. Field lock gaskets are not allowed.
- Casings are required under walls and footings. See Section 6-04 HH and 6-04 II.

(3) Fittings

- Ductile Iron, Class 52, compact type, cement mortar lined or epoxy coated. See Section 6-04 D.
- All fittings shall have restrained joints (See Section 6-04 Z) and concrete thrust blocking. Dual restraint is required on all changes in direction.
- “Field-Lok” gaskets as manufactured by V.S. Pipe and Foundry are not allowed.
- Cement concrete blocking is required at all changes in direction (Standard Details W-1, W-2, and W-3).

(4) Double Check Valve Assembly (DCVA)

Assembly must be installed in the orientation approved by the Washington State Department of Health. See Section 6-04 CC and Standard Detail W-45.

(5) Post Indicator Valve (PIV)

- Location – PIV shall be set on the fire service line between the easement/property line and the point of connection of the FDC on the fire service line.
- Clearance – 3 feet from obstructions, vegetation, fencing, structures, curb line, and edge of sidewalk; 5 feet from protective bollards.
- PIV – Listed for fire protection service, rated for 200 psi test pressure.
- Paint – Two coats of Rust-Oleum Regal Red over primer.

(6) Bollards

Bollards are required when the PIV or FDC may be subject to vehicular damage. Install 6-inch diameter minimum, Schedule 40 iron pipe or Class 52 DI pipe, filled with Class 3000 concrete.

- Height – equal to or higher than the height of the FDC or PIV.
- Embedment – 3-foot depth in a 15-inch-diameter concrete footing.
- Spacing – sufficient to protect the FDC or PIV spaced not more than 4 feet apart.
- Paint – Two coats of Rust-Oleum Regal Red over primer.

(7) Tamper Protection

- Tamper (supervisory) switches shall be installed on PIVs and DCVAs.
- Electrical conduits penetrating vault walls shall be neatly cored or drilled and the annular space grouted, inside and out, to prevent seepage.
- A vault drain (gravity to storm drain or sump pump – no dry wells) is required if tamper switches and wiring are not waterproof.
- Tamper protection will be inspected by Fire Department under the fire sprinkler permit (FB).

APPENDIX 6-1

WATER STANDARD DETAILS

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APPENDIX 6-2**WATER APPROVED MATERIALS LIST**

The following manufacturers have been approved for use for water works construction. Where specific manufacturers are listed no other manufacturer may be used without prior approval by the Utility.

DUCTILE IRON PIPE

All manufacturers that meet the performance requirements specified under the material section of the Standards.

DUCTILE IRON FITTINGS

All manufacturers that meet the performance requirements specified under the material section of the Standards.

GALVANIZED IRON PIPE

All manufacturers that meet the performance requirements specified under the material section of the Standards.

JOINT RESTRAINT SYSTEMS

American Ductile Iron Pipe (Flex-Ring)

EBAA Iron (MEGALUG 1100 Series)

EBAA Iron (MEGAFLANGE 2100 Series)

Griffin Pipe Products Company (Snap-Lok, Bolt-Lok)

Pacific States Cast Iron Pipe Co, (Thrust Lock)

Romac (Grip Ring), 600 Series, RomaGrip

Romac (Bell Restraint) 611 with 316SS stainless steel nuts and bolts

Star National Products (Shackle Products) - All rods and hardware shall be 316SS stainless steel.

Cooper B-Line B3132– Heavy Duty Hot Dipped Galvanized pipe clamps (embedded in concrete blocks)

US Pipe (TR FLEX)

Uni-Flange Corporation Series 1400, or Series 1450 with 316SS stainless steel nuts and bolts

REPAIR CLAMPS

Romac Industries, Models SS1 and SS2

COUPLINGS

Romac (400 and 501 Series), Smith-Blair (Rockwell), Mueller MaxiFit, Mueller MaxiStep

CASING (COATING FOR STEEL CASING)

Tnemee Hi-Build Tneme-Tar, Series 46H-413

CASING SPACERS

Pipeline Seal and Insulator Co.:

8" band, carbon steel with fusion-bonded coating, Model C8G-2

12" band, carbon steel with fusion-bonded coating, Model C12G-2

Cascade Waterworks Mfg. Co.:

Stainless Steel or hot-dip galvanized carbon steel Casing Spacers (catalog number depends on size)

Advance Products & Systems, Inc.:

8" band, stainless steel, Model SSI8

12" band, stainless steel, Model SSI12

8" band, carbon steel with fusion-bonded coating, Model SI8

12" band, carbon steel with fusion-bonded coating, Model SI12

CASING END SEALS

Pipeline Seal and Insulator Co.:

Standard Pull-on (Model S)

Custom Pull-on (Model C)

Cascade Waterworks Mfg. Co.:

CCES End Seal

Advance Products & Systems, Inc.

Molded End Seal, Model AM

GATE VALVES

All manufacturers that meet the performance requirements specified under the material section of the Standards.

PRV STATION

- PRESSURE REDUCING VALVES

CLA-VAL 90G-01ABCSKC }	6"	With stainless steel trim on disk guide, seat, and cover bearing
CLA-VAL 90G-01ACSKC }	2"	

- STRAINERS

Cla-Val X43H }	6"	Mesh openings 0.059 inch Stainless steel perforated screen, 1/16-inch diameter, 144 holes per square inch
MUESSCO 11-BC }	2"	

- PRESSURE RELIEF VALVES

CLA-VAL 50G-01KC }	2"	With stainless steel trim on disk guide, seat, and cover bearing
--------------------	----	---

INDIVIDUAL PRESSURE REDUCING VALVES (Residential)

Wilkins 600 with built-in bypass

INDIVIDUAL PRESSURE REDUCING VALVES (Commercial)

- PRESSURE REDUCING VALVES

Wilkins 600 HLR Series with built-in bypass

PRESSURE RELIEF VALVES

CLA-VAL 55F

SERVICE SADDLES

- 1" tap: Ford FC101 (4" to 8" mains), epoxy-coated saddle with stainless steel strap
 Smith-Blair 315, epoxy-coated saddle with stainless steel strap
 A.Y. McDonald 4835A series, epoxy-coated saddle with stainless steel strap
 Romac 101NS, nylon-coated saddle with stainless steel strap
- 1 1/2" & 2" tap: Ford FC202 and FCD202, epoxy-coated saddle with stainless steel strap(s)
 Smith-Blair 317, epoxy-coated saddle with stainless steel strap
 A.Y. McDonald 4845A or 4855A, epoxy-coated saddle with stainless steel strap(s)
 Romac 202NS, nylon-coated saddle with stainless steel strap(s)

CORPORATION STOPS

- 1" size: Ford Ballcorp FB1000-4
 Mueller No. P-15028
 A.Y. McDonald 4701-22, 4701B-22
- 1 1/2" size: Ford Ballcorp FB400-6
 Mueller Oriseal No. H-9968
 A.Y. McDonald 4701B-22, or 3128B (with FIPT by pack joint coupling 4754-22)
- 2" size: Ford Ballcorp FB400-7
 Mueller Oriseal No. H-9968
 A.Y. McDonald 4701B-22, or 3128B (with FIPT by pack joint coupling 4754-22)

ANGLE METER VALVES

- 1 1/2" Irrigation: Ford FV13-666W
 Mueller 1 1/2" H-14286
 A.Y. McDonald 4604B
- 2" Irrigation: Ford FV13-777W
 Mueller 2" H-14286
 A.Y. McDonald 4604B

VALVE BOXES

Olympic Foundry Inc.: #VB045 Lid, Top and Base Section

RICH (VanRich Casting Corp.): Top section and lid #045 with RICH Standard Base

BUTTERFLY VALVES

All manufacturers that meet the performance requirements specified under the material section of the Standards.

AIR AND VACUUM RELEASE VALVES

APCO No. 143-C, Val-Matic No. 201C, Crispin UL10

FIRE HYDRANTS

M & H 929

Mueller Centurion (No other Mueller hydrants allowed)

BRASS WATER SERVICE FITTINGS AND VALVES

Approved manufacturers of brass fittings and valves up to 2 inch sizes include Ford, Mueller, James Jones Company (except James Jones meter setters, which are not approved), and A.Y. McDonald Manufacturing Co. The items supplied shall be equal to the models listed in these Standards.

METER SETTERS

1" x 1" (horizontal):

Ford V74-12W

Mueller 1" No. H-1404 x 12 with multi-purpose connection No. H-14222

A.Y. McDonald 20-412WXDD44

1" x 1" (vertical):

Ford V74-84 x 12W

A.Y. McDonald 39-412WX2D44 (inlet coupling is MIPT by pack joint, 4753-22)

1-1/2" Domestic:

Ford VBB76-12B-11-66

A.Y. McDonald 20B612WWFF665 Vertical Meter Setter with Valve Rotated 90°

2" Domestic:

Ford VBB87-12B-11-77

A.Y. McDonald 20B712WWFF775 Vertical Meter Setter with Valve Rotated 90°

METER BOXES

1" x 1" Services:

Carson Industries 1527-18 BCFXL Meter Box, and
1527 Cover with Max View Reader Door
(formerly Mid-States Plastics MSBCF 1324-18)
Olympic Foundry SM30

1-1/2" and 2" Domestic:

Carson Industries 1730-18 BCFXL Meter Box, and
1730 Cover with Max View Reader Door
(formerly Mid-States Plastics MSBCF 1730-18)
Olympic Foundry SM301

1- 1/2" and 2" Irrigation:

Carson Industries 1730-18 BCFXL Meter Box, and
1730 Cover with Max View Reader Door
(formerly Mid-States Plastics MSBCF 1730-18)
Olympic Foundry SM-30

2" Blow-Off Assembly:

Olympic Foundry SM-30
Carson Industries 1730-18 BCFXL Meter Box, and
1730 Cover
(formerly Mid-States Plastics MSBCF 1730-18)

1" Air and Vacuum Release: Carson Industries 1730-18 BCFXL Meter Box, and
1730 Cover
(formerly Mid-States Plastics MSBCF 1730-18)

Pressure Reducing Valve Assembly: Carson Industries 1730-18 BCFXL Meter Box, and
1730 Cover
(formerly Mid-States Plastics MSBCF 1730-18)
Olympic Foundry SM-30

REDUCED PRESSURE BACKFLOW ASSEMBLIES

As approved on the most current Department of Health list for cross connection assemblies.

DOUBLE CHECK VALVE ASSEMBLIES

As approved on the most current Department of Health list for cross connection assemblies.

RESILIENT SEATED SHUT-OFF VALVES

All manufacturers that meet the performance requirements specified under the material section of the Standards.

NEOPRENE FOAM PAD (FOR CUSHION BETWEEN ADJACENT PIPES)

DOW Plastics Ethafoam™ 220

LADDER-UP

Bilco, Model LU-2 (steel safety post, hot dip galvanized)

VAULT HATCH/DOOR AND NON-SLIP TREATMENT

L.W. Products Company, Inc., Models HHD and HHS (rated for H-30 Vehicle Loading)

Hatches shall include recessed padlock hasp sized to accept City of North Bend padlocks.

Metal lids, hatches and access covers shall be constructed with a gray non-slip treatment by one of the approved products below:

<u>Manufacturer</u>	<u>*COF</u>	<u>Product</u>
LW Products	.95	Thermion Arc Metal Spray
SlipNOT Metal Safety Flooring .99		SlipNOT Grip Plate
IKG Industries	>.80	MEBAC 1 (Metal Bonded Anti-Slip Coatings)
Grating Pacific LLC	.92	ALGRIP Safety Floor Plates

*COF – coefficient of friction as determined by ASTM C1028-89

LINK SEAL

Vault wall pipe penetration seals shall be Link Seal Model C-316 (EDPM) with stainless steel hardware.

EXPANSION ANCHOR BOLTS INTO CONCRETE

Expansion anchor bolts shall be wedge style “Power Stud”, “Power Bolt” Hilti KB3-HPG in stainless steel or galvanized steel.

APPENDIX 6-3**WATER STANDARD PLAN NOTES**

Water General Notes:

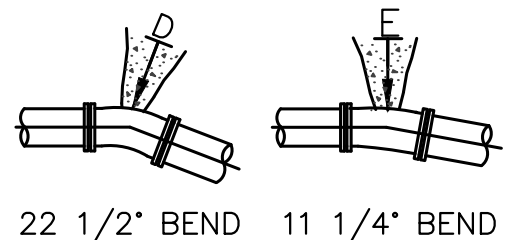
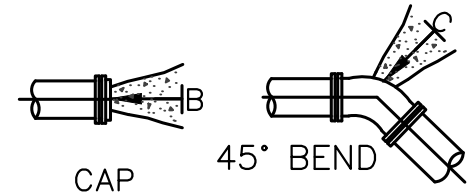
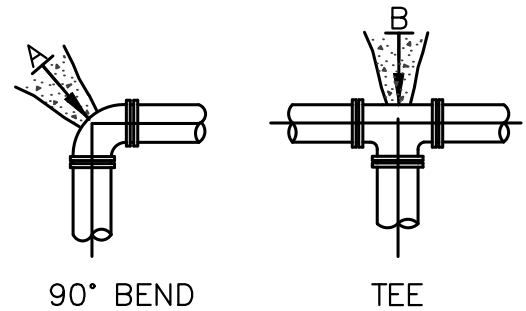
1. All work shall conform to the 2015 City of North Bend Water Standards and the Developer Extension Agreement.
2. All pipe shall be ductile iron class 52 unless otherwise shown.
3. All pipe and fittings not to be disinfected in place shall be swabbed with 1 percent available chlorine solution prior to installation.
4. The new water main shall be connected to the existing system only after new main is pressure tested, flushed, disinfected, and satisfactory bacteriological sample results are obtained. See Standard Detail W-8.
5. After disinfecting the water main, dispose of chlorinated water by discharging to the nearest operating sanitary sewer.
6. Water main shutoff shall be coordinated with the Water Operations Division for preferred timing during flow control conditions. Water main shutoffs shall not be scheduled to take place on Fridays, or on the 5 days before nor 1 day after a City holiday, unless otherwise approved by the Utility.
7. The locations of all existing utilities shown hereon have been established by field survey or obtained from available records and should therefore be considered approximate only and not necessarily complete. It is the sole responsibility of the contractor to independently verify the accuracy of all utility locations shown, and to further discover and avoid any other utilities not shown hereon which may be affected by the implementation of this plan.
8. Deflect the water main above or below existing utilities as required to maintain 3 feet minimum cover and 12-inch minimum vertical clearance between utilities unless otherwise specified.
9. Wrap all ductile iron pipe and adjacent valves and fittings with 8-mil. polyethylene conforming to AWWA C105.
10. The water main shall be installed only after the roadway subgrade is backfilled, graded and compacted in cut and fill areas.
11. Trench backfill and surface restoration of existing asphalt pavement shall be as required by the right-of-way use permit.
12. All fittings shall be blocked per Standard Detail unless otherwise specified.
13. All services shall be 1" x 1" per Standard Detail unless otherwise specified. Adaptors for 3/4-inch meters shall be used where applicable.
14. When working with asbestos cement pipe, the Contractor is required to maintain workers' exposure to asbestos material at or below the limit prescribed in WAC 296-62-07705.

15. Call 1-800-424-5555 48 hours before construction for utility locations.
16. Uniform plumbing code requires the installation of privately owned and operated pressure reducing valves where the operating pressure exceeds 80 psi.
17. The Contractor shall use a vacuum street sweeper to remove dust and debris from pavement areas as directed by the Engineer. Flushing of streets shall not be permitted without prior City approval.
18. Before commencement of trenching, the Contractor shall provide catch basin inserts for all catch basins that will receive runoff from the project site. The Contractor shall periodically inspect the condition of all inserts and replace as necessary.
19. Abandonment of existing water services shall be accomplished as follows:
 - a. Remove existing service saddle from water main and replace with new stainless steel repair band, Romac SS2, Ford Service Saddle FC101, or approved equal (will not be required when water main is to be abandoned).
 - b. Remove and dispose of existing setter and meter box.
 - c. Cap or crimp (if copper) existing service line to be abandoned in place, each end.
 - d. Return existing meter to City Utilities Inspector.
20. Where new utility line crosses below an existing AC main, the AC pipe shall be replaced with DI pipe to 3 feet past each side of the trench as shown on Standard Detail W-8. Wrap DI pipe and couplings with 8-mil polyethylene conforming to AWWA C105. Alternatively, where directed by the Engineer, the trench shall be backfilled with controlled density fill (CDF, aka flowable fill) from bottom of trench to spring line of the AC main.
21. Avoid crossing water or sewer mains at highly acute angles. The smallest angle measure between utilities should be 45 to 90 degrees.
22. Where water main crosses above or below sanitary sewer, one full length of water pipe shall be centered for maximum joint separation.
23. At points where existing thrust blocking is found, minimum clearance between the concrete blocking and other buried utilities or structures shall be 5 feet.
24. Workers must follow confined space regulations and procedures when entering or doing work in City-owned confined spaces. Completed Permit must be given to the Utilities inspector prior to entry.
25. Manholes, catch basins, and vaults are considered to be permit-required confined spaces. Entry into these spaces shall be in accordance with Chapter 296-809 WAC.
26. When work is to occur in easements, the Contractor shall notify the easement grantor and the City in writing a minimum of 48 hours in advance of beginning work (not including weekends or holidays). Failure to notify the grantor and the City will result in a Stop Work Order being posted

until the matter is resolved to the satisfaction of the City. A written release from the easement grantor shall be furnished to the Utilities Inspector prior to permit sign-off.

27. The Contractor shall restore the Right-of-Way and existing public utility easement(s) after construction to a condition equal or better than condition prior to entry. Contractor shall furnish a signed release from all affected property owners after restoration has been completed.

THRUST BLOCK - TABLE						
MINIMUM BEARING AREA AGAINST UNDISTURBED SOIL, SQUARE FEET						
PIPE SIZE, IN	PRESSURE, PSI	A	B	C	D	E
4	250	2.2	1.6	1.2	0.6	0.3
6	250	5.0	3.5	2.7	1.4	0.7
8	250	8.9	6.3	4.8	2.5	1.2
10	250	13.9	9.8	7.5	3.8	1.9
12	250	20.0	14.1	10.8	5.5	2.8
14	250	27.2	19.2	14.7	7.5	3.8
16	250	35.5	25.1	19.2	9.8	4.9
18	250	45.0	31.8	24.3	12.4	6.2
20	250	55.5	39.3	30.1	15.3	7.7
24	250	80.0	56.5	43.3	22.1	11.1



SAFE BEARING LOADS IN LB./SQ. FT.
THE SAFE BEARING LOADS GIVEN IN THE FOLLOWING TABLE ARE FOR HORIZONTAL THRUSTS WHEN THE DEPTH OF COVER OVER THE PIPE EXCEEDS 2 FEET.

<u>SOIL</u>	<u>SAFE BEARING LOAD LB. PER SQ. FT.</u>
* MUCK, PEAT, ETC.	0
SOFT CLAY	1,000
SAND	2,000
SAND & GRAVEL	3,000
SAND & GRAVEL CEMENTED WITH CLAY	4,000
HARD SHALE	10,000

* IN MUCK OR PEAT, ALL THRUSTS SHALL BE RESTRAINED BY PILES OR TIE RODS TO SOLID FOUNDATIONS OR BY REMOVAL OF MUCK OR PEAT AND REPLACEMENT WITH BALLAST OF SUFFICIENT STABILITY TO RESIST THRUST.

NOTES:

1. SQUARE FEET OF CONCRETE THRUSTS – BLOCK AREA BASED ON SAFE BEARING LOAD OF 2000 POUNDS PER SQUARE FOOT.
2. AREAS MUST BE ADJUSTED FOR OTHER SIZE PIPE, PRESSURES & SOIL CONDITIONS.
3. CONCRETE BLOCKING SHALL BE CAST IN PLACE & HAVE MINIMUM OF 1/4 SQUARE FOOT BEARING AGAINST THE FITTING.
4. BLOCK SHALL BEAR AGAINST FITTINGS ONLY & SHALL BE CLEAR OF JOINTS TO PERMIT TAKING UP OR DISMANTLING JOINT.
5. CONTRACTOR SHALL INSTALL BLOCKING ADEQUATE TO WITHSTAND FULL TEST PRESSURE AS WELL AS TO CONTINUOUSLY WITHSTAND OPERATING PRESSURE UNDER ALL CONDITIONS OF SERVICE.
6. FITTINGS AND BOLTS TO BE COVERED WITH VISQUEEN PRIOR TO CONCRETE PLACEMENT.



CITY OF NORTH BEND

CONCRETE BLOCKING

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

W-1



CITY OF NORTH BEND

RESERVED

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

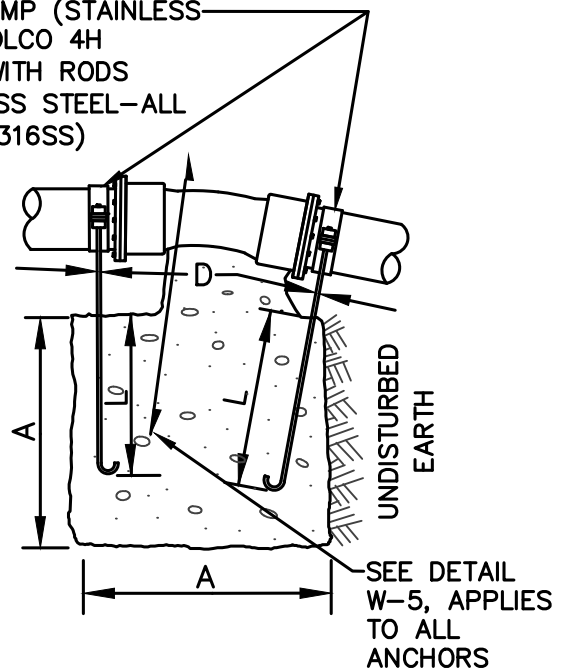
DATE

DWG. NO.

W-2

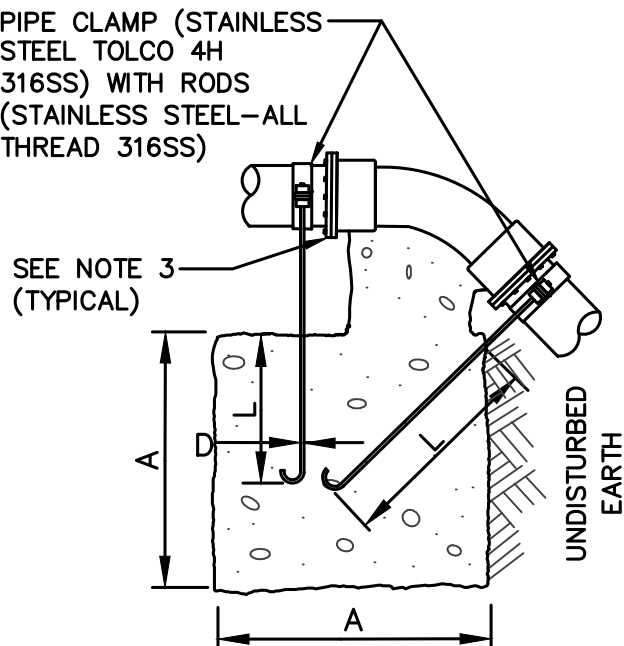
VERTICAL BLOCKING FOR 11 1/4°-22 1/2°-30° BENDS					
PIPE SIZE	V B	CU FT	A	D	L
4"	11 1/4°	8	2.0'	3/4"	1.5'
	22 1/2°	11	2.2'		2.0'
	30°	17	2.6'		
6"	11 1/4°	11	2.2'	3/4"	2.0'
	22 1/2°	25	2.9'		
	30°	41	3.5'		
8"	11 1/4°	16	2.5'	3/4"	2.0'
	22 1/2°	47	3.6'		
	30°	70	4.1'	3/4"	2.5'
12"	11 1/4°	32	3.2'	3/4"	2.0'
	22 1/2°	88	4.5'	7/8"	3.0'
	30°	132	5.1'		
16"	11 1/4°	70	4.1'	7/8"	3.0'
	22 1/2°	184	5.7'	1 1/8"	4.0'
	30°	275	6.5'	1 1/4"	
20"	11 1/4°	91	4.5'	7/8"	3.0'
	22 1/2°	225	6.1'	1 1/4"	4.0'
	30°	330	6.9'	1 3/8"	4.5'
24"	11 1/4°	128	5.0'	1"	3.5'
	22 1/2°	320	6.8'	1 3/8"	4.5'
	30°	480	7.9'	1 5/8"	5.5'
VERTICAL BLOCKING FOR 45° BENDS					
4"	45°	30	3.1'	3/4"	2.0'
6"		68	4.1'		
8"		123	5.0'		
12"		232	6.1'	3/4"	2.5'
16"		478	7.8'	1 1/8"	4.0'
20"		560	8.2'	1 1/4"	
24"		820	9.4'	1 3/8"	4.5'

PIPE CLAMP (STAINLESS
STEEL TOLCO 4H
316SS) WITH RODS
(STAINLESS STEEL-ALL
THREAD 316SS)



VERTICAL BLOCKING
FOR 11 1/4°, 22 1/2°, & 30° BENDS

PIPE CLAMP (STAINLESS
STEEL TOLCO 4H
316SS) WITH RODS
(STAINLESS STEEL-ALL
THREAD 316SS)



VERTICAL BLOCKING
FOR 45° BENDS

NOTES:

1. CONCRETE BLOCKING BASED ON 200 PSI PRESSURE AND 2500 PSI CONCRETE.
2. LEAVE BLOCK OPEN OR SHEETED 24 HOURS MINIMUM.
3. MEGA-LUG FITTINGS.
4. FITTINGS AND BOLTS TO BE COVERED WITH VISQUEEN PRIOR TO CONCRETE PLACEMENT.



CITY OF NORTH BEND

VERTICAL BLOCKING

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

W-3



CITY OF NORTH BEND

RESERVED

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

W-4



CITY OF NORTH BEND

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APPROVED:

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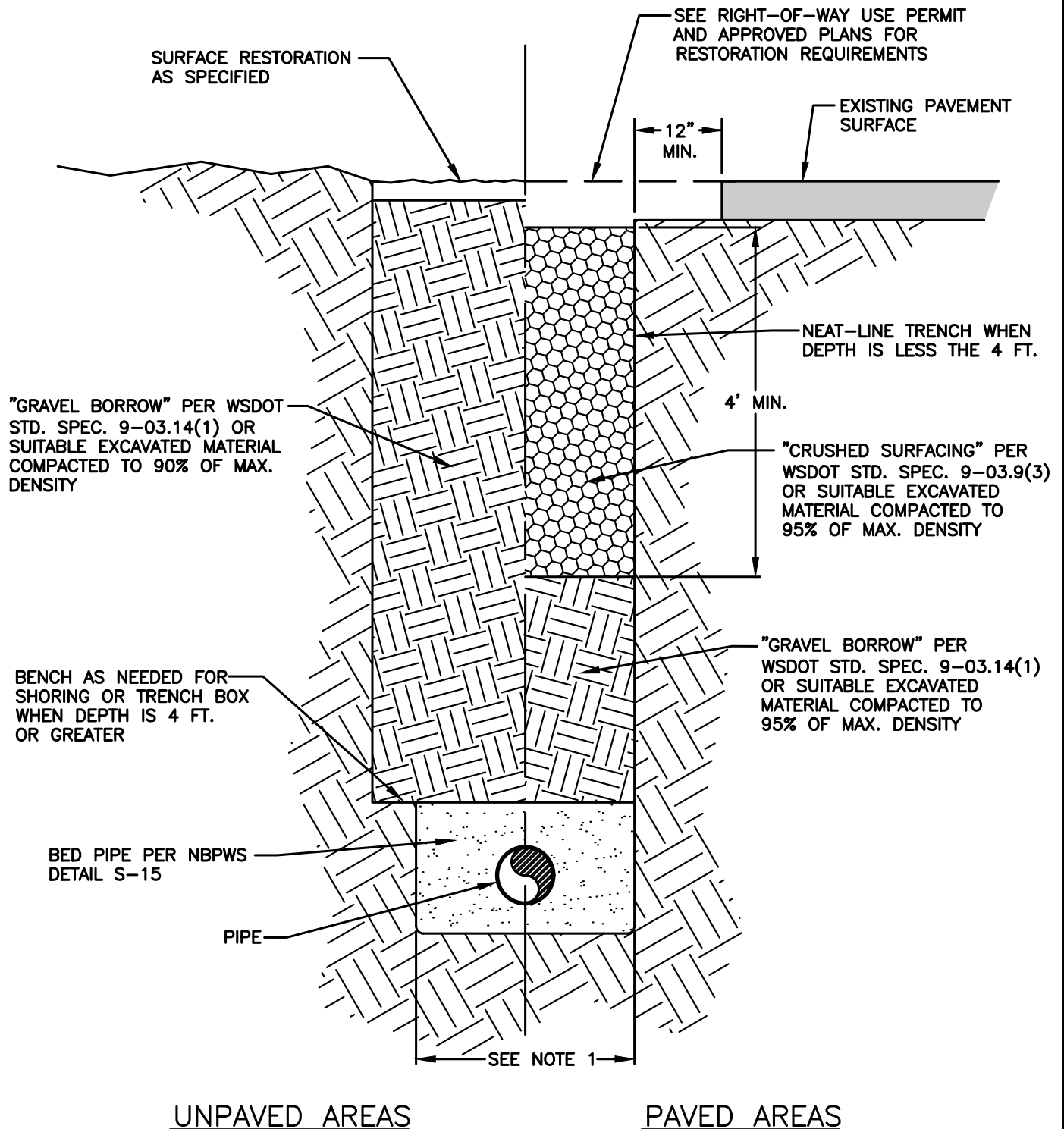
BY CITY

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DWG. NO.

W-5



NOTES:

1. FOR PIPES 15-INCHES AND UNDER, TRENCH WIDTH=I.D. + 30-INCHES. FOR PIPES 18-INCHES AND OVER, TRENCH WIDTH=(1.5 x I.D.)+18-INCHES. PER SECTION 2-09.4, "MEASUREMENT", OF THE WSDOT STANDARD SPECIFICATIONS.
2. EXCAVATIONS OVER 4' DEEP SHALL COMPLY WITH THE SAFETY STANDARD DESCRIBED IN CHAPTER 296-155 - PART N OF THE WAC.
3. SEE "BEDDING, BACKFILL AND COMPACTION" IN THE STANDARDS FOR ADDITIONAL CONSTRUCTION REQUIREMENTS.



CITY OF NORTH BEND

TYPICAL TRENCH DETAIL

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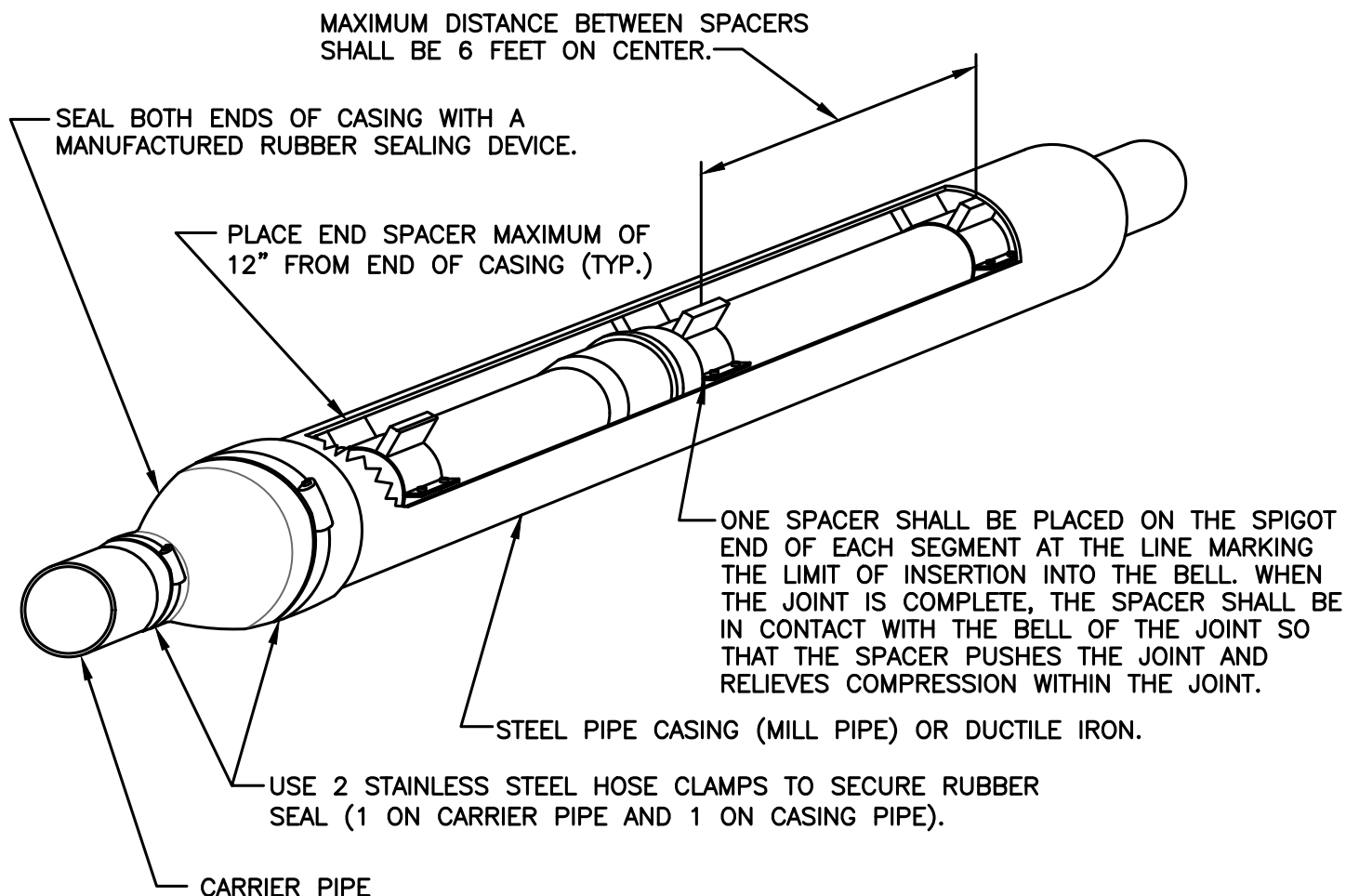
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W-6



CARRIER PIPE DIAMETER	4"	6"	8"	10"	12"
CASING DIAMETER	10"	12"	14"	16"	20"
STEEL CASING THICKNESS	0.25"	0.25"	0.25"	0.25"	0.25"
SPACER BAND WIDTH	8"	8"	8"	8"	8"

NOTES:

1. RUNNER HEIGHT SHALL BE SIZED TO PROVIDE:
 - A. MIN. 0.75" BETWEEN CARRIER PIPE BELL AND CASING PIPE WALL AT ALL TIMES.
 - B. MIN. 1.00" CLEARANCE BETWEEN RUNNERS AND TOP OF CASING WALL AT ALL TIMES.
2. MINIMUM RUNNER WIDTH SHALL BE 2 INCHES.
3. STEEL CASING DIAMETERS ARE "OUTSIDE DIAMETER" FOR 16" AND LARGER. .
4. SPACER BAND WIDTH SHALL BE 12" FOR CARRIER PIPES THAT ARE 36" DIAMETER OR GREATER.
5. FOR STEEL CASING, PROVIDE SHOP-APPLIED ANTI-CORROSIVE COATING ON CASING EXTERIOR CONFORMING TO AWWA 210. MINIMUM COATING 16 MILS DFT (DO NOT EXCEED MANUFACTURER'S MAXIMUM THICKNESS). PRODUCT SHALL BE EQUAL TO TNE MEC HI-BUILD TNE-M-TAR SERIES 46H-413.



CITY OF NORTH BEND

CASING INSTALLATION

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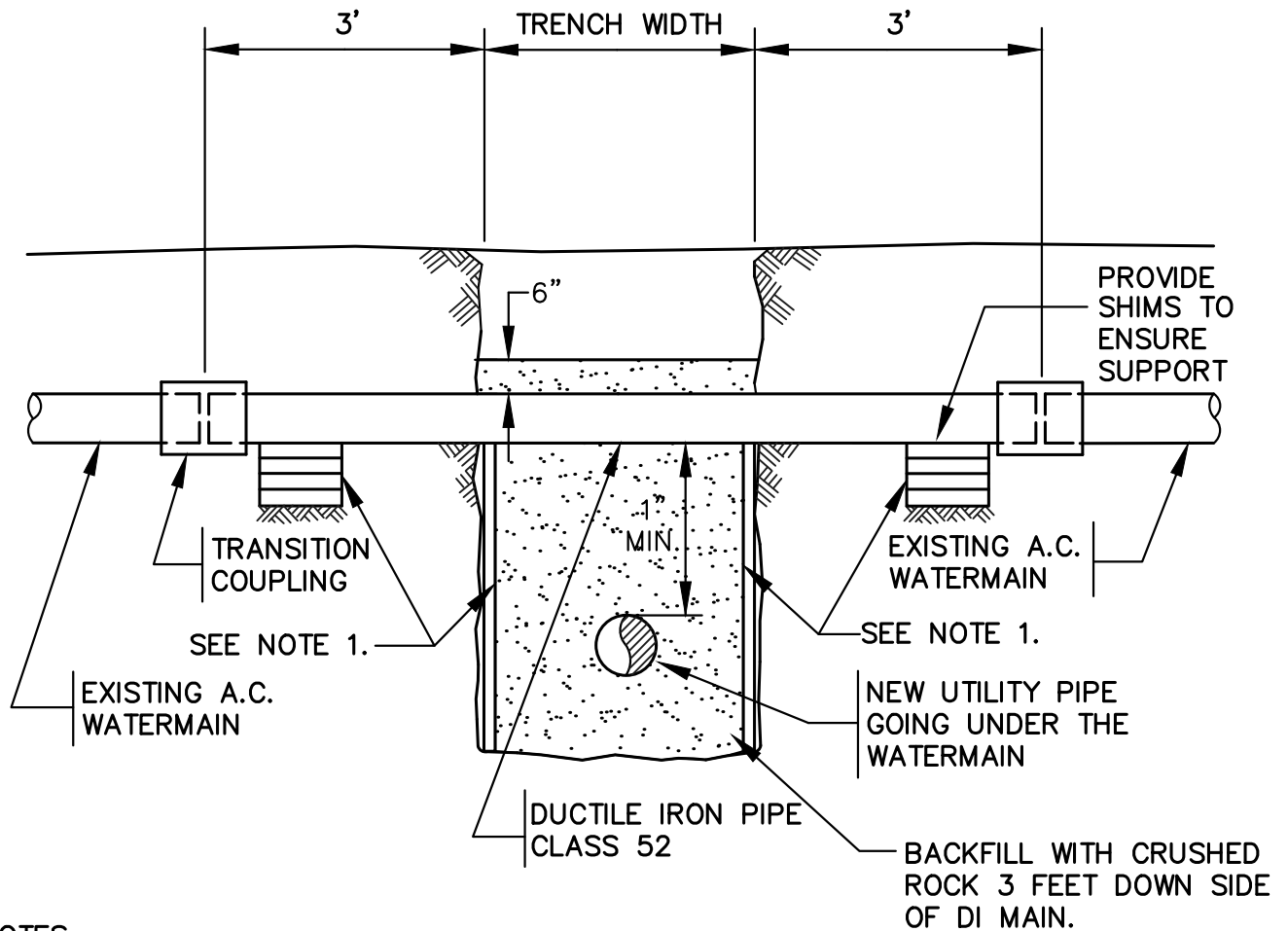
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DWG. NO.

W-7



NOTES:

1. D.I. PIPE SHALL REST ON FIRM BEARING EARTH: SHORE TRENCH WALL UNDER WATERMAIN AS SHOWN, OR SUPPORT PIPE WITH PATIO BLOCKS (8"x16"x 2"). STACK BLOCKS AS REQUIRED TO REST ON FIRM BEARING SOIL.
2. THE CONTRACTOR IS REQUIRED TO MAINTAIN WORKERS' EXPOSURE TO ASBESTOS MATERIAL AT OR BELOW THE LIMIT PRESCRIBED IN WAC 296-62-07705.
3. ASBESTOS CEMENT PIPE SHALL BE CUT WITH A HAND-OPERATED CARBIDE BLADE CUTTER WITH CONTROLLED FLOWING WATER.
4. CONTAMINATED CLOTHING SHALL BE LEFT AND BURIED IN TRENCH, OR TRANSPORTED IN SEALED IMPERMEABLE BAGS & LABELED IN ACCORDANCE WITH WAC 296-62-07721. ASBESTOS CEMENT PIPE SHALL BE LEFT AND BURIED IN TRENCH.



CITY OF NORTH BEND
TYPICAL A.C. WATERMAIN
CROSSING REPLACEMENT DETAIL

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W-8



CITY OF NORTH BEND

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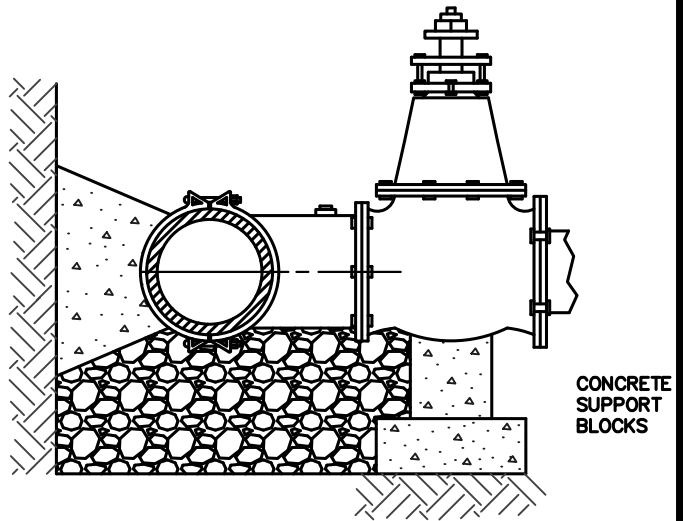
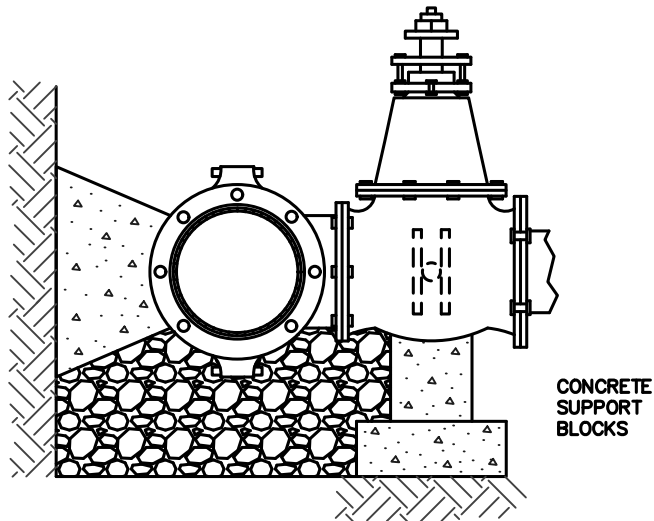
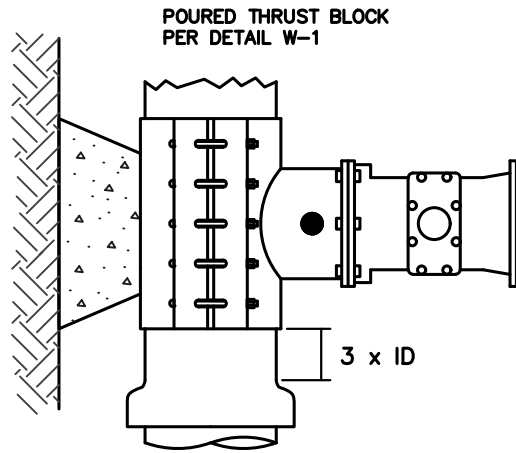
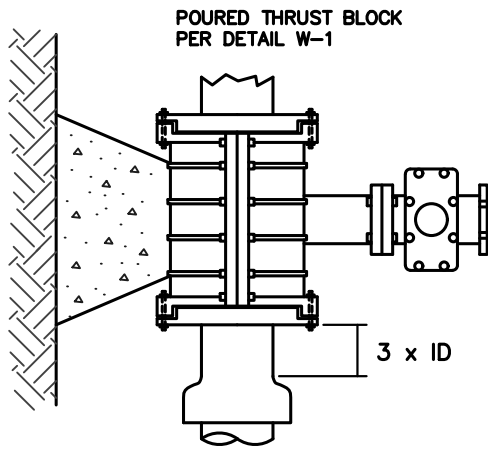
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DWG. NO.

W-9



DUTILE IRON TAPPING TEE MECHANICAL JOINT SLEEVE

INSTALLED ON ASBESTOS CEMENT PIPE,
CAST IRON PIPE AND DUCTILE IRON PIPE.

STAINLESS STEEL OR STEEL TAPPING TEE

STAINLESS STEEL TAPPING TEE

INSTALLED ON ASBESTOS CEMENT PIPE,
CAST IRON PIPE AND DUCTILE IRON
PIPE.

STEEL TAPPING TEE

INSTALLED ON DUCTILE IRON PIPE ONLY.

NOTES:

1. STAINLESS STEEL TAPPING TEES SHALL HAVE FULL CIRCLE SEAL. BOLTS AND NUTS SHALL BE STAINLESS STEEL.
2. STEEL TAPPING TEES SHALL BE EPOXY COATED. BOLTS AND NUTS SHALL BE COR-TEN, OR STAINLESS STEEL.
3. ALL TEES AND VALVES TO BE WATER TESTED BEFORE TAP.
4. TAPPING TEE MAY BE SIZE ON SIZE. TAP SHALL BE AT LEAST 2" SMALLER DIAMETER THAN THE EXISTING MAIN.
5. TAPPING TEE NOT ALLOWED FOR MAIN SMALLER THAN 3".
6. TAPPING TEES PERMITTED WITH CITY OF NORTH BEND'S APPROVAL ONLY.



CITY OF NORTH BEND

TAPPING TEES

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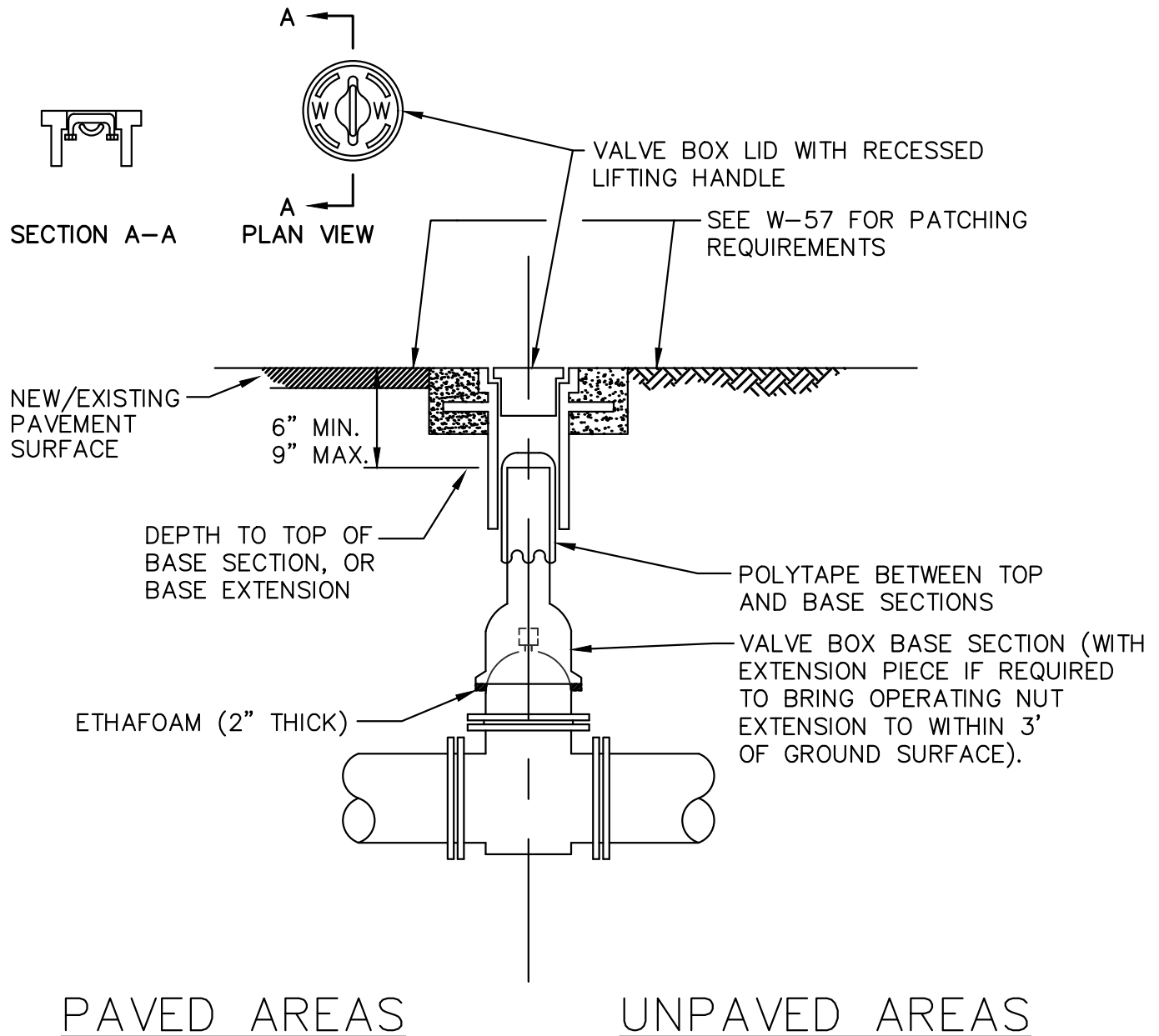
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DWG. NO.

W-10



NOTES:

1. ALL PARTS SHALL BE CAST OR DUCTILE IRON AND COATED WITH ASPHALTIC VARNISH.
2. OLYMPIC FOUNDRY INC: #VB045 LID, TOP AND BASE SECTION.
3. OLYMPIC FOUNDRY OR EQUIVALENT: TOP SECTION AND LID #045 WITH STANDARD BASE.
4. 12" ADJUSTING SLEEVE #044A.



CITY OF NORTH BEND
VALVE BOX INSTALLATION

APPROVED:

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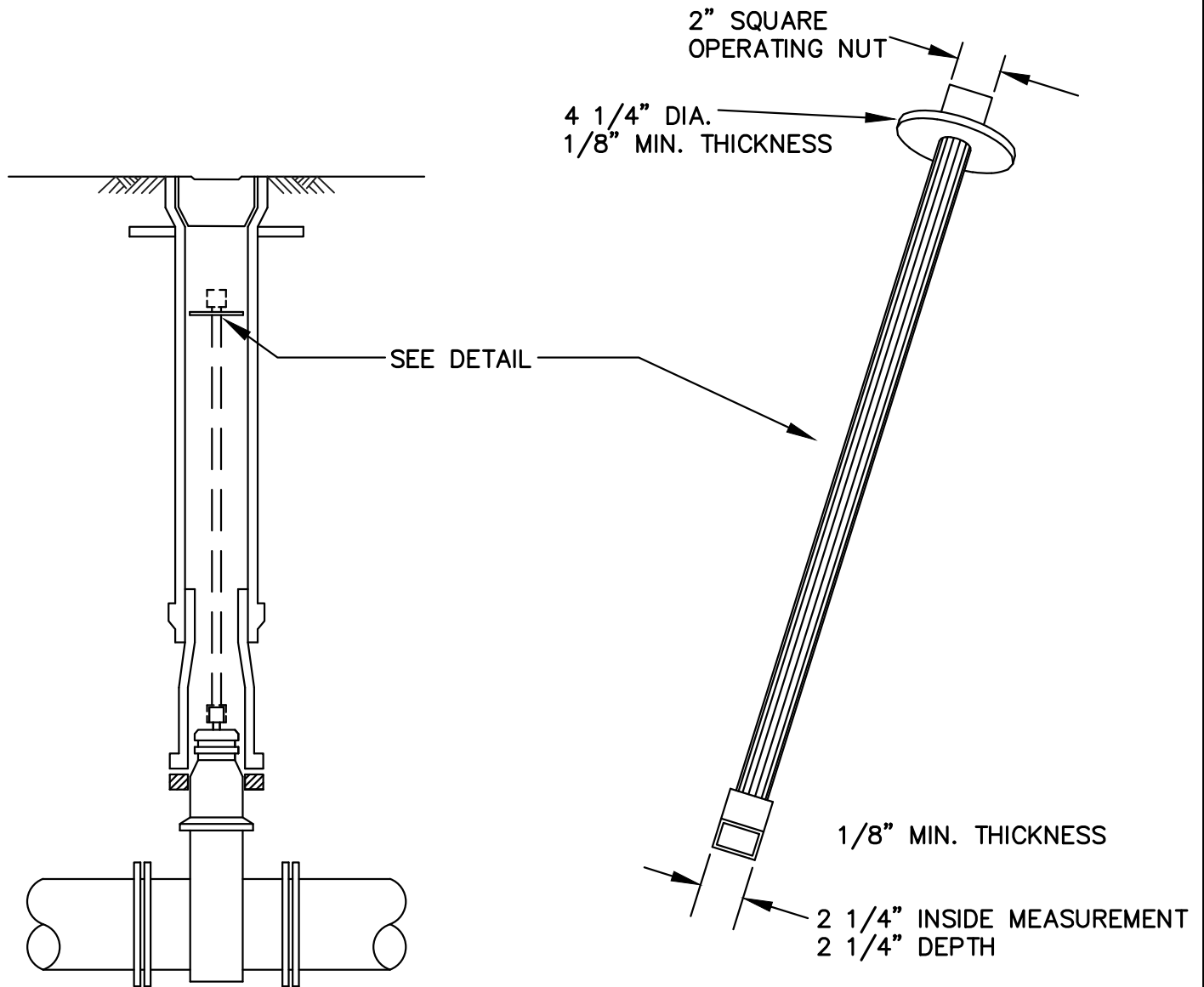
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DWG. NO.

W-11



VALVE OPERATING EXTENSION

EXTENSIONS ARE REQUIRED WHEN THE VALVE NUT IS MORE THAN THREE (3) FEET BELOW FINISHED GRADE. EXTENSIONS ARE TO BE A MINIMUM OF ONE (1) FOOT LONG. ONLY ONE EXTENSION TO BE USED PER VALVE.

NOTES:

1. ALL EXTENSIONS ARE TO BE MADE OF STEEL, SIZED AS NOTED, AND HOT DIPPED GALVANIZED.
2. INSTALL EXTENSIONS PERPENDICULAR TO THE WATER LINE VERTICAL ALIGNMENT.



CITY OF NORTH BEND
VALVE OPERATING EXTENSION

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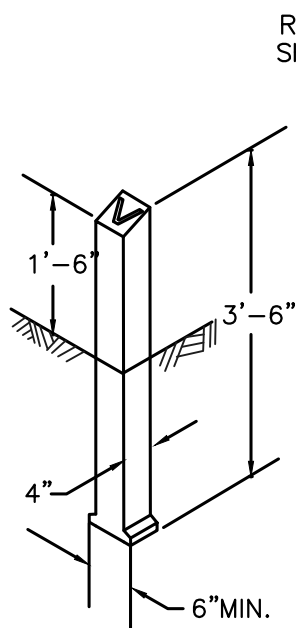
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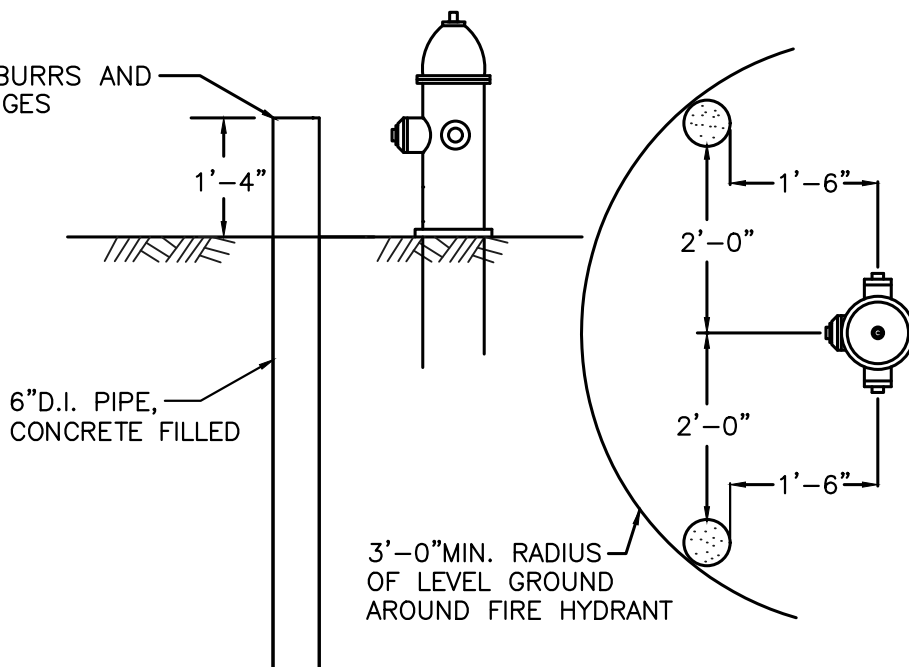
DWG. NO.

W-12



VALVE MARKER POST

REMOVE BURRS AND SHARP EDGES



ELEVATION

PLAN

FIRE HYDRANT GUARD POST

NOTES:

1. GUARD POST SHALL BE 6" CL.52 D.I. PIPE, 6' LONG, FILLED WITH CONCRETE. PAINT WITH TWO COATS OF "SAFETY YELLOW" RUSTOLEUM, KRYLON, SHERWIN WILLIAMS OR EQUAL.
2. CONCRETE VALVE MARKER POST SHALL BE EQUAL TO FOG TITE METER SEAL COMPANY. PAINT WITH TWO COATS OF RUST-OLEUM HIGH GLOSS YELLOW PAINT. PAINT DISTANCE FROM THE VALVE MARKER TO THE VALVE ON THE POST WITH BLACK ENAMEL PAINT.
3. VALVE MARKER POST TO BE USED FOR ALL MAINLINE VALVES OUTSIDE PAVED AREAS.
4. GUARD POSTS ONLY REQUIRED WHERE HYDRANT AND TRAFFIC ARE NOT PHYSICALLY SEPARATED (E.G. VERTICAL CURB)



CITY OF NORTH BEND
FIRE HYDRANT GUARD POST &
VALVE MARKER POST

APPROVED:

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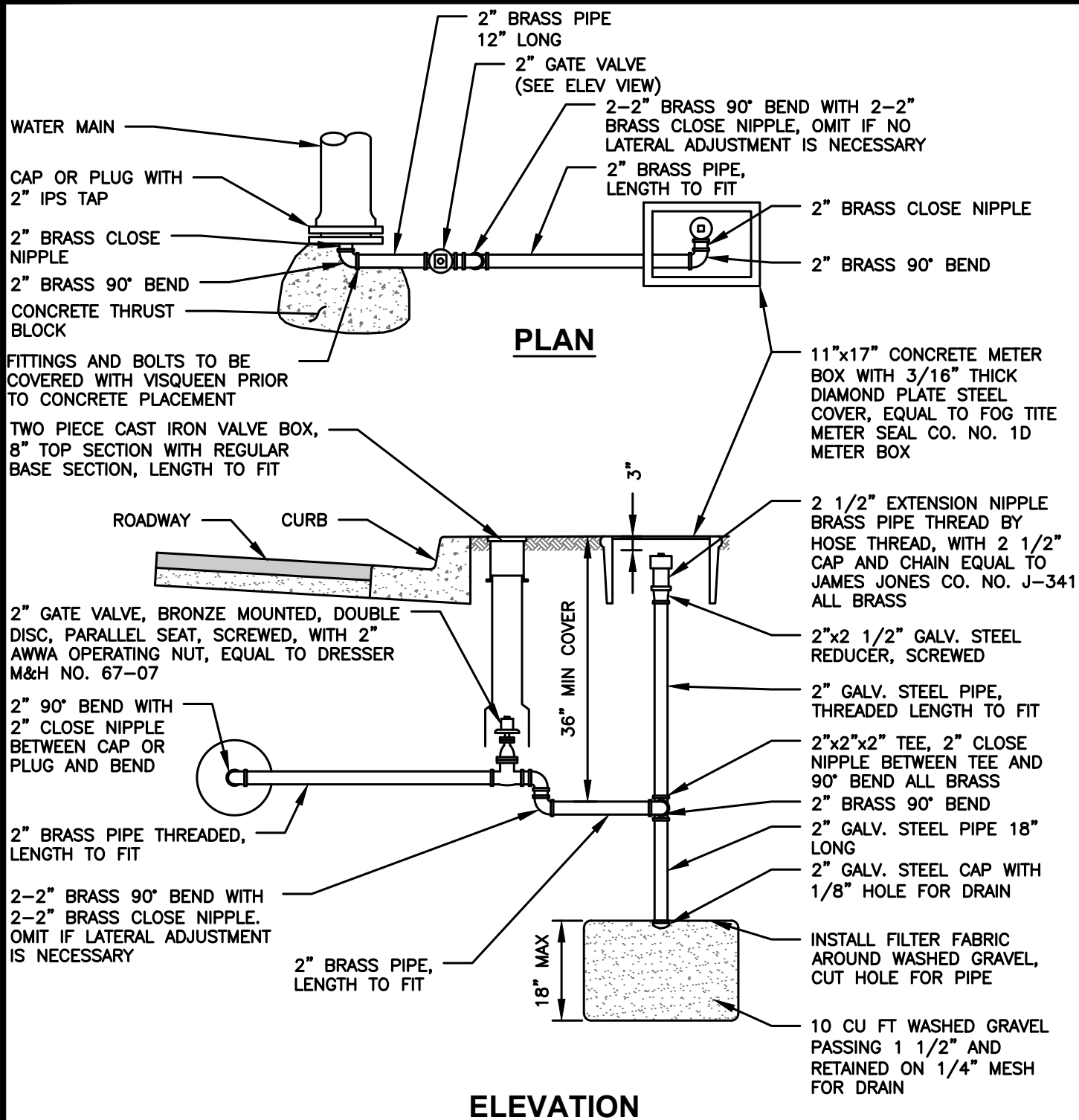
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W-14



CITY OF NORTH BEND

2-INCH BLOW-OFF ASSEMBLY END-OF-LINE

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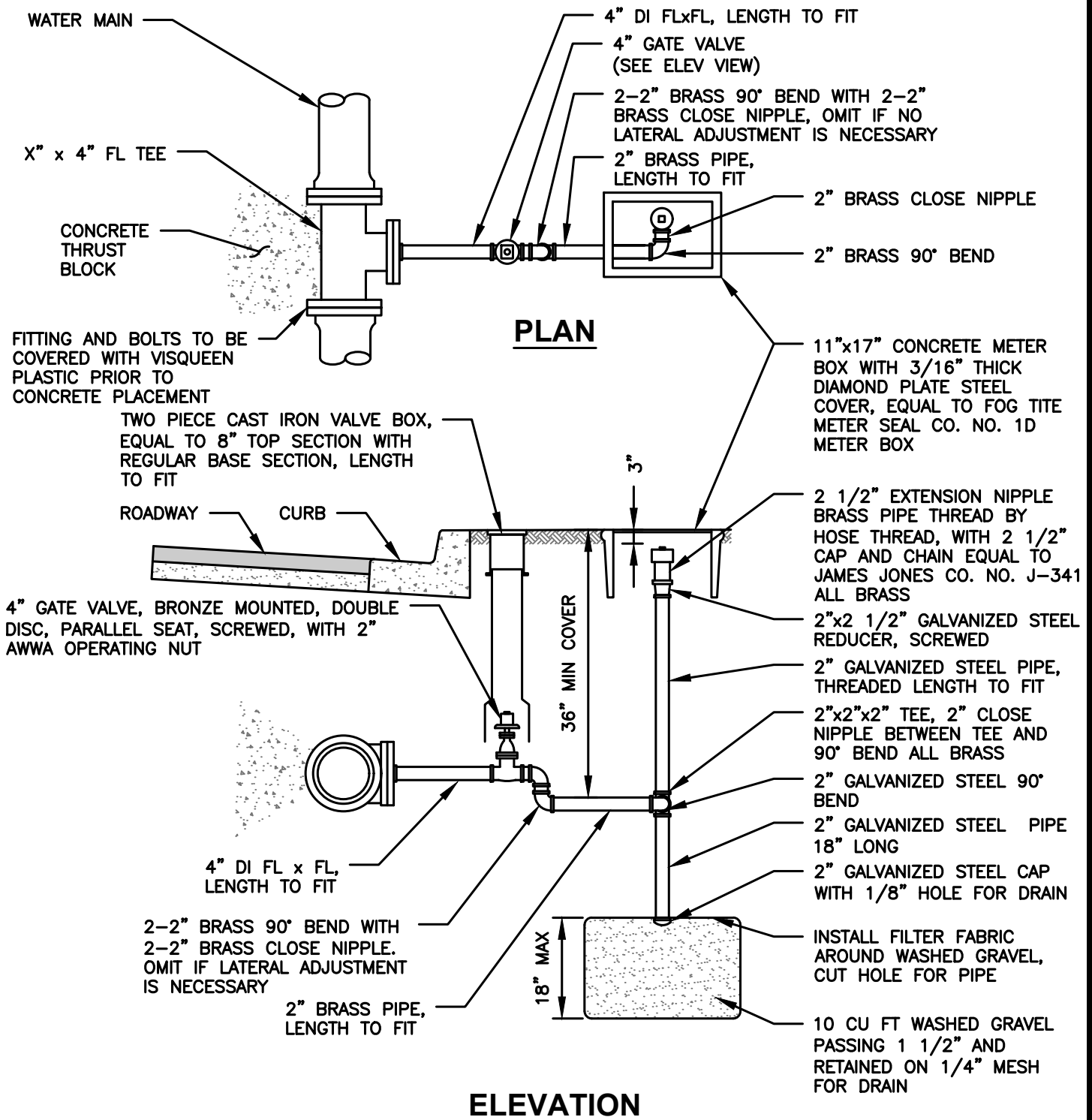
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DWG. NO.

W-15A



CITY OF NORTH BEND

2-INCH BLOW-OFF ASSEMBLY ON MAIN LINE

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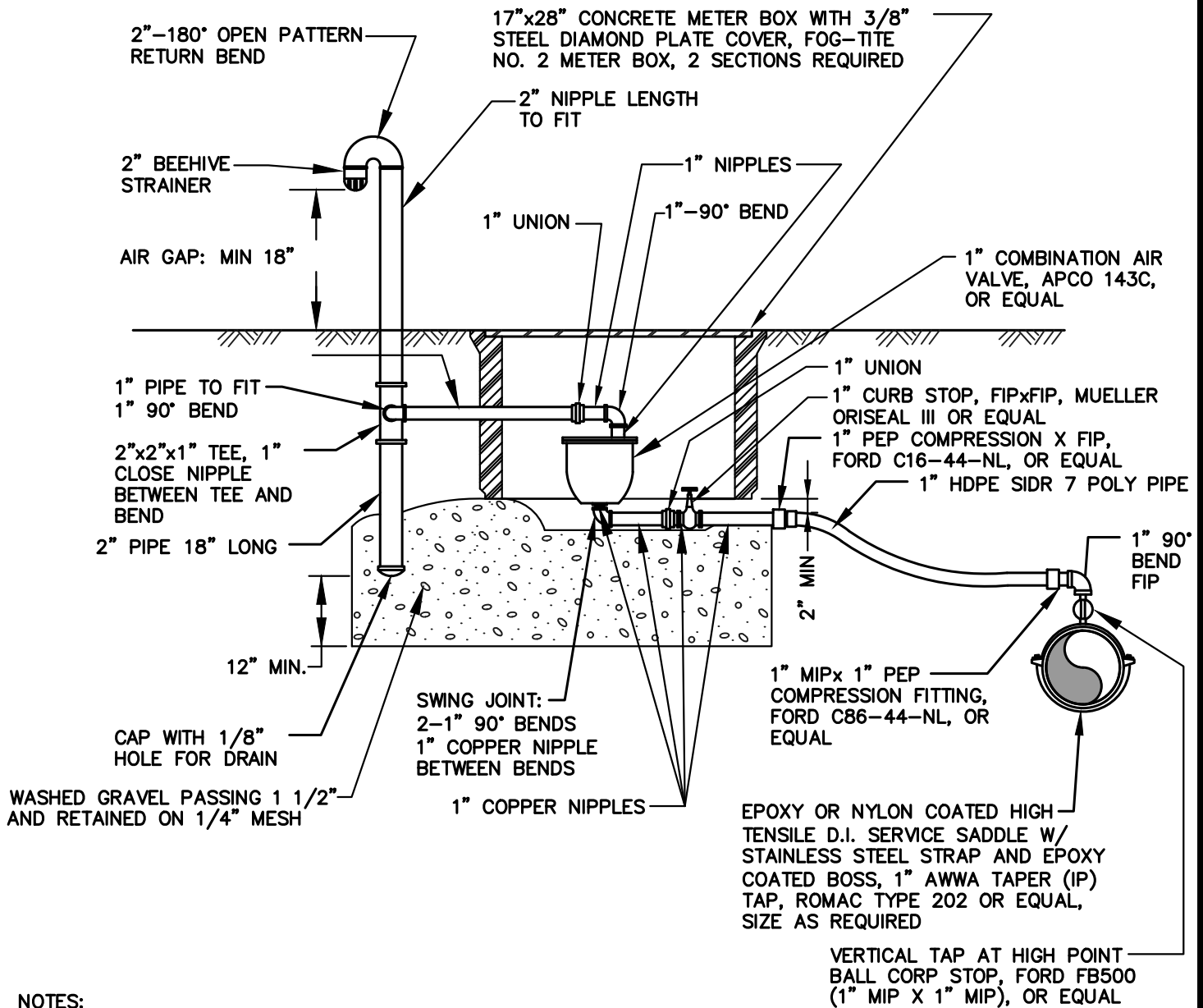
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DWG. NO.

W-15B



CITY OF NORTH BEND

1-INCH AIR & VACUUM RELEASE VALVE ASSEMBLY

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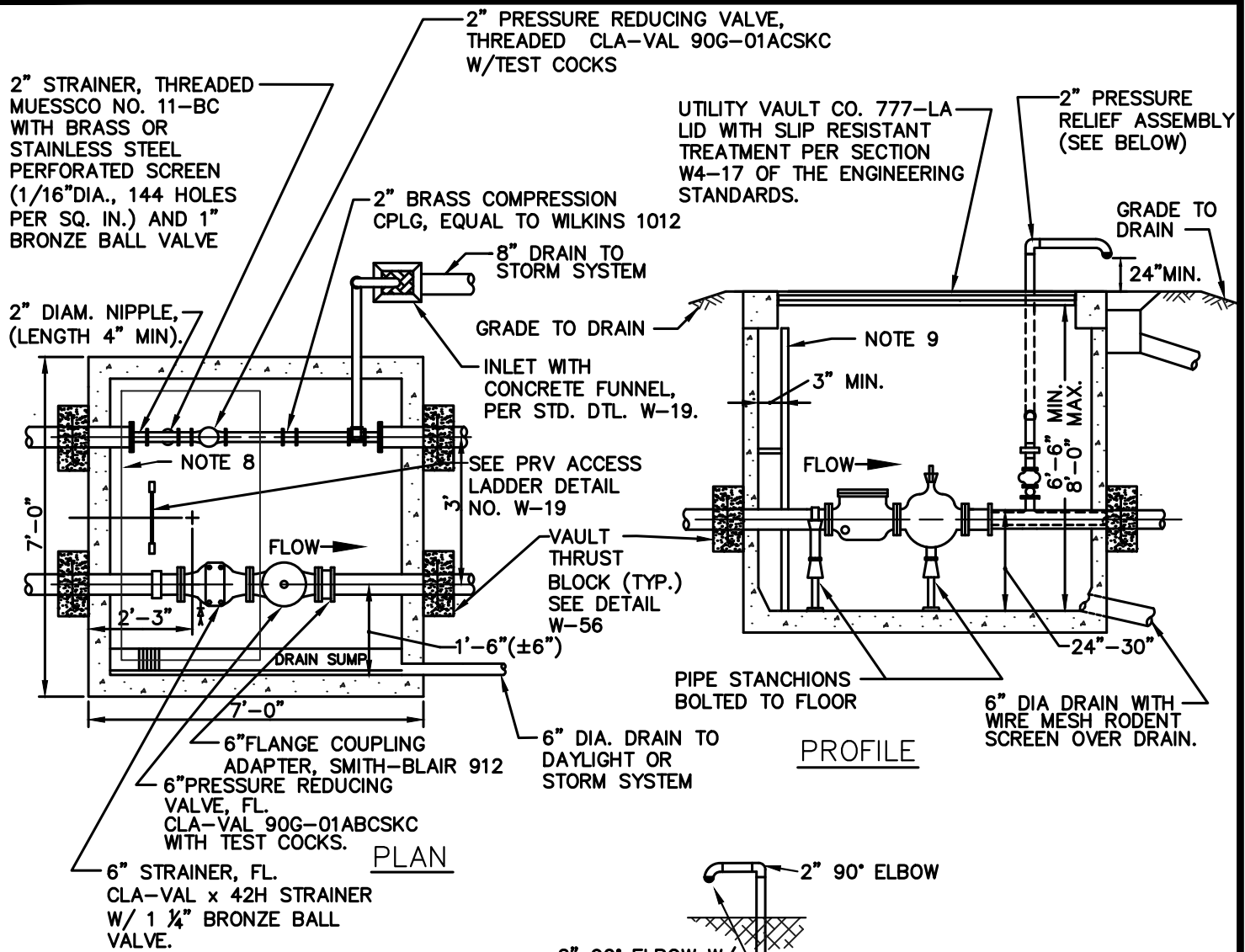
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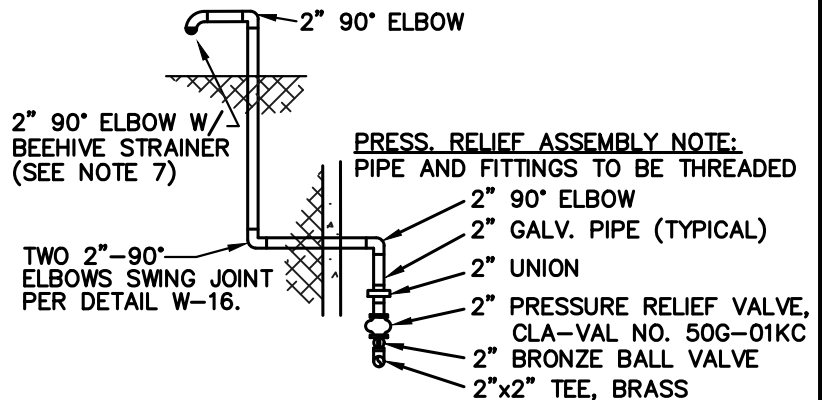
DWG. NO.

W-16



NOTES:

1. SIZING OF VALVES WILL BE MODIFIED FOR OTHER SIZES OF PIPE.
2. GALVANIZED LADDER TO BE SECURED TO VAULT PER STD. DTL. NO. W-19.
3. ALL P.R.V.s SHALL HAVE OPENING/CLOSING SPEED CONTROLS, EPOXY COATED BODY AND VALVE POSITION INDICATOR, CLA-VAL X101.
4. PILOT CONTROLS SHALL BE ON SIDE OF P.R.V. FACING INTERIOR OF VAULT TO PROVIDE EASY ACCESS.
5. ALL CLA-VAL PRVs AND PRESSURE RELIEF VALVES SHALL BE EQUIPPED W/STAINLESS STEEL TRIM (SEAT, STEM & COVER BEARING).
6. SEAL ALL PIPE PENETRATIONS THROUGH VAULT W/ LINK SEAL MODULAR SEALS.
7. PRESSURE RELIEF DISCHARGE DOWNSPOUT SHALL DIRECT WATER TOWARDS CENTER OF INLET GRATE.
8. HATCH AND LADDER PER DETAIL W-19.
9. PROVIDE LADDER-UP EXTENSION, BILCO MODEL LU-2, OR EQUAL.
10. MINIMUM 2' OF LEVEL, UNOBSTRUCTED AREA AROUND HATCHES.
11. PROVIDE CAST OR FIELD CORE DRILLED HOLES THROUGH VAULT WALLS FOR PIPE PENETRATIONS.



2" PRESSURE RELIEF ASSEMBLY



CITY OF NORTH BEND

STANDARD PRESSURE REDUCING STATION

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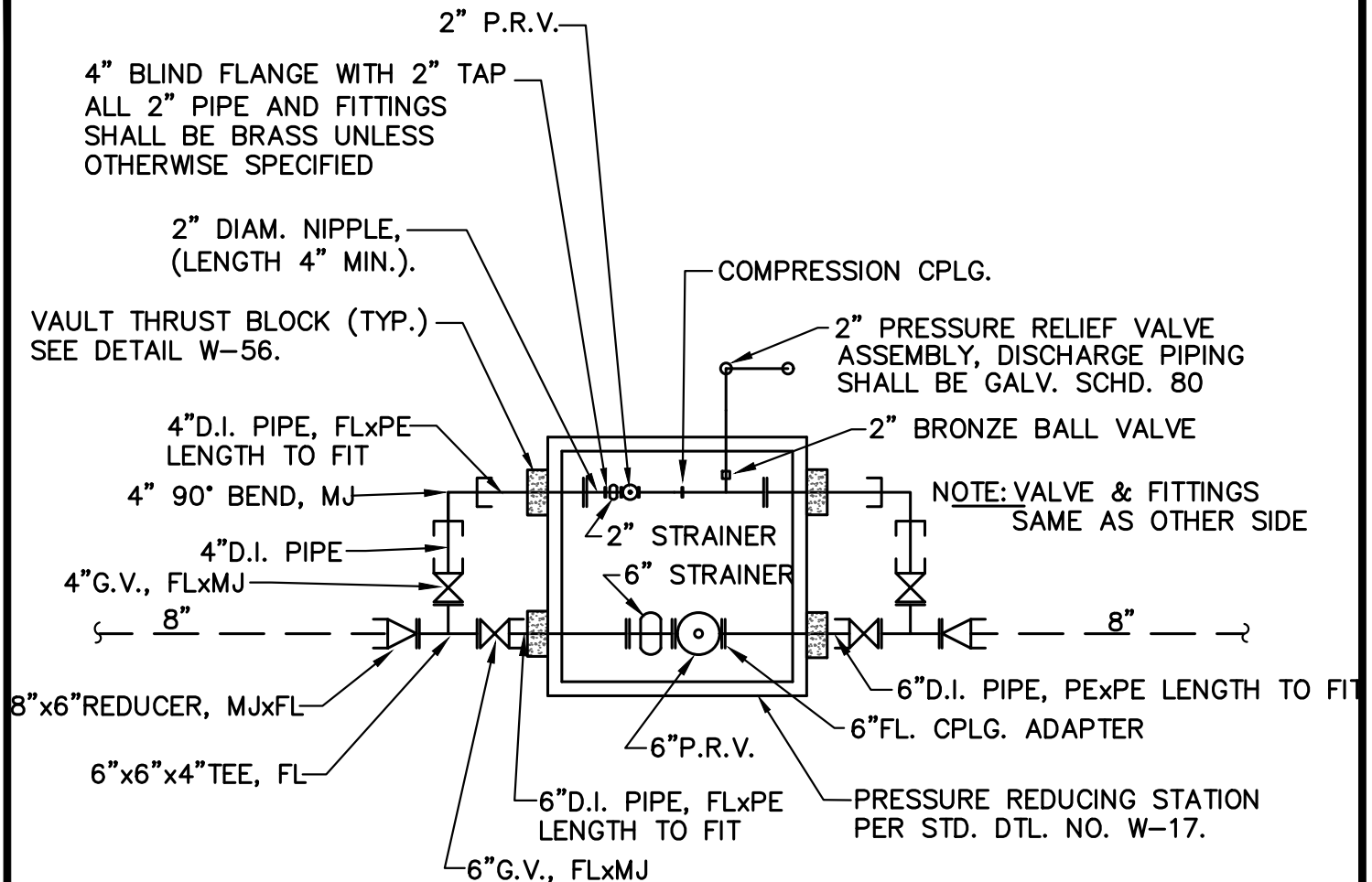
BY CITY

MAY 2018

DATE

DWG. NO.

W-17



NOTE: D.I. PIPING TO BE CLASS 52

NOTES:

1. SIZING OF VALVES WILL BE MODIFIED FOR OTHER SIZES OF PIPE.
2. GALVANIZED LADDER TO BE SECURED TO VAULT PER STD. DTL. NO. W-19.
3. ALL P.R.V.s SHALL HAVE OPENING/CLOSING SPEED CONTROLS, EPOXY COATED BODY AND VALVE POSITION INDICATOR, CLA-VAL X101.
4. PILOT CONTROLS SHALL BE ON SIDE OF P.R.V. FACING INTERIOR OF VAULT TO PROVIDE EASY ACCESS.
5. SEAL ALL PIPE PENETRATIONS THROUGH VAULT W/ LINK SEAL MODULAR SEALS.



CITY OF NORTH BEND

TYPICAL P.R.V. SCHEMATIC

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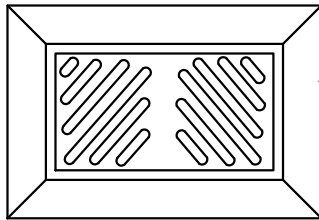
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MAY 2018

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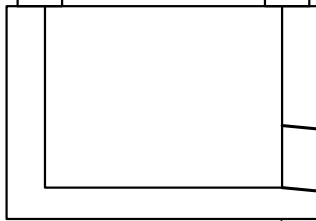
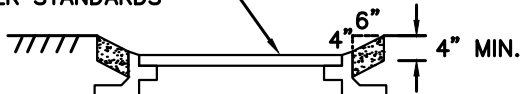
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W-18



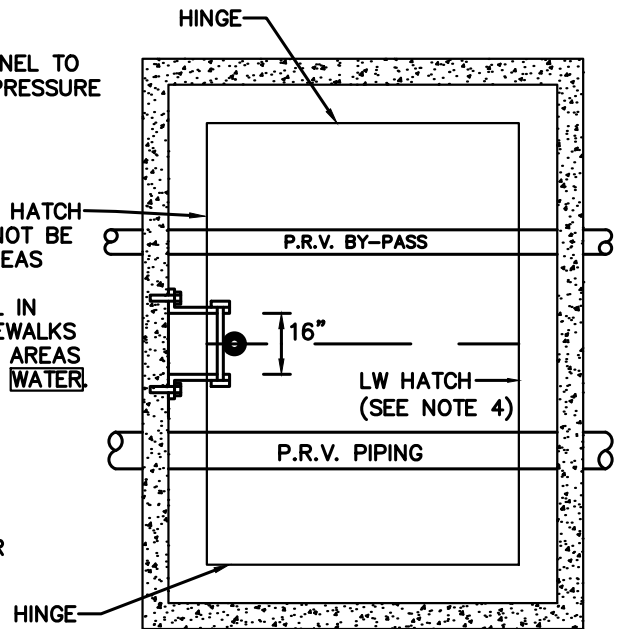
PROVIDE CONCRETE FUNNEL TO CONTAIN WATER FROM PRESSURE RELIEF DISCHARGE.

PARKING LOT/ AREA GRATE AND FRAME PER STANDARDS



CONCRETE INLET PER STANDARDS

VAULTS WITH LW HATCH ACCESS SHALL NOT BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC. INSTALL IN SHOULDERS, SIDEWALKS OR LANDSCAPED AREAS ONLY. TO READ **WATER**



PLAN VIEW

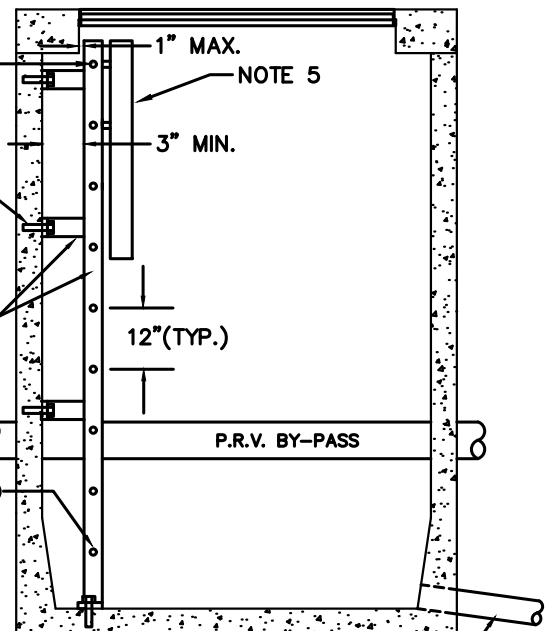
PRESSURE RELIEF DRAIN

FIRST STEP MINIMUM 8" BELOW TOP OF COVER, MAXIMUM 12".

CONCRETE MECHANICAL ANCHOR BOLT, GALVANIZED OR STAINLESS STEEL (TYPICAL)

SIDE RAIL AND BRACKET, 1 1/2" x 1/4" GALV. STEEL (TYPICAL)

RUNG, NO. 8 DEFORMED REINFORCING BAR CONFORMING TO ASTM A 615



ELEVATION VIEW

NOTES:

1. LADDER TO BE SECURED TO VAULT WALL AT 3 LOCATIONS, ONE AT THE TOP, MIDDLE AND BOTTOM.
2. ALL LADDER PARTS TO BE GALVANIZED CONFORMING TO ASTM A 123
3. LOCATE PRESSURE RELIEF DRAIN OUTSIDE PEDESTRIAN AND TRAFFIC AREAS.
4. ACCESS HATCH SHALL BE LOCKING ALUMINUM LW PRODUCTS HDD 48"x60" DOUBLE DOOR MODEL RATED FOR H-30 LOADING WITH SLIP RESISTANT TREATMENT PER SECTION W4-17 OF THE ENGINEERING STANDARDS. HATCHES SHALL INCLUDE RECESSED PADLOCK HASP SIZED TO ACCEPT CITY OF BELLEVUE WATER DIVISION PADLOCKS (CONTACT LW PRODUCTS).
5. LADDER-UP ATTACHMENT REQUIRED ON ALL VAULT LADDERS. BILCO MODEL LU-2, OR EQUAL.
6. MANHOLE LID IS OPTIONAL ONLY WHEN STATION COVER IS LOCATED IN TRAFFIC.
7. DRAIN HATCH GUTTER DRAIN TO EXISTING CB OR DAYLIGHT.



CITY OF NORTH BEND PRESSURE REDUCING STATION ACCESS LADDER AND PRESSURE RELIEF DRAIN

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BY CITY

MAY 2018

DATE

DWG. NO.

W-19



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W-20



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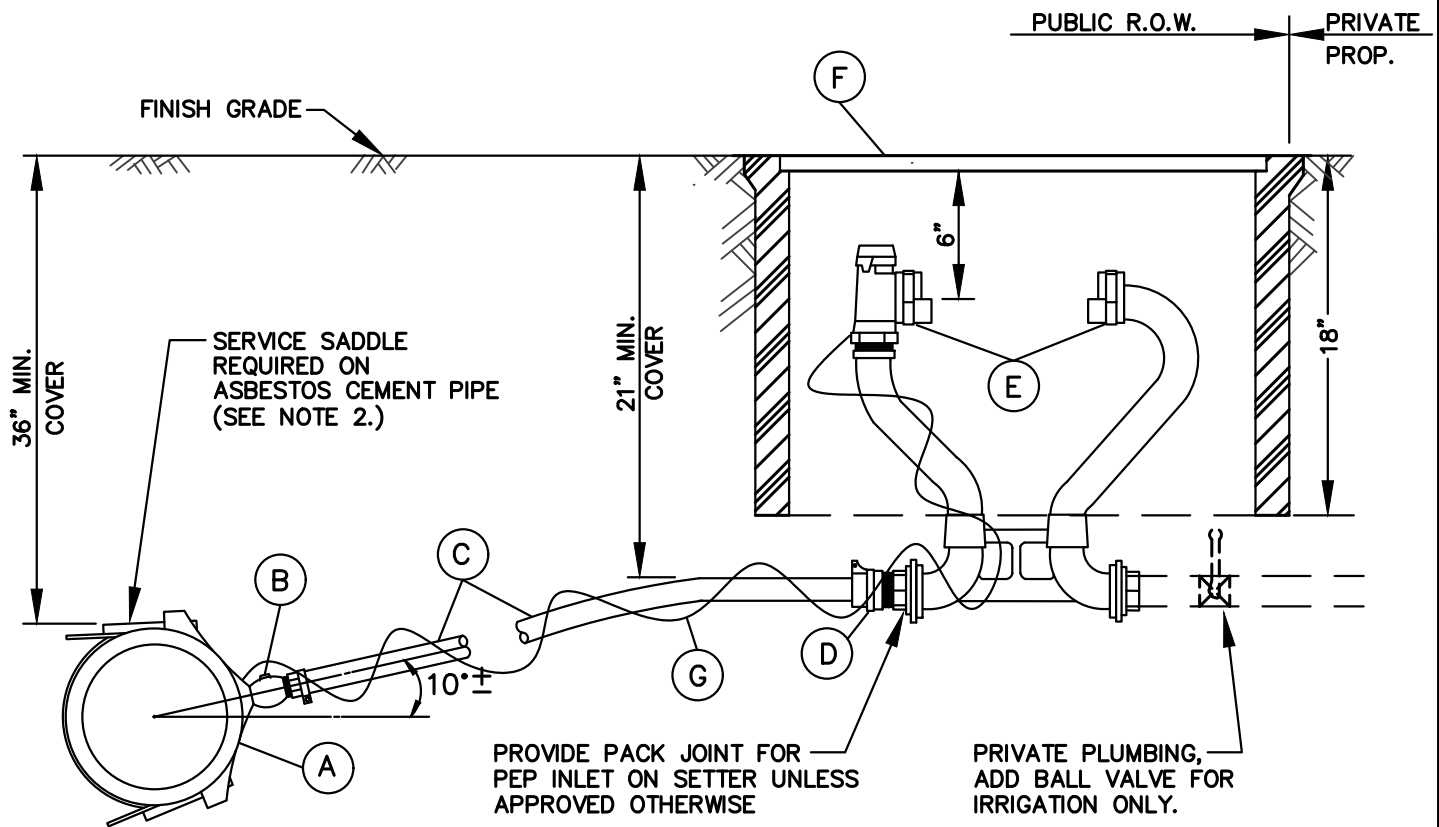
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DATE

DWG. NO.

W-21



HORIZONTAL METER SETTER INSTALLATION

- (A) EPOXY OR NYLON COATED HIGH TENSILE D.I. SERVICE SADDLE W/ STAINLESS STEEL STRAP AND EPOXY COATED BOSS, 1" MIP THREAD ROMAC TYPE 202 OR EQUAL, SIZE AS REQUIRED.
- (B) BALL CORPORATION STOP 1" MIP THREAD INLET BY 1" PACK JOINT OUTLET FOR PE PIPE FORD FB1101-4-NL BA
- (C) 1" HDPE 200 PSI SIDR 7.
- (D) COUPLING, 1" MALE IRON PIPE THREAD BY 3/4" OR 1" PACK JOINT (COMPRESSION FITTING) FOR POLYETHYLENE PIPE (IF APPROVED FOR USE)
- (E) 3/4" OR 1" METER SETTER WITH 3/4" OR 1" PACK JOINT PER PEP INLET (UNLESS APPROVED OTHERWISE) AND SINGLE CHECK VALVE WITH PADLOCK WINGS, OR EQUAL.
- (F) METER BOX, EQUAL TO FOGTITE B-10 (1") OR B-9 1/2 (3/4"), HINGED READER LID AND 2" TR/PL HOLE.
- (G) 12 AWG BLUE TRACER WIRE.

NOTES:

1. SERVICE LINE SHALL BE PERPENDICULAR TO THE WATERMAIN, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
2. APPROVED BACKFLOW PREVENTION MUST BE INSTALLED WITH IRRIGATION SERVICE PER D.O.H. REQUIREMENTS. IRRIGATION SYSTEM SHALL NOT BE PUT INTO SERVICE UNTIL THE BACKFLOW PREVENTION DEVICE IS APPROVED BY A CITY WATER QUALITY TECHNICIAN.
3. METER WILL BE SUPPLIED AND INSTALLED BY THE CITY.



CITY OF NORTH BEND

1x3/4" OR 1"x1" SINGLE WATER
SERVICE OR DOMESTIC
IRRIGATION SERVICE

APPROVED:

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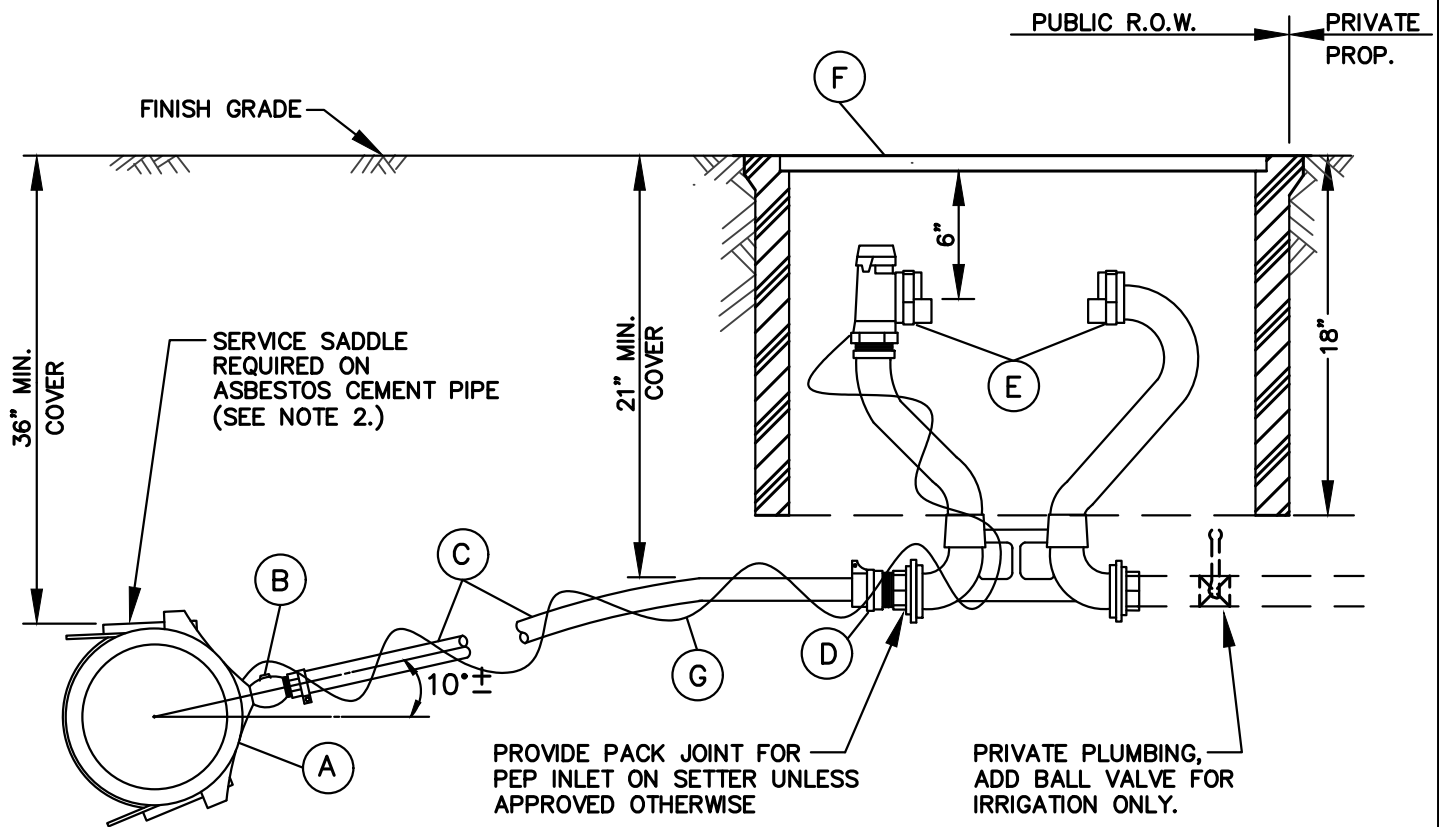
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DATE

DWG. NO.

W-22



HORIZONTAL METER SETTER INSTALLATION

- (A) EPOXY OR NYLON COATED HIGH TENSILE D.I. SERVICE SADDLE W/ STAINLESS STEEL STRAP AND EPOXY COATED BOSS, 1-1/2" MIP THREAD TAP, ROMAC TYPE 202 OR EQUAL, SIZE AS REQUIRED.
- (B) BALL CORPORATION STOP 1-1/2" MIP THREAD INLET BY 1-1/2" PACK JOINT OUTLET FOR PE PIPE FORD FB1101-6-IDR7-NL BALL CORP, OR EQUAL.
- (C) 1" HDPE 200 PSI SIDR 7.
- (D) COUPLING, 1-1/2" MALE IRON PIPE THREAD BY 1-1/2" PACK JOINT (COMPRESSION FITTING) FOR POLYETHYLENE PIPE (IF APPROVED FOR USE). FORD PACK JOINT COUPLING C86-66-IDR7-NL, OR EQUAL.
- (E) 1" METER SETTER WITH 1-1/2" PACK JOINT PER PEP INLET (UNLESS APPROVED OTHERWISE) AND SINGLE CHECK VALVE FORD VBH74-12W-18-XX-XX-NL STYLE, OR EQUAL.
- (F) METER BOX, EQUAL TO FOGTITE B-10 (1") OR B-9 1/2 (3/4"), HINGED READER LID AND 2" TR/PL HOLE.
- (G) 12 AWG BLUE TRACER WIRE.

NOTES:

1. SERVICE LINE SHALL BE PERPENDICULAR TO THE WATERMAIN, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
2. APPROVED BACKFLOW PREVENTION MUST BE INSTALLED WITH IRRIGATION SERVICE PER D.O.H. REQUIREMENTS. IRRIGATION SYSTEM SHALL NOT BE PUT INTO SERVICE UNTIL THE BACKFLOW PREVENTION DEVICE IS APPROVED BY A CITY WATER QUALITY TECHNICIAN.
3. METER WILL BE SUPPLIED AND INSTALLED BY THE CITY.



CITY OF NORTH BEND

1-1/2"x1" SINGLE WATER
SERVICE OR DOMESTIC
IRRIGATION SERVICE

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

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DWG. NO.

W-23



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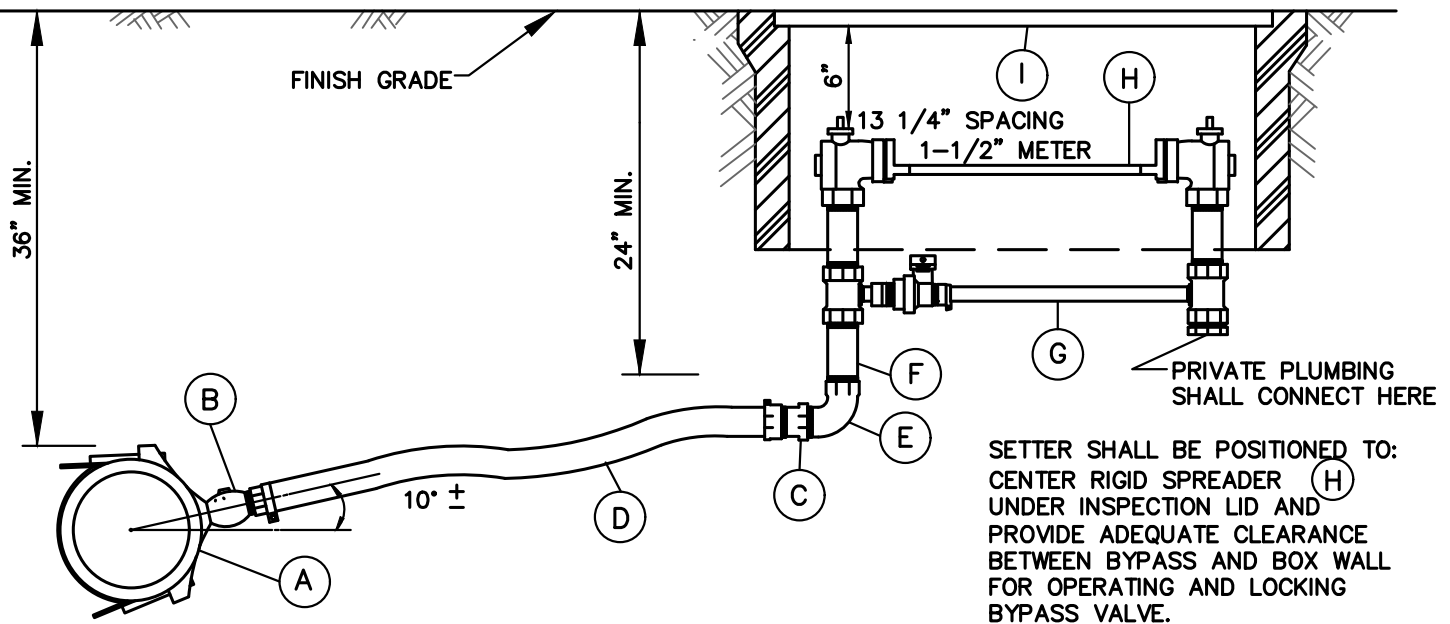
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MAY 2018

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DWG. NO.

W-24



- (A) EPOXY OR NYLON COATED HIGH TENSILE D.I. SERVICE SADDLE W/ DOUBLE STAINLESS STEEL STRAP AND EPOXY COATED BOSS, 1 1/2" MIP TAPER (IP) TAP, FORD FCD202, OR EQUAL, SIZE AS REQUIRED.
- (B) BALL CORPORATION STOP, 1 1/2" MIP TAPER (IP) INLET BY 1 1/2" MALE IRON PIPE THREAD OUTLET WITH BALL VALVE (OR EQUAL LOW-FRICTION VALVE), FORD FB1101-6-IDR7-NL BALL CORP, OR EQUAL.
- (C) 1 1/2" MIP THREAD TO 1 1/2" PACK JOINT FOR PE PIPE, FORD C-86-66-IDR7-NL, OR EQUAL.
- (D) 1 1/2" SDR 7 HDPE.
- (E) 1 1/2" 90 DEGREE BEND, BRASS, FEMALE IRON PIPE THREAD BY FEMALE IRON PIPE THREAD.
- (F) 1 1/2" NIPPLE, BRASS, M.I.P.T. X M.I.P.T., LENGTH AS REQUIRED TO MEET PROPER GRADE.
- (G) 1 1/2" BRASS AND COPPER METER SETTER WITH LOW BYPASS:
 -FLANGED BALL METER VALVE ON INLET AND OUTLET
 -BALL VALVE ON BYPASS
 -PADLOCK WINGS ON ALL VALVES
 -VERTICAL INLET AND OUTLET, F.I.P.T.
 -BUSHING INCLUDED ON OUTLET
 -OMIT BYPASS WHEN USED FOR IRRIGATION ONLY
 FORD VBB76-12B-11-66 WITH LOW BYPASS OR A.Y. MCDONALD 20B612WWFF665 VERTICAL METER SETTER WITH VALVE ROTATED 90 DEG., OR EQUAL.
- (H) RIGID METER SPREADER TO BE INSTALLED IN METER SETTER BY CONTRACTOR.
- (I) METER BOX, EQUAL TO:
 FOGTITE NO. 2 METER BOX (2 SECTIONS REQ'D): CONCRETE LID WITH DROP IN INSPECTION PLATE FOR LANDSCAPED AREAS, STEEL DIAMOND PLATE COVER IN TRAFFIC AREAS.

NOTES:

- SERVICE LINE SHALL BE PERPENDICULAR TO THE WATERMAIN, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
- BYPASS WILL BE LOCKED OFF BY CONSTRUCTION INSPECTOR WHEN METER SPREADER IS INSTALLED.
- METER WILL BE SUPPLIED AND INSTALLED BY THE CITY.



CITY OF NORTH BEND
 1 1/2" DOMESTIC WATER,
 IRRIGATION AND/OR FIRE
 SERVICE

APPROVED:

MARK RIGOS, P.E.

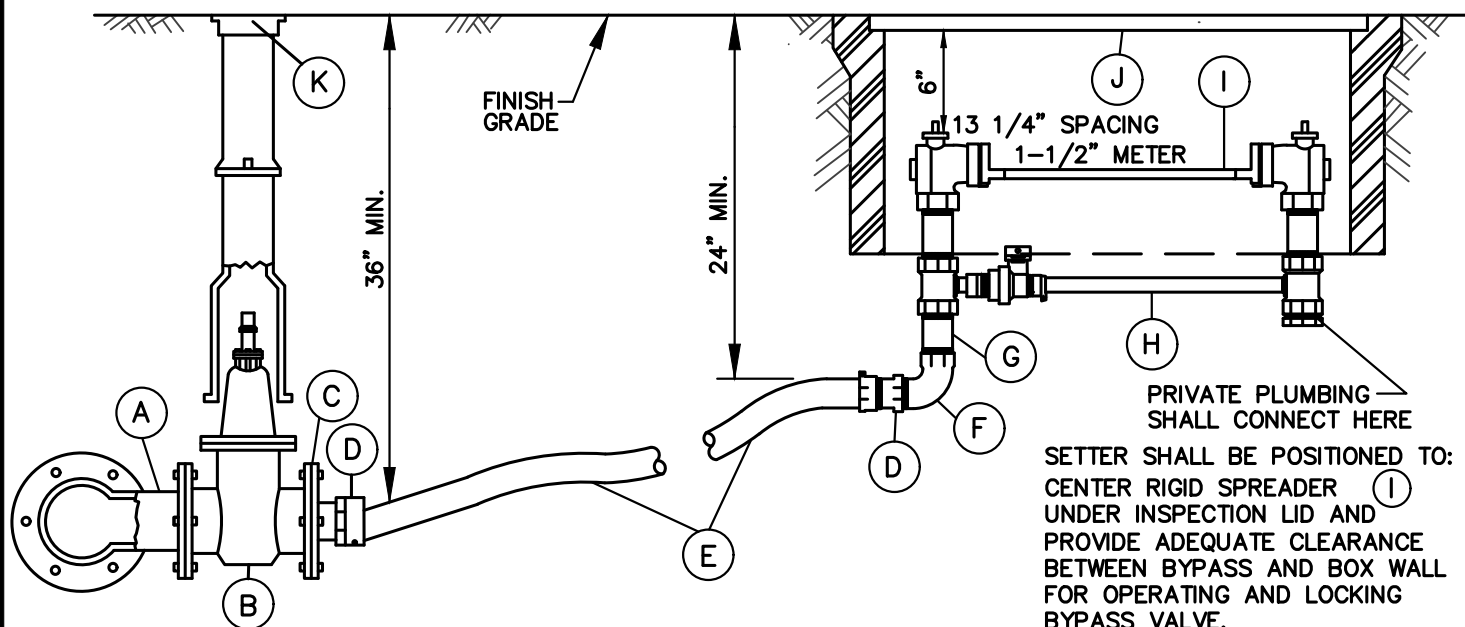
BY CITY

MAY 2018

DATE

DWG. NO.

W-25



- (A) DUCTILE IRON TEE WITH 4" BRANCH, FL WITH (3) GATE VALVES (ON NEW MAINS), TAPPING TEE WITH 4" BRANCH, FL WITH (1) GATE VALVE (ON EXISTING MAINS).
- (B) 4" GATE VALVE, FL.
- (C) 4" REDUCING COMPANION FLANGE WITH 1 1/2" TAP.
- (D) 1 1/2" MIP THREAD TO 1 1/2" PACK JOINT FOR PE PIPE, FORD C-86-66-IDR7-NL, OR EQUAL.
- (E) 1 1/2" SDR 7 HDPE.
- (F) 1 1/2" 90 DEGREE BEND, BRASS, FEMALE IRON PIPE THREAD BY FEMALE IRON PIPE THREAD.
- (G) 1 1/2" NIPPLE, BRASS, M.I.P.T. x M.I.P.T., LENGTH AS REQUIRED TO MEET PROPER GRADE.
- (H) 1 1/2" BRASS AND COPPER METER SETTER WITH LOW BYPASS:
-FLANGED BALL METER VALVE ON INLET AND OUTLET
-BALL VALVE ON BYPASS
-PADLOCK WINGS ON ALL VALVES
-VERTICAL INLET AND OUTLET, F.I.P.T.
-BUSHING INCLUDED ON OUTLET
FORD VBB76-12B-11-66 WITH LOW BYPASS OR A.Y. McDONALD 20B612WWFF665 VERTICAL METER SETTER WITH VALVE ROTATED 90 DEG., OR EQUAL.
- (I) RIGID METER SPREADER TO BE INSTALLED IN METER SETTER BY CONTRACTOR.
- (J) METER BOX, EQUAL TO:
FOGTITE NO. 2 METER BOX (2 SECTIONS REQ'D): CONCRETE LID WITH DROP IN INSPECTION PLATE FOR LANDSCAPED AREAS, STEEL DIAMOND PLATE COVER IN TRAFFIC AREAS.
- (K) TWO PIECE CAST IRON VALVE BOX TO FIT, EQUAL TO OLYMPIC FOUNDRY #045 - WITH RECESSED HANDLE LID. SEE DETAIL W-11.

NOTES:

- SERVICE LINE SHALL BE PERPENDICULAR TO THE WATERMAIN, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
- BYPASS WILL BE LOCKED OFF BY CONSTRUCTION INSPECTOR WHEN METER SPREADER IS INSTALLED.
- METER WILL BE SUPPLIED AND INSTALLED BY THE CITY.



CITY OF NORTH BEND

**1 1/2" DOMESTIC WATER SERVICE
(COMMERCIAL AND MULTI-FAMILY)**

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

W-26



CITY OF NORTH BEND

RESERVED

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

W-27



CITY OF NORTH BEND

RESERVED

APPROVED:

MARK RIGOS, P.E.

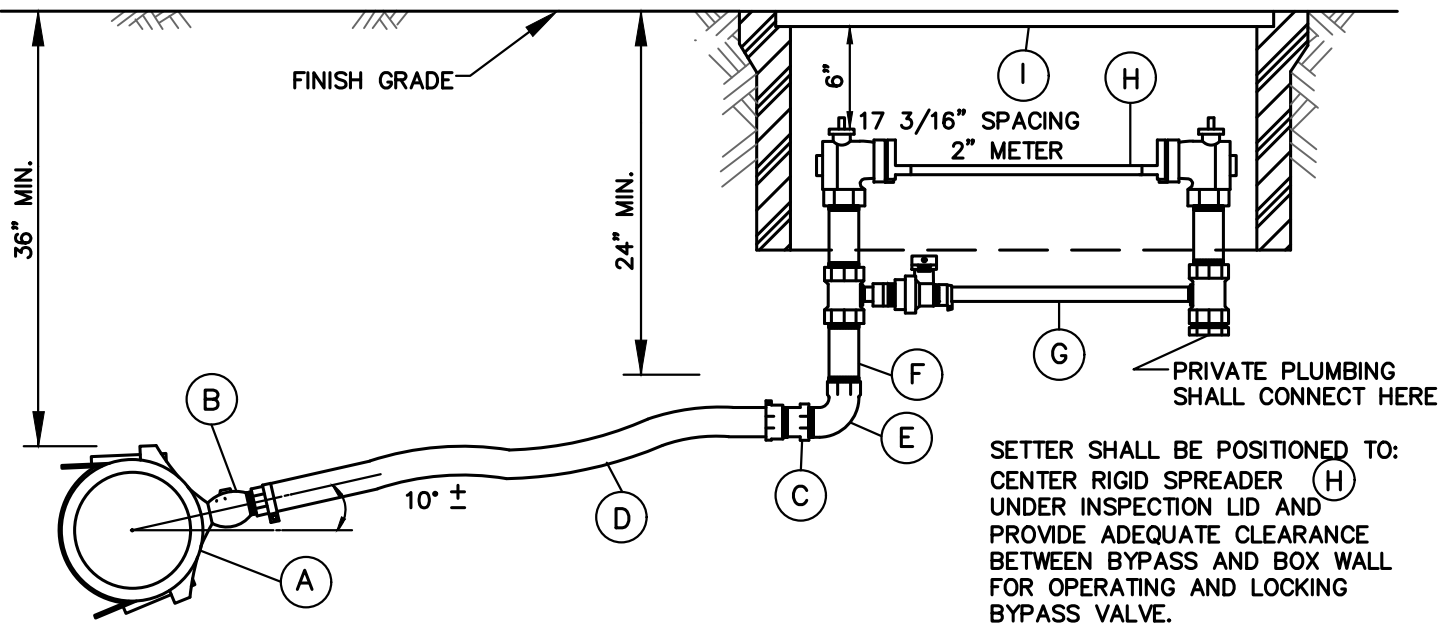
BY CITY

MAY 2018

DATE

DWG. NO.

W-28



- (A) EPOXY OR NYLON COATED HIGH TENSILE D.I. SERVICE SADDLE W/ DOUBLE STAINLESS STEEL STRAP AND EPOXY COATED BOSS, 2" MIP TAPER (IP) TAP, FORD FCD202, OR EQUAL, SIZE AS REQUIRED.
- (B) BALL CORPORATION STOP, 2" MIP TAPER (IP) INLET BY 2" MALE IRON PIPE THREAD OUTLET WITH BALL VALVE (OR EQUAL LOW-FRICTION VALVE), FORD FB1101-7-IDR7-NL BALL CORP, OR EQUAL.
- (C) COUPLING, 2" MIP THREAD TO PACK JOINT FOR PE PIPE, FORD C-86-77-IDR7-NL, OR EQUAL.
- (D) 2" SDR 7 HDPE.
- (E) 2" 90 DEGREE BEND, BRASS, FEMALE IRON PIPE THREAD BY FEMALE IRON PIPE THREAD.
- (F) 2" NIPPLE, BRASS, M.I.P.T. X M.I.P.T., LENGTH AS REQUIRED TO MEET PROPER GRADE.
- (G) 2" BRASS AND COPPER METER SETTER WITH LOW BYPASS:
 - FLANGED BALL METER VALVE ON INLET AND OUTLET
 - BALL VALVE ON BYPASS
 - PADLOCK WINGS ON ALL VALVES
 - VERTICAL INLET AND OUTLET, F.I.P.T.
 - BUSHING INCLUDED ON OUTLET
 - OMIT BYPASS WHEN USED FOR IRRIGATION ONLY
 FORD VBB77-12B-11-77 WITH LOW BYPASS OR A.Y. MCDONALD 20B712WWFF775 VERTICAL METER SETTER WITH VALVE ROTATED 90 DEG., OR EQUAL.
- (H) RIGID METER SPREADER TO BE INSTALLED IN METER SETTER BY CONTRACTOR.
- (I) METER BOX, EQUAL TO:
FOGTITE NO. 2 METER BOX (2 SECTIONS REQ'D): CONCRETE LID WITH DROP IN INSPECTION PLATE FOR LANDSCAPED AREAS, STEEL DIAMOND PLATE COVER IN TRAFFIC AREAS.

NOTES:

1. SERVICE LINE SHALL BE PERPENDICULAR TO THE WATERMAIN, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
2. BYPASS WILL BE LOCKED OFF BY CONSTRUCTION INSPECTOR WHEN METER SPREADER IS INSTALLED.
3. METER WILL BE SUPPLIED AND INSTALLED BY THE CITY.



CITY OF NORTH BEND

**2" DOMESTIC WATER, IRRIGATION
AND/OR FIRE SERVICE**

APPROVED:

MARK RIGOS, P.E.

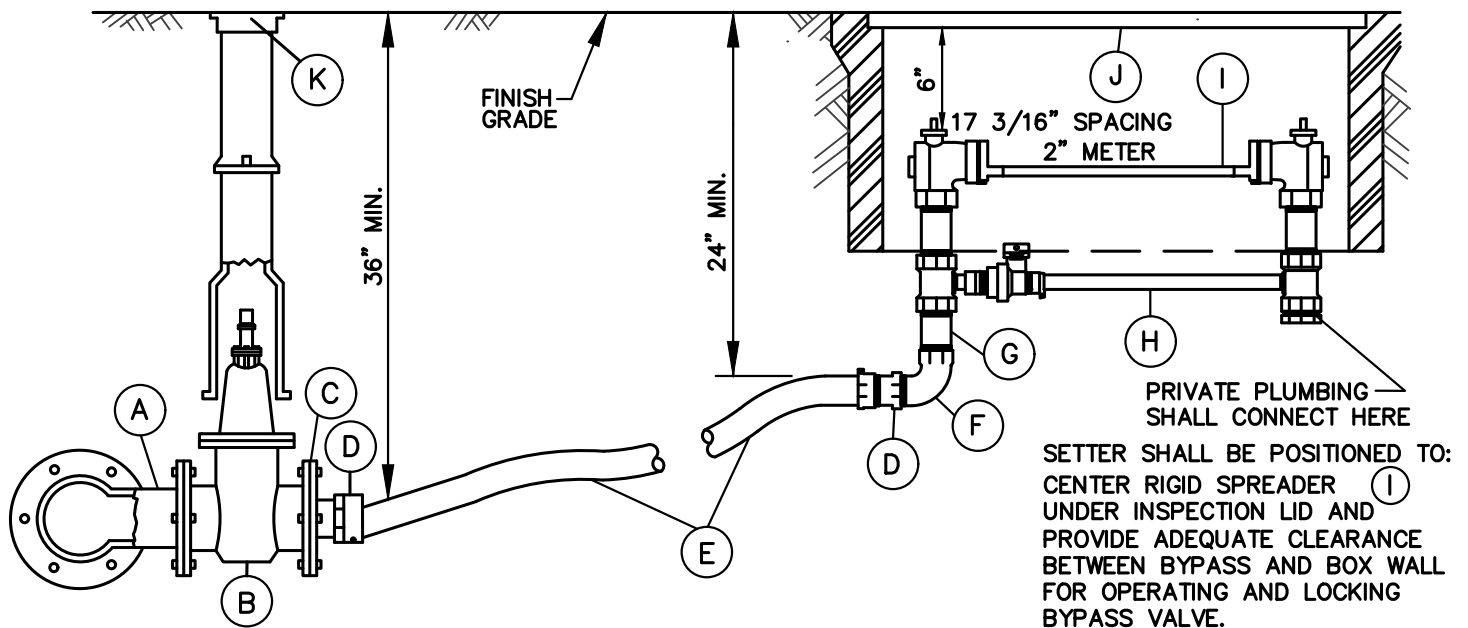
BY CITY

MAY 2018

DATE

DWG. NO.

W-29



- (A) DUCTILE IRON TEE WITH 4" BRANCH, FL WITH (3) GATE VALVES (ON NEW MAINS), TAPPING TEE WITH 4" BRANCH, FL WITH (1) GATE VALVE (ON EXISTING MAINS).
- (B) 4" GATE VALVE, FL.
- (C) 4" REDUCING COMPANION FLANGE WITH 1 1/2" TAP.
- (D) 2" MIP THREAD TO 2" PACK JOINT FOR PE PIPE, FORD C-86-77-IDR7-NL, OR EQUAL.
- (E) 2" SIDR 7 HDPE.
- (F) 2" 90 DEGREE BEND, BRASS, FEMALE IRON PIPE THREAD BY FEMALE IRON PIPE THREAD.
- (G) 2" NIPPLE, BRASS, M.I.P.T. x M.I.P.T., LENGTH AS REQUIRED TO MEET PROPER GRADE.
- (H) 2" BRASS AND COPPER METER SETTER WITH LOW BYPASS:
 -FLANGED BALL METER VALVE ON INLET AND OUTLET
 -BALL VALVE ON BYPASS
 -PADLOCK WINGS ON ALL VALVES
 -VERTICAL INLET AND OUTLET, F.I.P.T.
 -BUSHING INCLUDED ON OUTLET
 FORD VBB77-12B-11-77 WITH LOW BYPASS OR A.Y. MCDONALD 20B712WWFF775 VERTICAL METER SETTER WITH VALVE ROTATED 90 DEG., OR EQUAL.
- (I) RIGID METER SPREADER TO BE INSTALLED IN METER SETTER BY CONTRACTOR.
- (J) METER BOX, EQUAL TO:
 FOGTITE NO. 2 METER BOX (2 SECTIONS REQ'D): CONCRETE LID WITH DROP IN INSPECTION PLATE FOR LANDSCAPED AREAS, STEEL DIAMOND PLATE COVER IN TRAFFIC AREAS.
- (K) TWO PIECE CAST IRON VALVE BOX TO FIT, EQUAL TO OLYMPIC FOUNDRY #045 - WITH RECESSED HANDLE LID. SEE DETAIL W-11.

NOTES:

- SERVICE LINE SHALL BE PERPENDICULAR TO THE WATERMAIN, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
- BYPASS WILL BE LOCKED OFF BY CONSTRUCTION INSPECTOR WHEN METER SPREADER IS INSTALLED.
- METER WILL BE SUPPLIED AND INSTALLED BY THE CITY.



CITY OF NORTH BEND
2" DOMESTIC WATER SERVICE
(COMMERCIAL AND MULTI-FAMILY)

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

W-30



CITY OF NORTH BEND

RESERVED

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

W-31



CITY OF NORTH BEND

RESERVED

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

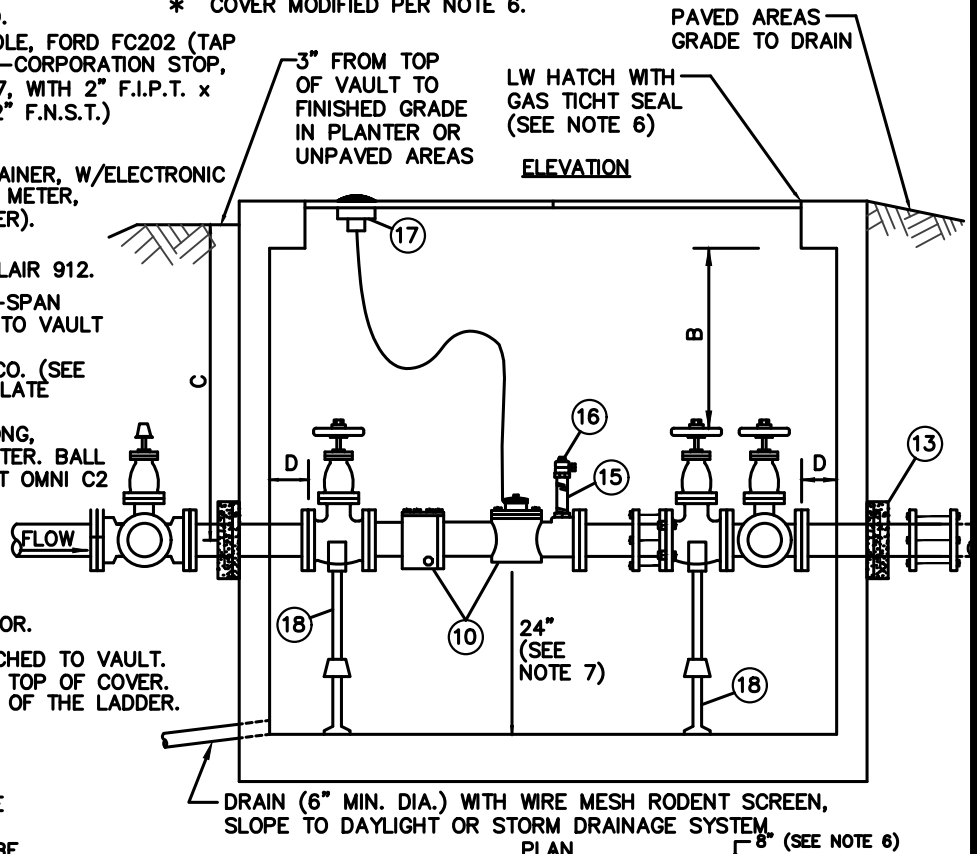
W-32

MATERIALS LIST — (ALL SIZES ARE SAME AS METER UNLESS OTHERWISE LISTED)

- ① 1-MECH. CPLG. TO FIT, EQUAL TO ROMAC 501
- ② 1-4"x3" REDUCER, P.E.xM.J. (FOR 3" SERVICE ONLY)
- ③ 1-TEE, M.J. x FL.
- ④ 1-GATE VALVE, F.L.x M.J. (W/VALVE BOX & COVER)
- ⑤ 3-D.I. PIPE, P.E., LENGTH AS REQUIRED
- ⑥ 2-90° BEND, M.J.
- ⑦ 2-D.I. PIPE, P.E.xFL., LENGTH AS REQUIRED.
- ⑧ 1-EPOXY OR NYLON COATED SERVICE SADDLE, FORD FC202 (TAP POINTED UP AT 12-O'CLOCK) OR EQUAL, 1-CORPORATION STOP, AWWA TAPER(CC) x M.I.P.T., FORD FB400-7, WITH 2" F.I.P.T. x 2 1/2" M.N.S.T. ADAPTOR AND CAP (2 1/2" F.N.S.T.)
- ⑨ 3-GATE VALVE, FL.
- ⑩ SENSUS OMNI C2 METER W/ INTERNAL STRAINER, W/ELECTRONIC RESOLUTION (100'S OF CUBIC FEET FOR 3" METER, 500 CUBIC FEET FOR 4-6" METER) REGISTER).
- ⑪ 1-D.I. ADAPTER FL. x P.E., LENGTH TO FIT.
- ⑫ 2-FL.xCPLG. ADAPTER, EQUAL TO SMITH-BLAIR 912.
- ⑬ WELDED FL. RESTRAINT OR MEGA-LUG MID-SPAN RESTRAINT AND THRUST BLOCK ADJACENT TO VAULT SEE STANDARD DETAIL W-56.
- ⑭ PRECAST CONC. VAULT BY UTILITY VAULT CO. (SEE TABLE FOR MODEL NO.) W/TWO DIAMOND PLATE DOORS RATED FOR H-30 LOADING.
- ⑮ 1-2" BRASS NIPPLE, M.I.P.T.xM.I.P.T., 6" LONG, CONNECT TO TEST PORT OF COMPOUND METER. BALL VALVE FORD FB1000 FIPTxFIPT SIZED TO FIT OMNI C2 FLUSHPORT.
- ⑯ 2 M.I.P.T. x 2 1/2" MNST ADAPTOR AND CAP (2 1/2" FNST).
- ⑰ TR/PL SENSOR (TO MOUNT IN VAULT ACCESS DOOR).
- ⑱ 2-ADJUSTABLE STANCHION BOLTED TO FLOOR.
- ⑲ 1-GALVANIZED STEEL LADDER TO BE ATTACHED TO VAULT. THE FIRST STEP SHALL BE MAX. 8" BELOW TOP OF COVER.
- ⑳ 1-BILCO LADDER UP, LU-2 MODEL AT TOP OF THE LADDER. SEE DETAIL W-19.
- ㉑ 1- TEE, FL.

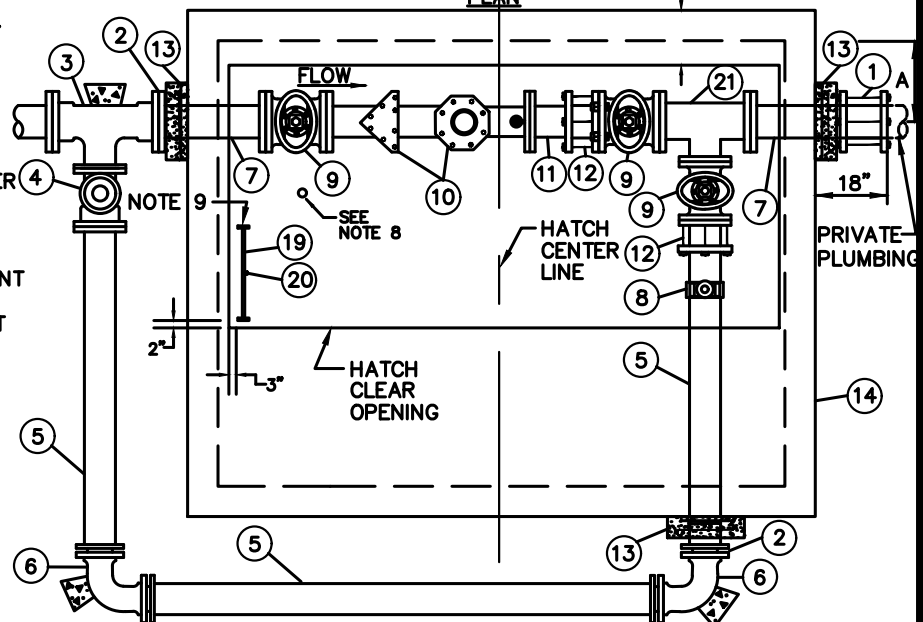
METER SIZE	MAIN-LINE	BYPASS	CORP STOP FOR FLUSH PORT-SIZE	MIN. CLEARANCES				VAULT MODEL	VAULT COVER * (W/SPECIAL OFFSET)
				A	B	C	D		
3"	4"D.I.	4" D.I.	2"	10"	6"	2'-8"	6"	577-LA	57TL-2-332P
4"	4"D.I.	4" D.I.	2"	12"	6"	2'-8"	6"	676-WA	676-TW-2-332P
6"	6"D.I.	6" D.I.	2"	12"	6"	3'-2"	6"	4484-LA	4484-TL2-332P

* COVER MODIFIED PER NOTE 6.



NOTES:

1. ALL MATERIALS, INCLUDING METER SHALL BE FURNISHED BY CONTRACTOR.
2. ALL PIPE & FITTINGS 3" & LARGER SHALL BE CEMENT LINED DUCTILE IRON, CLASS 52 MINIMUM.
3. TEE WITH (3) GATE VALVES REQUIRED AT DISTRIBUTION MAIN.
4. VAULTS SHALL NOT BE INSTALLED IN AREAS W/VEHICULAR TRAFFIC.
5. IN CENTRAL BUSINESS DISTRICT, 3" THROUGH 6" METERS SHALL CONNECT TO WATER MAIN W/8" PIPE (SUBSTITUTE 8"xSERVICE SIZE REDUCER M.J.xP.E., AT UPSTREAM SIDE OF ITEM (3)).
6. VAULT COVER SHALL INCLUDE 2 LOCKING ALUMINUM LW HATCH DOORS (PART NO. HHD-36"x72") DOORS SHALL HAVE SLIP RESISTANT TREATMENT PER SECTION W4-17 OF THE ENGINEERING STANDARDS. DOORS SHALL BE CAST IN COVER WITH 8" SPECIAL OFFSET FROM VAULT WALL, AS SHOWN. COVER TO READ "WATER".
7. PROVIDE 24" CLEARANCE BETWEEN VAULT FLOOR & BOTTOM OF COMPOUND METER. WHERE ELEVATION OF VAULT FLOOR IS TOO LOW TO DRAIN TO DAYLIGHT OR STORM SYSTEM, THIS CLEARANCE CAN BE REDUCED TO A MINIMUM OF 12", IF SUBSTITUTION OF A SHORTER VAULT ALLOWS FLOOR TO DRAIN TO DAYLIGHT OR STORM SYSTEM (APPROVED BY THE UTILITY ON A CASE BY CASE BASIS ONLY). SUBSTITUTE VAULTS ARE AS FOLLOWS:
 3" 575-LA WITH 57TL-2-332P COVER (WITH SPECIAL OFFSET + LW ALUM. HATCH)
 4" 675-WA WITH 675-TW-2-332P COVER (WITH SPECIAL OFFSET + LW ALUM. HATCH)
8. PROVIDE 2 1/4" DIAM. OPENING IN ALUMINUM DOOR FOR TR/PL SENSOR.
9. LADDER TO BE BOLTED TO VAULT FLOOR AND TO VAULT WALL AT THREE LOCATIONS. RUNGS SHALL BE SPACED AT 12" ON CENTER.
10. ALL FITTINGS OUTSIDE VAULT SHALL INCLUDE THRUST BLOCKING AND JOINT RESTRAINT DEVICES.
11. PIPE, FITTINGS, VALVES OUTSIDE VAULT SHALL BE 4" FOR 3" SERVICE INSTALLATION.
12. MINIMUM 2' OF LEVEL, UNOBSTRUCTED AREA AROUND HATCHES.



CITY OF NORTH BEND

3" TO 6" DOMESTIC METER INSTALLATION

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

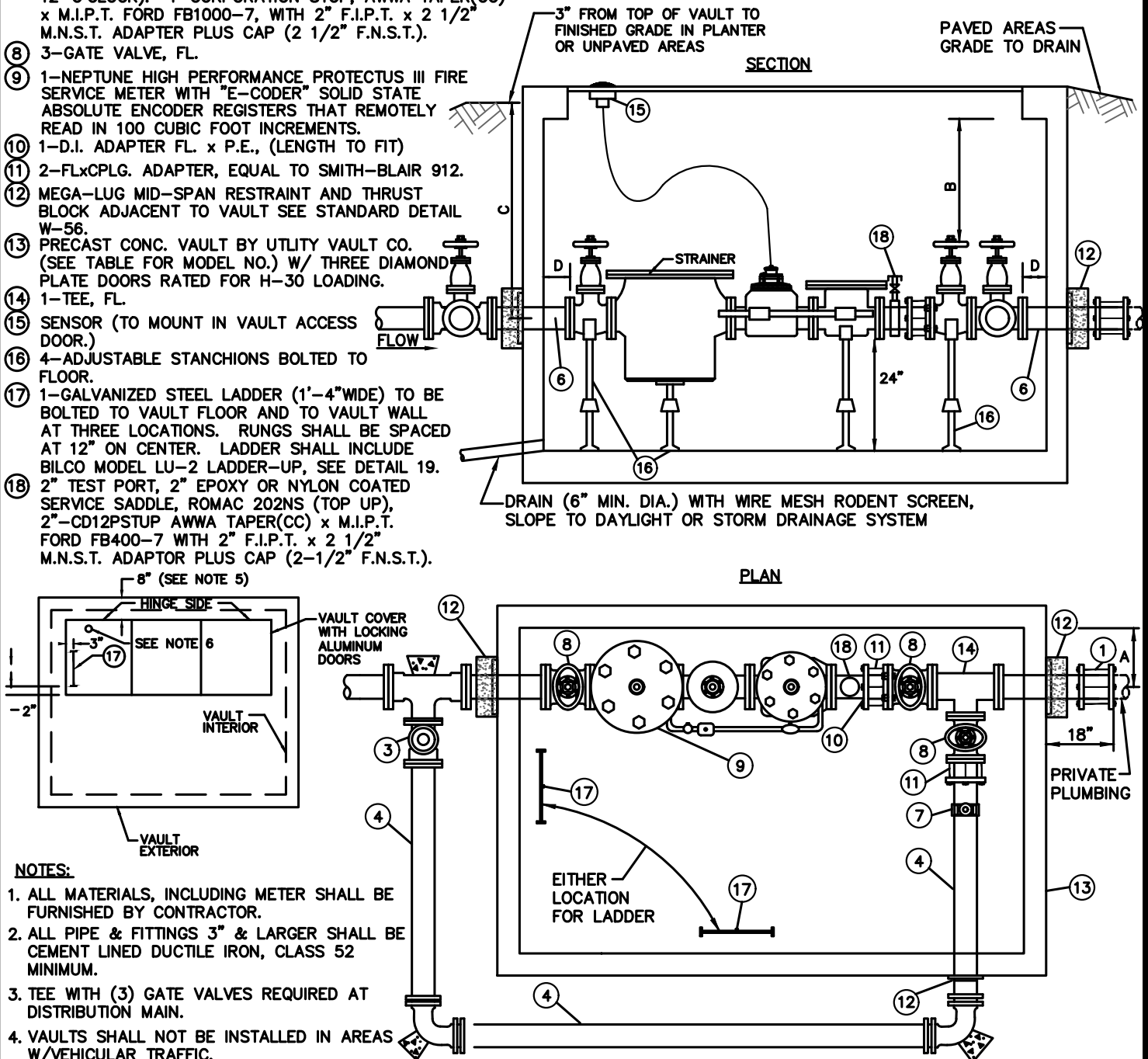
W-33

MATERIALS LIST – (ALL SIZES ARE SAME AS METER UNLESS OTHERWISE LISTED)

- ① 1-MECH CPLG. TO FIT, EQUAL TO ROMAC 501
- ② 1-TEE, M.J. x FL.
- ③ 1-GATE VALVE, F.L.x M.J. (W/VALVE BOX & COVER)
- ④ 3-D.I. PIPE, P.E., LENGTH AS REQUIRED
- ⑤ 2-90° BEND, M.J.
- ⑥ 2-D.I. PIPE, P.E.xFL., LENGTH AS REQUIRED.
- ⑦ 1-EPOXY OR NYLON COATED SERVICE SADDLE, FORD FC202 OR FCD202 OR EQUAL (TAP POINTED UP AT 12-O'CLOCK). 1-CORPORATION STOP, AWWA TAPER(CC) x M.I.P.T. FORD FB1000-7, WITH 2" F.I.P.T. x 2 1/2" M.N.S.T. ADAPTER PLUS CAP (2 1/2" F.N.S.T.).
- ⑧ 3-GATE VALVE, FL.
- ⑨ 1-NEPTUNE HIGH PERFORMANCE PROTECTUS III FIRE SERVICE METER WITH "E-CODER" SOLID STATE ABSOLUTE ENCODER REGISTERS THAT REMOTELY READ IN 100 CUBIC FOOT INCREMENTS.
- ⑩ 1-D.I. ADAPTER FL. x P.E., (LENGTH TO FIT)
- ⑪ 2-FLxCPLG. ADAPTER, EQUAL TO SMITH-BLAIR 912.
- ⑫ MEGA-LUG MID-SPAN RESTRAINT AND THRUST BLOCK ADJACENT TO VAULT SEE STANDARD DETAIL W-56.
- ⑬ PRECAST CONC. VAULT BY UTILITY VAULT CO. (SEE TABLE FOR MODEL NO.) W/ THREE DIAMOND PLATE DOORS RATED FOR H-30 LOADING.
- ⑭ 1-TEE, FL.
- ⑮ SENSOR (TO MOUNT IN VAULT ACCESS DOOR.)
- ⑯ 4-ADJUSTABLE STANCHIONS BOLTED TO FLOOR.
- ⑰ 1-GALVANIZED STEEL LADDER (1'-4"WIDE) TO BE BOLTED TO VAULT FLOOR AND TO VAULT WALL AT THREE LOCATIONS. RUNGS SHALL BE SPACED AT 12" ON CENTER. LADDER SHALL INCLUDE BILCO MODEL LU-2 LADDER-UP, SEE DETAIL 19.
- ⑱ 2" TEST PORT, 2" EPOXY OR NYLON COATED SERVICE SADDLE, ROMAC 202NS (TOP UP), 2"-CD12PSTUP AWWA TAPER(CC) x M.I.P.T. FORD FB400-7 WITH 2" F.I.P.T. x 2 1/2" M.N.S.T. ADAPTOR PLUS CAP (2-1/2" F.N.S.T.).

METER SIZE	MAIN-LINE	BYPASS	CORP STOP FOR FLUSH PORT-SIZE	MIN. CLEARANCES				VAULT MODEL	VAULT COVER * (W/SPECIAL OFFSET)
				A	B	C	D		
8"	8"D.I.	8" D.I.	2"	21"	6"	5'-0"	6"	712-LA	712TL-3-332P

* COVER MODIFIED PER NOTE 5.



NOTES:

1. ALL MATERIALS, INCLUDING METER SHALL BE FURNISHED BY CONTRACTOR.
2. ALL PIPE & FITTINGS 3" & LARGER SHALL BE CEMENT LINED DUCTILE IRON, CLASS 52 MINIMUM.
3. TEE WITH (3) GATE VALVES REQUIRED AT DISTRIBUTION MAIN.
4. VAULTS SHALL NOT BE INSTALLED IN AREAS W/VEHICULAR TRAFFIC.
5. VAULT COVER SHALL INCLUDE 3 LOCKING ALUMINUM LW HATCH DOORS (PART NO. HHS-42"x42") WITH SLIP RESISTANT TREATMENT PER SECTION W4-17 OF THE ENGINEERING STANDARDS. DOORS SHALL BE CAST IN COVER WITH 8" SPECIAL OFFSET FROM VAULT WALL, AS SHOWN. COVER TO READ "WATER".
6. PROVIDE 2 1/4" DIAM. OPENING IN STEEL DOOR FOR SENSOR.
7. ALL FITTINGS OUTSIDE VAULT SHALL INCLUDE THRUST BLOCKING AND JOINT RESTRAINT DEVICES.
8. MINIMUM 2' OF LEVEL, UNOBSTRUCTED AREA AROUND HATCHES.



CITY OF NORTH BEND

8" DOMESTIC METER INSTALLATION

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

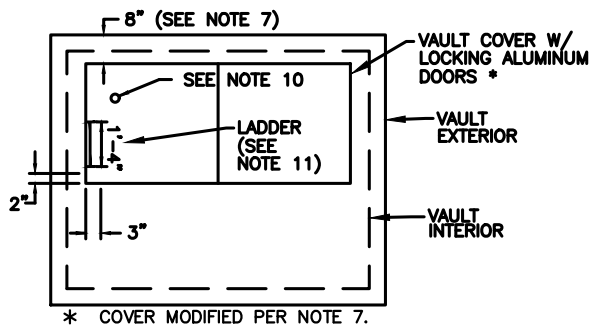
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W-34

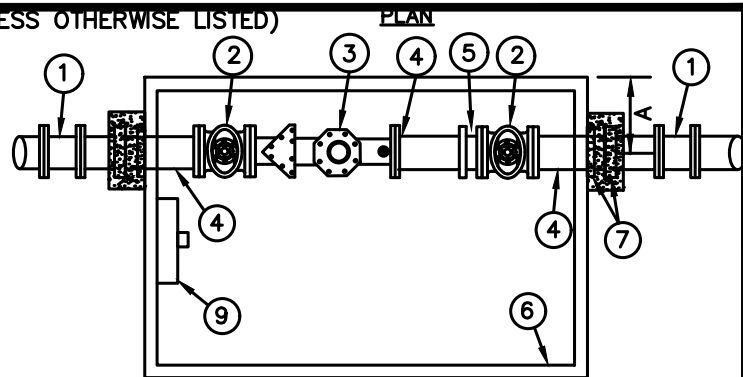
MATERIALS LIST— (ALL SIZES ARE SAME AS METER UNLESS OTHERWISE LISTED)

- ① 2—MECH. CPLG. TO FIT, EQUAL TO ROMAC 501 (4"x3" REDUCER, M.J. FOR 3" METER INSTALLATION ON UPSTREAM SIDE OF VAULT).
- ② 2—GATE VALVE, FLANGE.
- ③ 1—SENSUS OMNI C2 METER WITH INTERNAL STRAINER WITH ELECTRONIC REGISTER RESOLUTION (100'S OF CUBIC FEET FOR 3" METER, 500 CUBIC FEET FOR 4–6" METER) REGISTER.
- ④ 1—D.I. ADPT. FL.xPE. LENGTH TO FIT.
- ⑤ 1—CPLG. ADPT., FL. ROMAC — FCA 501.
- ⑥ PRECAST CONC. VAULT BY UTILITY VAULT CO. (577—LA.) WITH TWO DIAMOND PLATE DOORS RATED FOR H-30 LOADING W/ 8" OFFSET, SEE NOTE 7.
- ⑦ WELDED FL. RESTRAINT OR MEGALUG MID-SPAN RESTRAINT AND THRUST BLOCK ADJACENT TO VAULT STANDARD DETAIL W-56.
- ⑧ CONNECT THE FOLLOWING TO METER TEST PORT. 1—2" BRASS NIPPLE, M.I.P.T. x M.I.P.T. AND 2" F.I.P.T. x 2 1/2" M.N.S.T. PLUS CAP (2 1/2" M.N.S.T.), 6" LONG 1—2" BALL VALVE, F.I.P.T. x M.I.P.T. FORD B81-777
- ⑨ 1—GALVANIZED STEEL LADDER TO BE ATTACHED TO VAULT. SEE NOTE 11.
- ⑩ TR/PL SENSOR (TO MOUNT IN VAULT ACCESS DOOR).

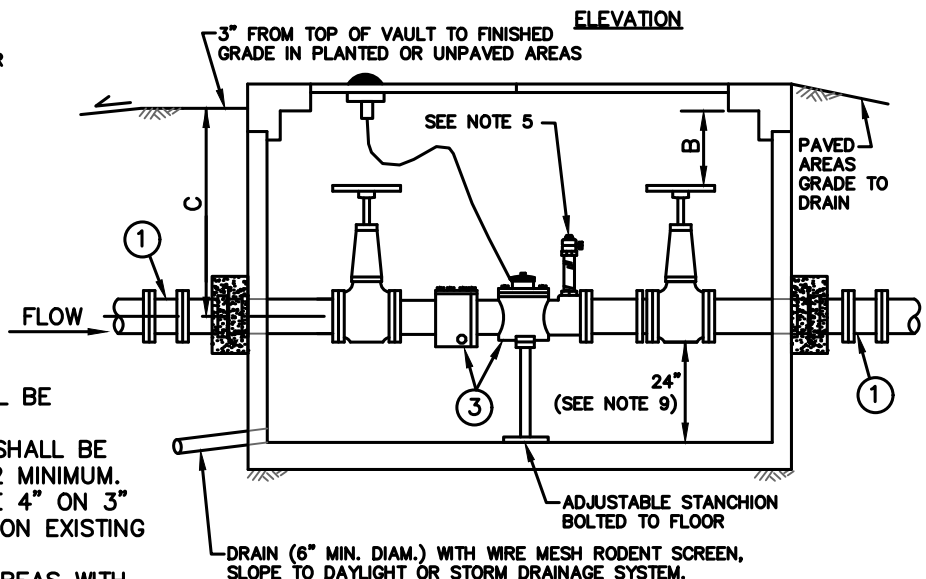


NOTES:

1. ALL MATERIALS INCLUDING METER SHALL BE FURNISHED BY CONTRACTOR.
2. ALL PIPE & FITTINGS 3" AND LARGER SHALL BE CEMENT LINED DUCTILE IRON, CLASS 52 MINIMUM.
3. PIPING FROM MAIN TO VAULT SHALL BE 4" ON 3" METER INSTALLATION. TEE WITH VALVE ON EXISTING MAIN REQUIRED.
4. VAULTS SHALL NOT BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC.
5. TEST PORT NOZZLE SHALL BE DIRECTED UPWARD UNLESS OTHERWISE DIRECTED, (SEE ITEM 8).
6. IN CENTRAL BUSINESS DISTRICT, CONNECT TO WATER MAIN WITH 8" PIPE. SUBSTITUTE 8" X SERVICE SIZE REDUCER, MJ, FOR ITEM 1 ON UPSTREAM SIDE OF VAULT. VAULT COVER SHALL INCLUDE 2 LOCKING ALUMINUM LW HATCH DOORS (PART NO. HHD-48"x48") WITH SLIP RESISTANT TREATMENT PER SECTION W4-17 OF THE ENGINEERING STANDARDS. DOORS SHALL BE CAST IN COVER WITH 8" SPECIAL OFFSET FROM VAULT WALL, AS SHOWN. COVER TO READ "WATER".



8. MINIMUM 2' OF LEVEL, UNOBSTRUCTED AREA AROUND HATCHES.
9. PROVIDE 24" CLEARANCE BETWEEN VAULT FLOOR & BOTTOM OF METER, WHERE ELEVATION OF VAULT FLOOR IS TOO LOW TO DRAIN TO DAYLIGHT OR STORM SYSTEM. THIS CLEARANCE CAN BE REDUCED TO A MINIMUM OF 12", IF SUBSTITUTION OF A SHORTER VAULT ALLOWS FLOOR TO DRAIN TO DAYLIGHT OR STORM SYSTEM (APPROVED BY THE UTILITY ON A CASE BY CASE BASIS ONLY.) SUBSTITUTE VAULT AS FOLLOWS: 575—LA WITH LW PRODUCTS HHD-48"x48" COVER (WITH SPECIAL OFFSET) ALLOWED ONLY ON 3" AND 4" METERS.
10. PROVIDE 2 1/4" DIAM. OPENING IN ALUMINUM HATCH DOOR FOR TR/PL SENSOR.
11. LADDER TO BE BOLTED TO VAULT FLOOR AND TO VAULT WALL AT THREE LOCATIONS. RUNGS SHALL BE SPACED AT 12" ON CENTER. LADDER SHALL INCLUDE BILCO MODEL LU-2 LADDER-UP. SEE DETAIL 19.
12. A FULL FLOW BYPASS MAY BE REQUIRED, DEPENDING ON APPLICATION. TO BE DETERMINED BY THE CITY.



METER SIZE	MAIN-LINE	CORP. STOP FOR METER TESTING SIZE	MINIMUM CLEARANCES			
			A	B	C	D
3"	4"D.I.	2"	10"	6"	2'-8"	9"
4"	4"D.I.	2"	12"	6"	2'-8"	9"
6"	6"D.I.	2"	13"	6"	3'-2"	6"



CITY OF NORTH BEND

3" TO 6" IRRIGATION METER INSTALLATION

APPROVED:

MARK RIGOS, P.E.

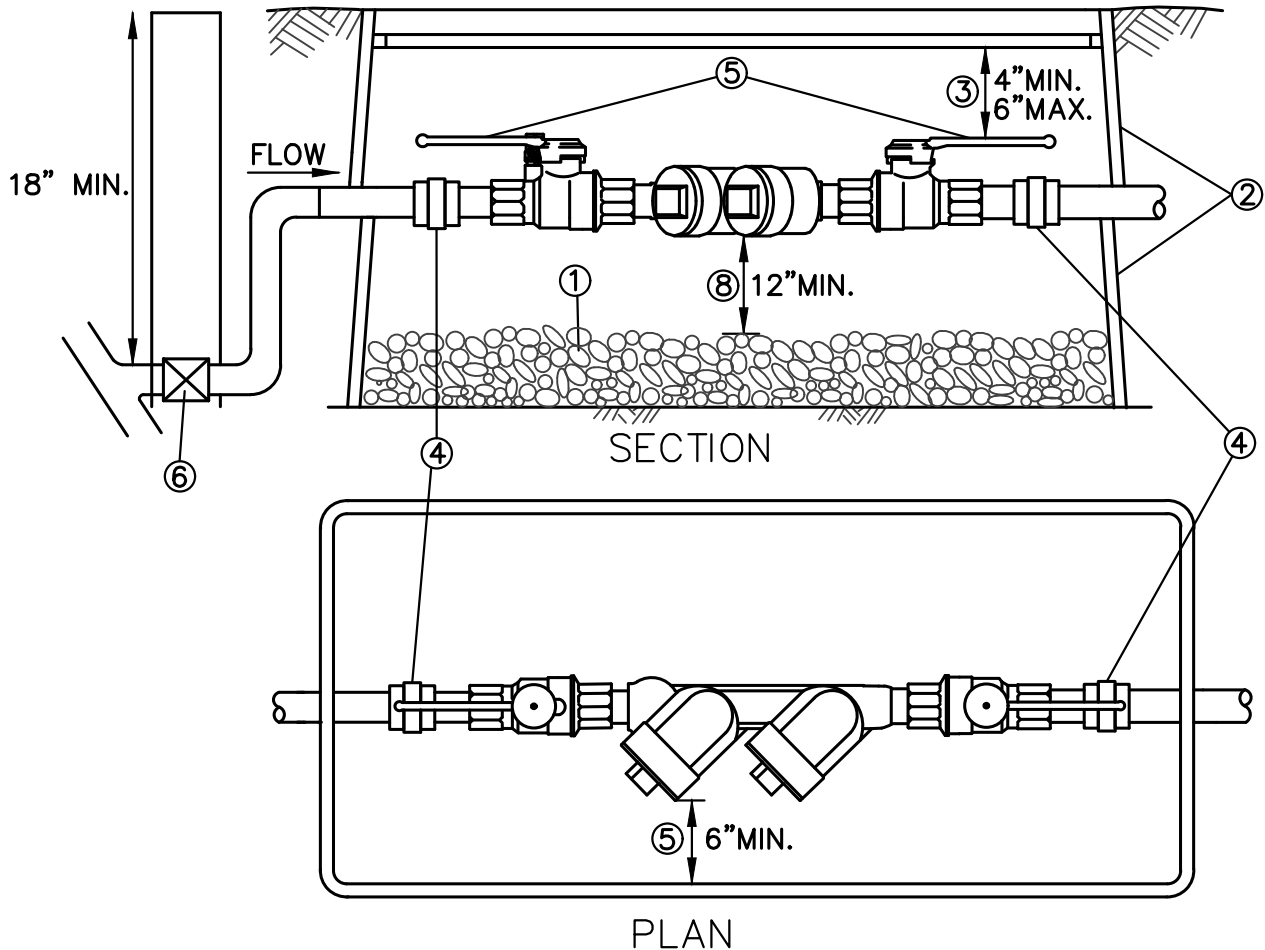
BY CITY

MAY 2018

DATE

DWG. NO.

W-35



- ① 1" ROUND WASHED GRAVEL BY 6" DEEP ON BOTTOM OF BOX
- ② ENCLOSE 2" & SMALLER D.C.V.A. IN TWO METER BOXES STACKED ON TOP OF EACH OTHER OR, OVERSIZED BOX. MUST HAVE REMOVABLE COVER. BOXES TO BE LOCATED IN SIDEWALK AND AREAS WITH VEHICULAR TRAFFIC SHALL BE METAL, EQUAL TO OLYMPIC FOUNDRY SM30. BOXES IN OTHER NON-TRAFFIC AREAS TO BE CARSON INDUSTRIES 1730-18 BCFXL METER BOX WITH 1730 COVER.
- ③ MAXIMUM OF 6" DISTANCE BETWEEN UNDERSIDE OF LID AND HIGHEST POINT OF DEVICE.
- ④ (2) UNIONS.
- ⑤ WHEN TEST-COCKS ARE FACING SIDWAYS THERE MUST BE A 6" MIN. CLEARANCE BETWEEN THEM AND SIDE OF BOX.
- ⑥ PER PLUMBING CODE REQUIREMENT, IRRIGATION SYSTEMS MUST HAVE SHUT OFF INSTALLED AS SHOWN. FEMALE FITTINGS ARE PROHIBITED IN CONJUNCTION WITH METALLIC MALE FITTINGS.

NOTES:

1. ALL INSTALLATIONS MUST MEET MINIMUM STANDARDS OF THE UNIFORM PLUMBING CODE AND WSDOH APPROVED INSTALLATIONS LIST.
2. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.



CITY OF NORTH BEND
1" TO 2" DOUBLE CHECK VALVE
ASSEMBLY FOR IRRIGATION
SYSTEMS (OUTSIDE INSTALLATION)

APPROVED:

MARK RIGOS, P.E.

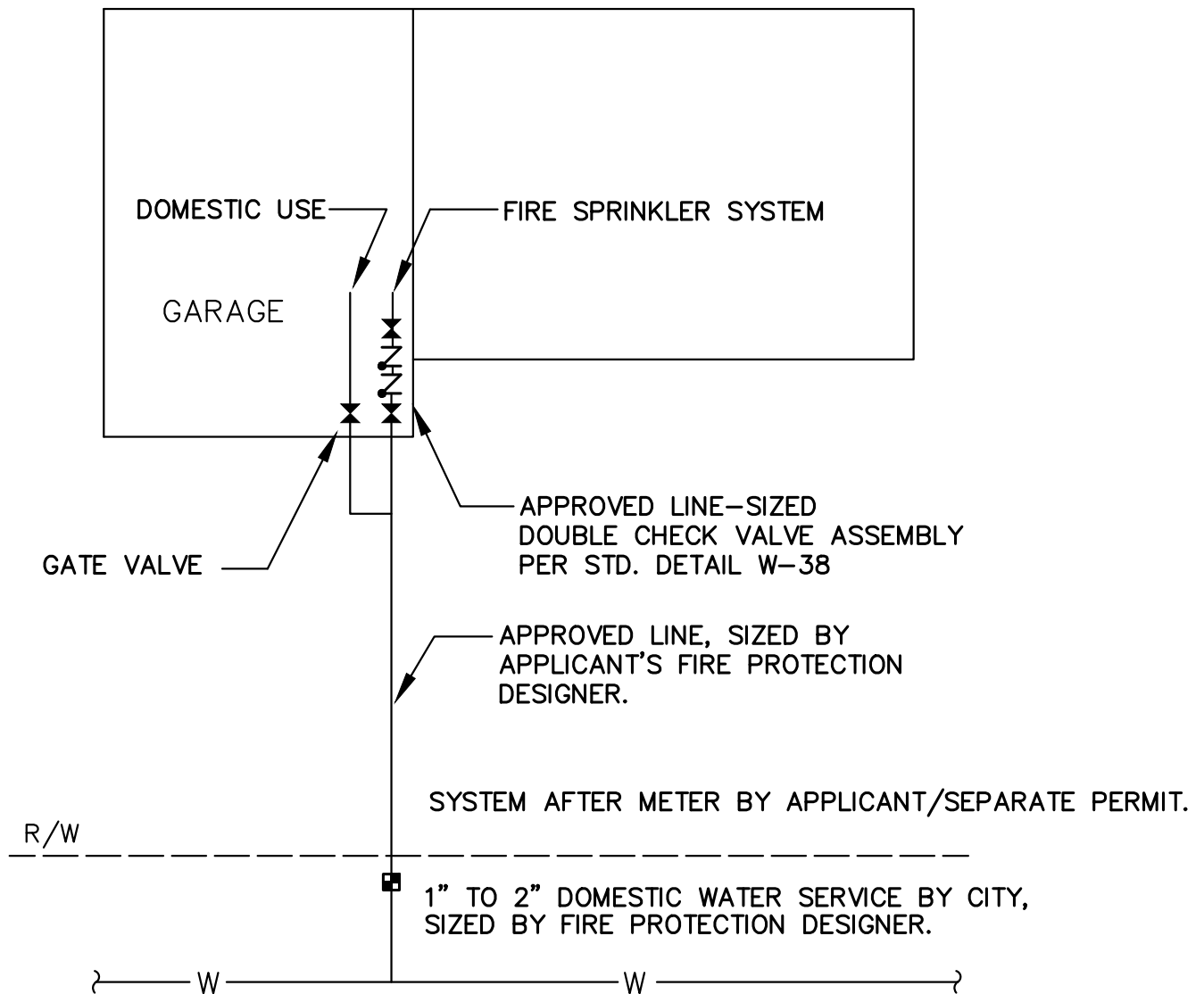
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MAY 2018

DATE

DWG. NO.

W-36



NOTE:

1. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.



CITY OF NORTH BEND
INSIDE DCVA INSTALLATION FOR
RESIDENTIAL FIRE SPRINKLER
SYSTEMS

APPROVED:

MARK RIGOS, P.E.

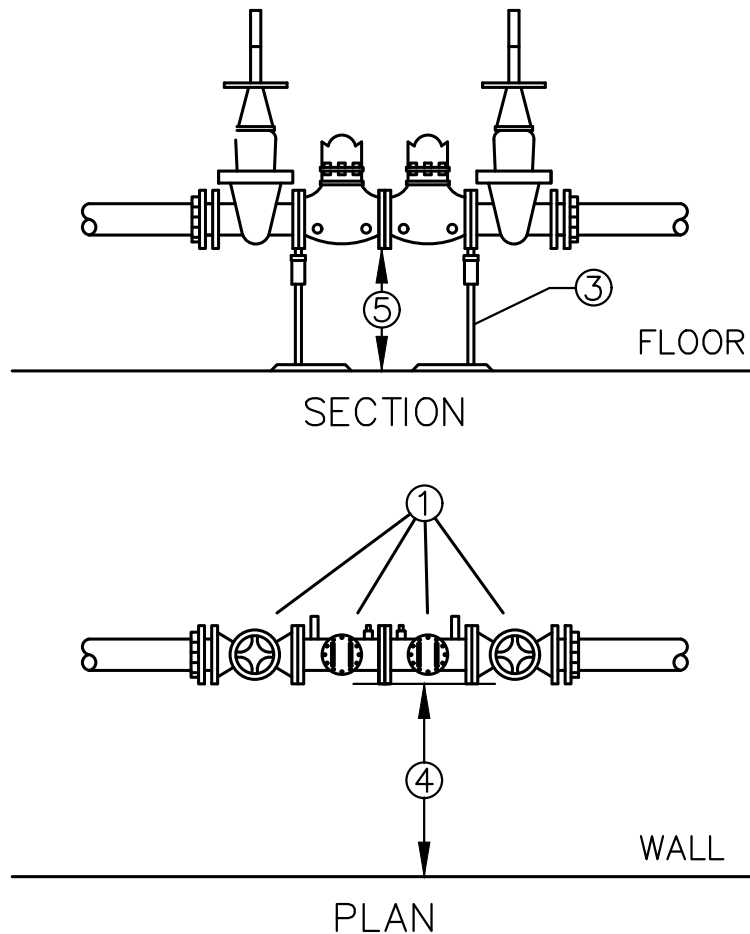
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MAY 2018

DATE

DWG. NO.

W-37



NOTES:

- ① LINE-SIZED WA STATE APPROVED DOUBLE CHECK VALVE ASSEMBLY. THE D.C.V.A. INCLUDES (2) RESILIENT-SEATED SHUT-OFF VALVES AND (4) RESILIENT-SEATED TEST-COCKS.
- ② THE D.C.V.A. MUST BE INSTALLED PER WSDOH APPROVED INSTALLATIONS LIST.
- ③ (2) SUPPORTS (EITHER WALL OR FLOOR) ONE ON EACH SIDE OF ASSEMBLY, MUST FIRMLY ANCHOR DEVICE. REQUIRED FOR 2 1/2" AND LARGER LINE SIZE.
- ④ MUST PROVIDE A MINIMUM OF 6" SIDE CLEARANCE BETWEEN D.C.V.A. AND WALL OR OBSTRUCTION.
- ⑤ CLEARANCE BETWEEN FLOOR AND ASSEMBLY MUST BE A MINIMUM OF 12" AND A MAXIMUM OF 5'.
- ⑥ TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.
- ⑦ PROTECT AGAINST FREEZING OR DAMAGE. USE HEAT-TAPE IF AREA IS SUBJECT TO FREEZING.
- ⑧ INTERIOR WATER APPURTENANCES MUST CONFORM TO UNIFORM PLUMBING CODE REQUIREMENTS.
- ⑨ FDC TO BE LOCATED DOWNSTREAM OF DCVA (COMMERCIAL ONLY).



CITY OF NORTH BEND

**DOUBLE CHECK VALVE ASSEMBLY
(INSIDE INSTALLATION)**

APPROVED:

MARK RIGOS, P.E.

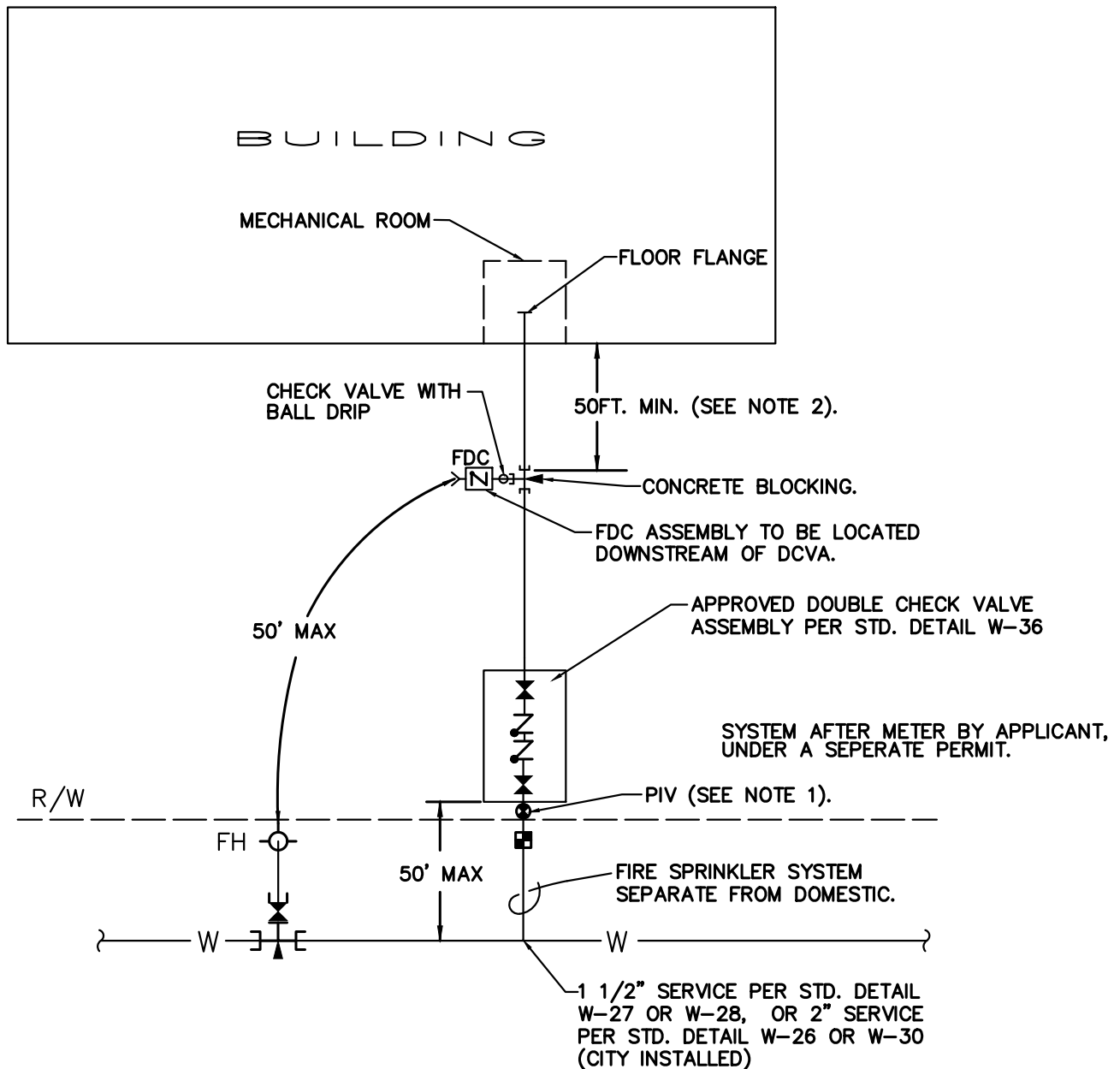
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MAY 2018

DATE

DWG. NO.

W-38



NOTES:

1. PIV MUST BE LOCATED ON THE FIRELINE BETWEEN THE R/W LINE AND THE FDC.
2. FIRE MARSHALL SHALL APPROVE FDC LOCATION IF LESS THAN 50FT. FROM STRUCTURE.
3. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.



CITY OF NORTH BEND
OUTSIDE DCVA INSTALLATION FOR
1 1/2" & 2" COMMERCIAL FIRE
SPRINKLER SYSTEMS

APPROVED:

MARK RIGOS, P.E.

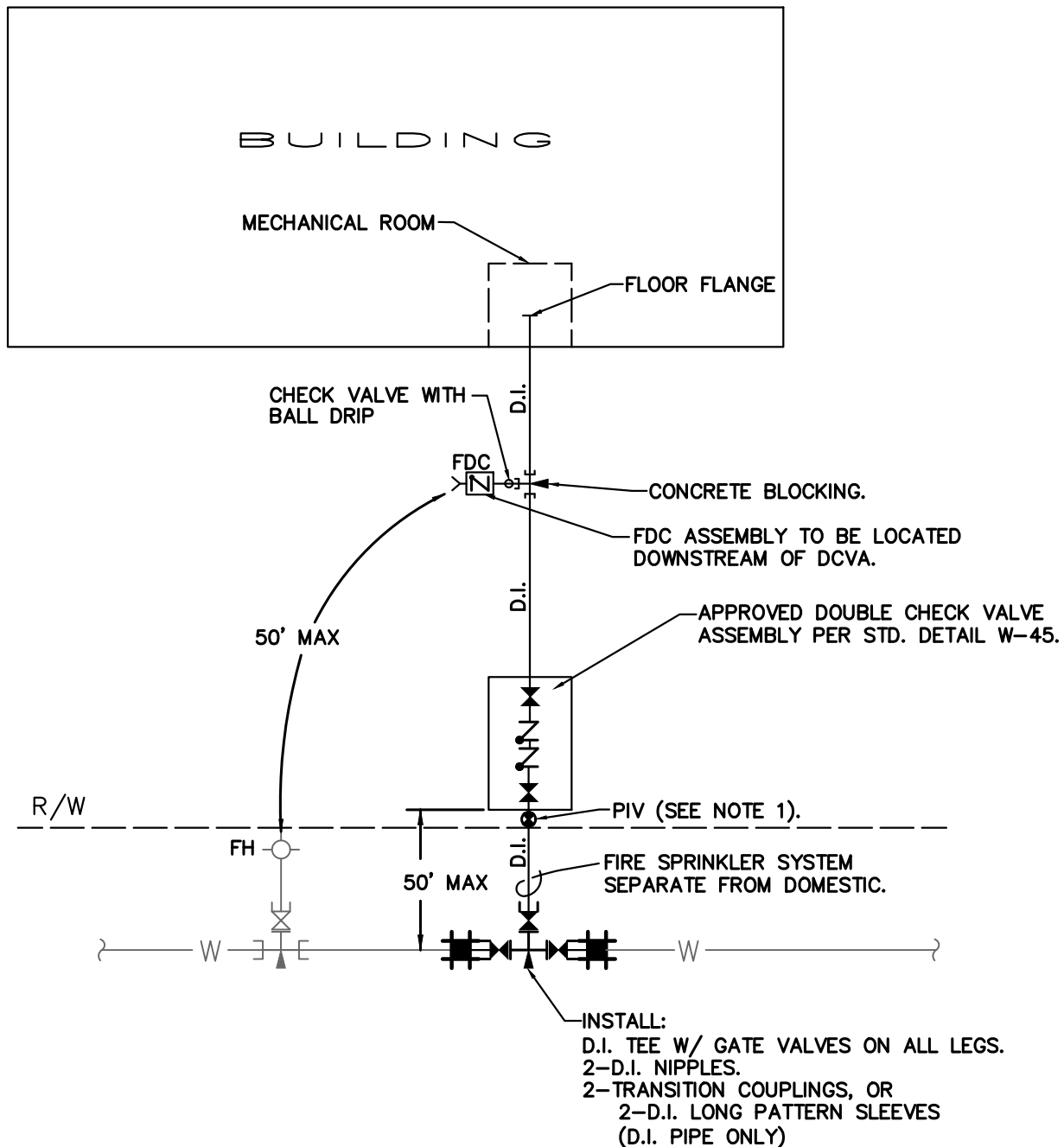
BY CITY

MAY 2018

DATE

DWG. NO.

W-39



NOTES:

1. WHERE POSSIBLE, PIV SHALL BE LOCATED ON THE FIRELINE BETWEEN THE R/W LINE AND THE FDC.
2. FIRE MARSHALL SHALL APPROVE FDC LOCATION.
3. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.



CITY OF NORTH BEND
OUTSIDE DCVA INSTALLATION FOR
3" AND LARGER COMMERCIAL
FIRE SPRINKLER SYSTEMS

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

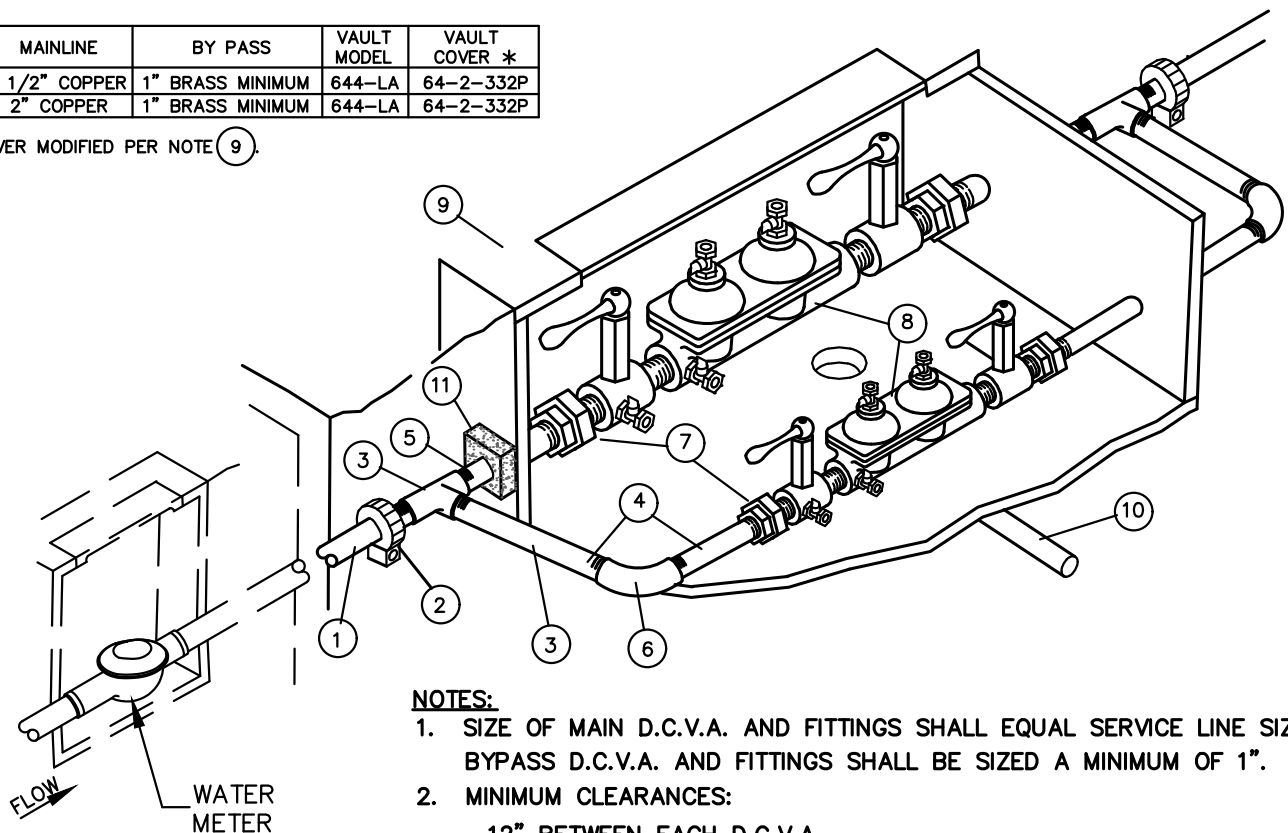
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DWG. NO.

W-40

METER SIZE	MAINLINE	BY PASS	VAULT MODEL	VAULT COVER *
1 1/2"	1 1/2" COPPER	1" BRASS MINIMUM	644-LA	64-2-332P
2"	2" COPPER	1" BRASS MINIMUM	644-LA	64-2-332P

* COVER MODIFIED PER NOTE ⑨.



NOTES:

1. SIZE OF MAIN D.C.V.A. AND FITTINGS SHALL EQUAL SERVICE LINE SIZE. BYPASS D.C.V.A. AND FITTINGS SHALL BE SIZED A MINIMUM OF 1".
2. MINIMUM CLEARANCES:
 - 12" BETWEEN EACH D.C.V.A.
 - 12" BETWEEN D.C.V.A. AND SIDE OF VAULT.
 - 12" BETWEEN D.C.V.A. AND VAULT FLOOR.
 - 24" SOIL COVER OVER SERVICE LINE.
3. INSTALL PLUGS IN ALL TEST COCKS.
4. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.
5. BRASS FITTINGS.
6. WHERE ACCESS OPENING DOES NOT EXPOSE SHUT OFF VALVES, MIN. 18" CLEARANCE SHALL BE REQUIRED BETWEEN TOP OF VALVE AND UNDERSIDE OF VAULT COVER.

- ① COPPER TUBING, TYPE K. *
- ② COUPLING, MALE IRON PIPE THREAD BY PACK JOINT (COMPRESSION FITTING) FOR COPPER, MUELLER NO. H-15428 OR EQUAL. *
- ③ BRASS TEE, MAIN LINE SIZE x 1", FEMALE IRON PIPE THREAD. *
- ④ BRASS NIPPLE, LENGTH TO FIT, 1", MALE IRON PIPE THREAD. *
- ⑤ BRASS NIPPLE, MAIN LINE SIZE, LENGTH TO FIT, MALE IRON PIPE THREAD. *
- ⑥ BRASS ELBOW, 1", FEMALE IRON PIPE THREAD. *
- ⑦ BRASS UNION, MALE x FEMALE IRON PIPE THREAD. *
- ⑧ WASHINGTON STATE APPROVED DOUBLE CHECK VALVE ASSEMBLY. MUST BE INSTALLED IN APPROVED ORIENTATION.
- ⑨ CONCRETE VAULT WITH 2 LOCKING ALUMINUM LW HATCH DOORS (PART NO. HHD-36"x72"), RATED FOR H-30 LOADING, WITH SLIP RESISTANT TREATMENT PER SECTION W4-17 OF THE ENGINEERING STANDARDS. COVER TO READ "WATER". SIZE VAULT TO PROVIDE MINIMUM CLEARANCES LISTED IN NOTE 2.
- ⑩ DRAIN, SLOPE TO DAYLIGHT OR STORM DRAINAGE SYSTEM (DO NOT CONNECT TO SANITARY SEWER). WIRE MESH RODENT SCREEN OVER DRAIN.
- ⑪ VAULT PENETRATION THRUST BLOCK SEE STANDARD DETAIL W-56.

* TYPICAL, EACH SIDE OF D.C.V.A.



CITY OF NORTH BEND
 1 1/2" & 2" DOMESTIC DOUBLE
 CHECK VALVE ASSEMBLY FOR
 CONTINUOUS SUPPLY
 (OUTSIDE INSTALLATION)

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

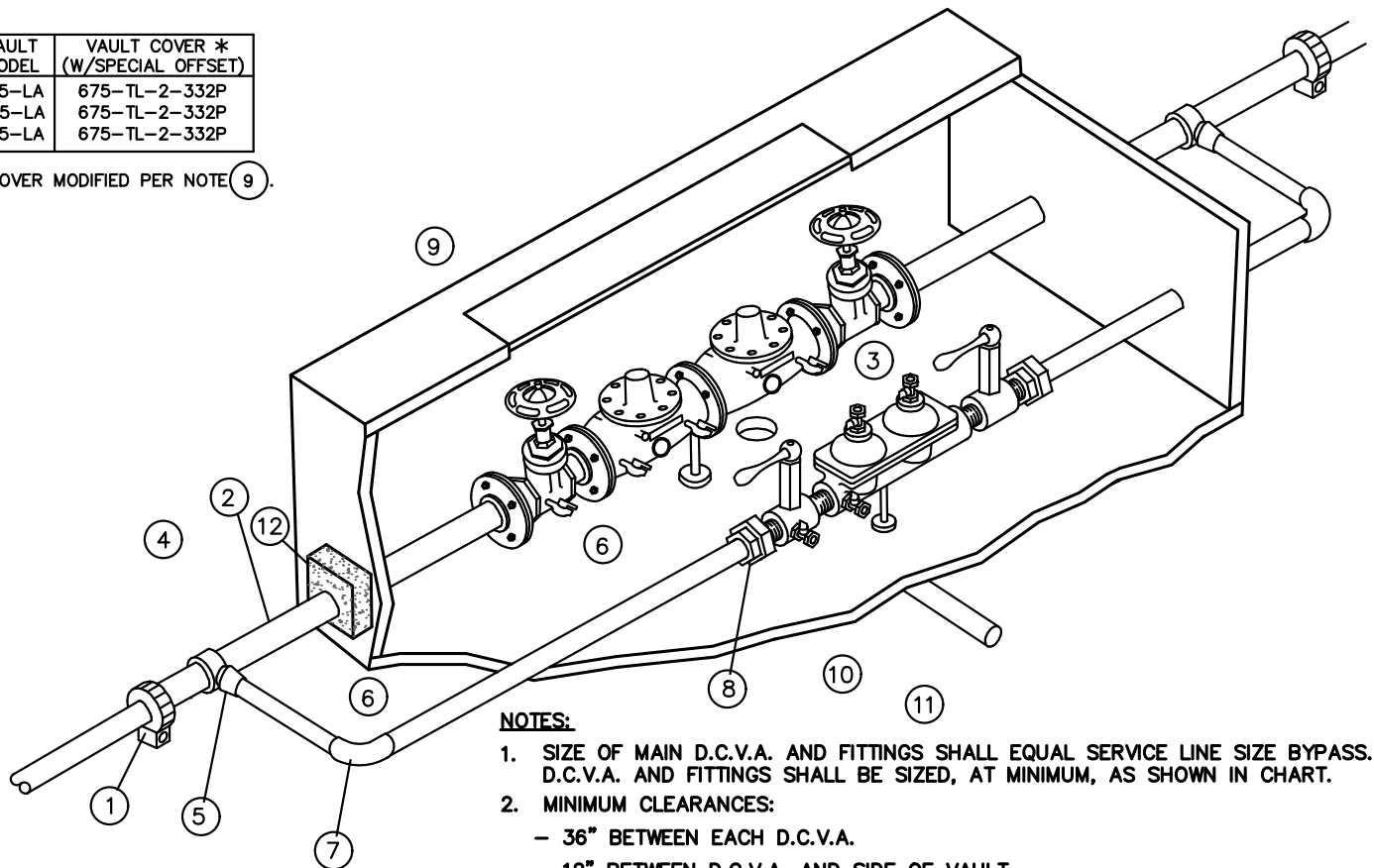
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DWG. NO.

W-41

VAULT MODEL	VAULT COVER * (W/SPECIAL OFFSET)
675-LA	675-TL-2-332P
675-LA	675-TL-2-332P
675-LA	675-TL-2-332P

* COVER MODIFIED PER NOTE 9.



NOTES:

1. SIZE OF MAIN D.C.V.A. AND FITTINGS SHALL EQUAL SERVICE LINE SIZE BYPASS. D.C.V.A. AND FITTINGS SHALL BE SIZED, AT MINIMUM, AS SHOWN IN CHART.
2. MINIMUM CLEARANCES:
 - 36" BETWEEN EACH D.C.V.A.
 - 12" BETWEEN D.C.V.A. AND SIDE OF VAULT.
 - 12" BETWEEN D.C.V.A. AND VAULT FLOOR.
 - 24" SOIL COVER OVER SERVICE LINE.
3. INSTALL PLUGS IN ALL TEST COCKS.
4. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.
5. PROVIDE LADDER AND LADDER-UP PER DETAIL W-19.
6. WHERE ACCESS OPENING DOES NOT EXPOSE SHUT OFF VALVES MIN. 18" CLEARANCE SHALL BE REQUIRED BETWEEN TOP OF VALVE AND UNDERSIDE OF VAULT COVER.
7. MINIMUM 2' OF LEVEL, UNOBSTRUCTED AREA AROUND HATCHES.
8. LOCATE HATCH PER DETAIL W-17.

METER SIZE	MAIN-LINE	BY PASS
3"	3"D.I.	1 1/2" COPPER MINIMUM
4"	4"D.I.	1 1/2" COPPER MINIMUM
6"	6"D.I.	2" COPPER MINIMUM

- 1 FLEX COUPLING , ROCKWELL 441 OR EQUAL. *
- 2 D.I. PIPE, P.E. X FL., LENGTH TO FIT. *
- 3 STATE APPROVED INTERNALLY LOADED DOUBLE CHECK VALVE ASSEMBLY, COMPLETE WITH (2) FULL FLOW BALL VALVE SHUT-OFF VALVES AND TEST COCKS. *
- 4 DOUBLE STRAP SERVICE SADDLE, ROMAC 202S WITH IPS TAP, OR EQUAL. *
- 5 COUPLING, OUTSIDE IRON PIPE THREAD TO COPPER COMPRESSION CONNECTION, MUELLER H-15428, OR EQUAL. *
- 6 COPPER TUBING, TYPE K. *
- 7 1/4 BEND COUPLING, COPPER TO COPPER, MUELLER H-15526, OR EQUAL. *
- 8 COUPLING, COPPER COMPRESSION CONNECTION BY FEMALE IRON PIPE THREAD, MUELLER H-15451, OR EQUAL. *
- 9 CONCRETE VAULT WITH 2 LOCKING ALUMINUM LW HATCH DOORS (PART NO. HHD-36"x72"), RATED FOR H-30 LOADING, WITH SLIP RESISTANT TREATMENT PER SECTION W4-17 OF THE ENGINEERING STANDARDS. COVER TO READ "WATER". SIZE VAULT TO PROVIDE MINIMUM CLEARANCES LISTED IN NOTE 2.
- 10 ADJUSTABLE PIPE STANCHIONS, BOLTED TO FLOOR.
- 11 DRAIN, SLOPE TO DAYLIGHT OR STORM DRAINAGE SYSTEM (DO NOT CONNECT TO SANITARY SEWER). WIRE MESH RODENT SCREEN OVER DRAIN.
- 12 VAULT PENETRATION THRUST BLOCK SEE STANDARD DETAIL W-56.

* TYPICAL, EACH SIDE OF D.C.V.A.



CITY OF NORTH BEND
 3" TO 6" DOMESTIC DOUBLE CHECK
 VALVE ASSEMBLY FOR CONTINUOUS
 SUPPLY
 (OUTSIDE INSTALLATION)

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

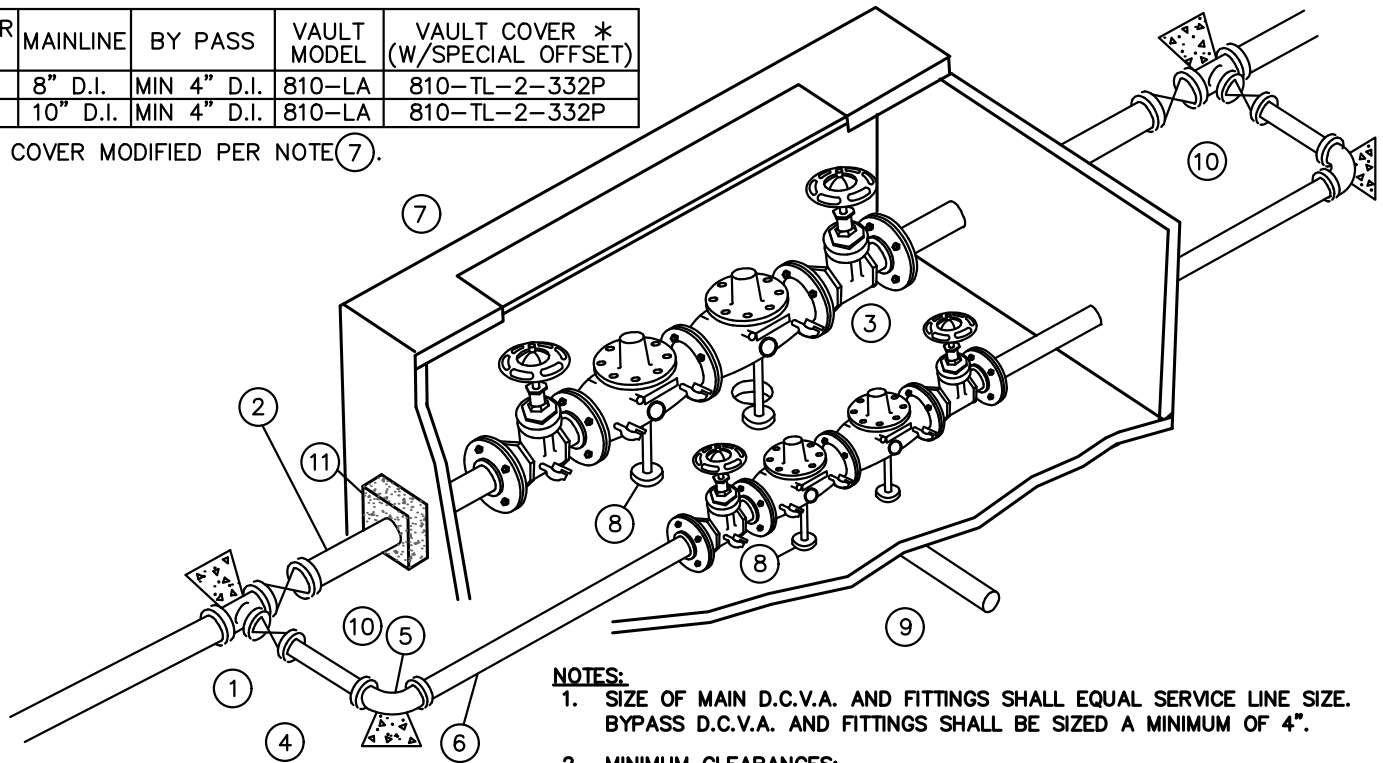
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DWG. NO.

W-42

METER SIZE	MAINLINE	BY PASS	VAULT MODEL	VAULT COVER * (W/SPECIAL OFFSET)
8"	8" D.I.	MIN 4" D.I.	810-LA	810-TL-2-332P
10"	10" D.I.	MIN 4" D.I.	810-LA	810-TL-2-332P

* COVER MODIFIED PER NOTE ⑦.



NOTES:

1. SIZE OF MAIN D.C.V.A. AND FITTINGS SHALL EQUAL SERVICE LINE SIZE. BYPASS D.C.V.A. AND FITTINGS SHALL BE SIZED A MINIMUM OF 4".
2. MINIMUM CLEARANCES:
 - 36" BETWEEN EACH D.C.V.A.
 - 12" BETWEEN D.C.V.A. AND SIDE OF VAULT.
 - 12" BETWEEN D.C.V.A. AND VAULT FLOOR.
 - 24" SOIL COVER OVER SERVICE LINE.
3. INSTALL PLUGS IN ALL TEST COCKS.
4. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.
5. PROVIDE LADDER AND LADDER-UP PER DETAIL W-19.
6. WHERE ACCESS OPENING DOES NOT EXPOSE SHUT OFF VALVES MIN. 24" CLEARANCE SHALL BE REQUIRED BETWEEN TOP OF VALVE AND UNDERSIDE OF VAULT COVER.
7. ALL FITTINGS OUTSIDE VAULT SHALL INCLUDE THRUST BLOCKING AND JOINT RESTRAINT DEVICES.
8. MINIMUM 2' OF LEVEL, UNOBSTRUCTED AREA AROUND HATCHES.
9. LOCATE HATCH PER DETAIL W-17.

① TEE, MJ, MAINLINE SIZE BY 4" MINIMUM BRANCH. *

② D.I. PIPE, P.E. X FL., LENGTH TO FIT. *

③ STATE APPROVED INTERNALLY LOADED DOUBLE CHECK VALVE ASSEMBLY, COMPLETE WITH (2) FULL FLOW BALL VALVE SHUT-OFF VALVES AND TEST COCKS.

④ 4" MINIMUM DI PIPE, PE x PE, LENGTH TO FIT. *

⑤ 4" MINIMUM 90° BEND, MJ. *

⑥ 4" MINIMUM DI PIPE, PE x FL, LENGTH TO FIT. *

⑦ CONCRETE VAULT WITH 2 LOCKING ALUMINUM LW HATCH DOORS (PART NO. HHD-36"x72"), RATED FOR H-30 LOADING, WITH SLIP RESISTANT TREATMENT PER SECTION W4-17 OF THE ENGINEERING STANDARDS. COVER TO READ "WATER". SIZE VAULT TO PROVIDE MINIMUM CLEARANCES LISTED IN NOTE 2.

⑧ ADJUSTABLE PIPE STANCHIONS, BOLTED TO FLOOR.

⑨ DRAIN, SLOPE TO DAYLIGHT OR STORM DRAINAGE SYSTEM (DO NOT CONNECT TO SANITARY SEWER). WIRE MESH RODENT SCREEN OVER DRAIN.

⑩ GATE VALVE, F.L.xM.J. (WITH VALVE BOX AND COVER).

⑪ VAULT PENETRATION THRUST BLOCK SEE STANDARD DETAIL W-56 FOR BOTH MAINLINE AND BYPASS.

* TYPICAL, EACH SIDE OF D.C.V.A.



CITY OF NORTH BEND
8" AND 10" DOMESTIC DOUBLE CHECK
VALVE ASSEMBLY FOR CONTINUOUS
SUPPLY
(OUTSIDE INSTALLATION)

APPROVED:

MARK RIGOS, P.E.

BY CITY

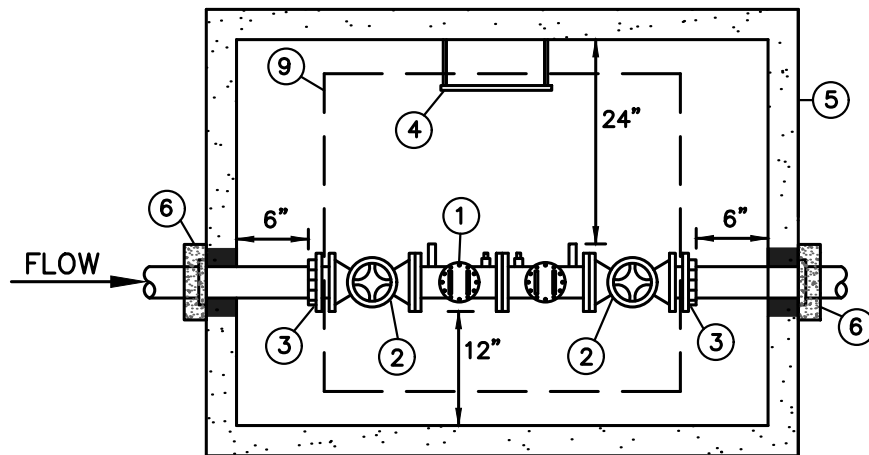
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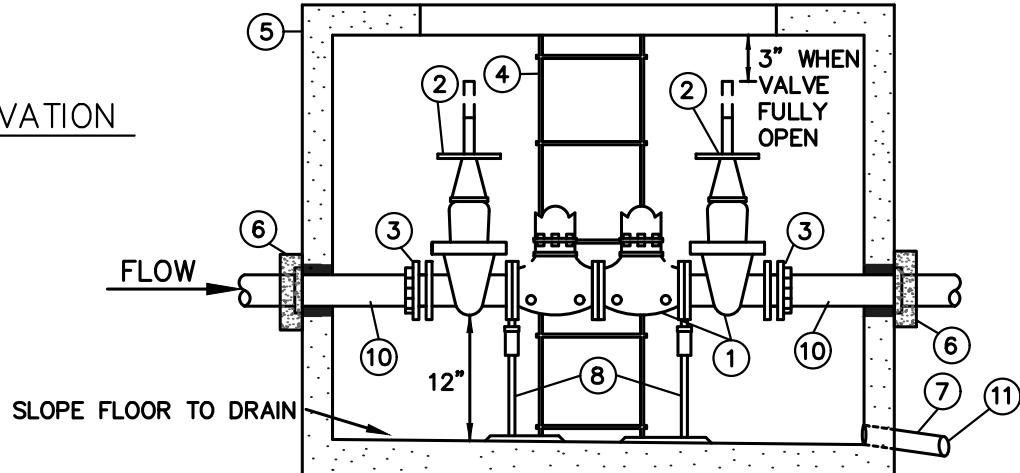
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W-43

PLAN



ELEVATION



- ① STATE APPROVED DOUBLE CHECK VALVE ASSEMBLY, COMPLETE WITH (2) RESILIENT SEATED O.S.&Y. VALVES AND (4) RESILIENT SEATED TEST COCKS.
- ② EACH VALVE SHALL BE MARKED WITH MODEL NUMBER WITH DESIGNATION OF RESILIENT SEAT: SUCH AS "RS" OR "R", WHICH MUST BE CAST, MOLDED, OR AFFIXED ONTO THE BODY OR BONNET OF THE VALVE. ALL FERROUS BODIED VALVES SHALL BE COATED WITH A MINIMUM OF 4MLS. OF EPOXY OR EQUIVALENT POLYMERIZED COATING.
- ③ MEGAFLANGE
- ④ ONE GALVANIZED STEEL LADDER TO BE SECURED TO VAULT WITH LADDER-UP (BILCO MODEL LU-2). LADDER TO BE ATTACHED TO VAULT PER STANDARD DETAIL W-19.
- ⑤ CONCRETE VAULT WITH 2 LOCKING ALUMINUM LW HATCH DOORS (PART NO. HHD-36"x72"), RATED FOR H-30 LOADING WITH SLIP RESISTANT TREATMENT PER SECTION W4-17 OF THE ENGINEERING STANDARDS. COVER TO READ "WATER". VAULT SHALL BE EQUAL TO UTILITY VAULT CO. MODEL LISTED IN TABLE BELOW.
- ⑥ WATER TIGHT GROUT. RESTRAIN INLET/OUTLET PIPE WITH MEGALUG MID-SPAN RESTRAINT AND THRUST BLOCK ADJACENT TO VAULT SEE STANDARD DETAIL W-56.
- ⑦ DRAIN, SLOPE TO DAYLIGHT OR STORM DRAINAGE SYSTEM, MINIMUM DIAMETER 6".
- ⑧ TWO ADJUSTABLE PIPE STANCHIONS, BOLTED TO FLOOR.
- ⑨ ACCESS TO BE CENTERED OVER ASSEMBLY.
- ⑩ CL. 52 D.I., PEXFL WITH RETAINER GLANDS.
- ⑪ INSTALL WIRE MESH RODENT SCREEN OVER DRAIN OUTLET.

NOTES:

1. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.
2. TEE AND GATE VALVES REQUIRED ON MAIN.
3. ALL CLEARANCES SHOWN ARE MINIMUM.
4. VAULTS SHALL NOT BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC.
5. IN CENTRAL BUSINESS DISTRICT, 3" THROUGH 6" ASSEMBLIES SHALL CONNECT TO WATER MAIN WITH 8" PIPE.
6. MINIMUM 2' OF LEVEL, UNOBSTRUCTED AREA AROUND HATCHES.

SIZE	MIN. VAULT SIZE (INSIDE)			UTIL. VAULT CO. MODEL	UTIL. VAULT CO. COVER
	W	L	H		
3"	3'-8"	4'-8"	3'-3"	644-LA	64-2-332P
4"	3'-10"	5'-3"	3'-8"	575-LA	57TL-2-332P
6"	4'-0"	6'-6"	4'-5"	577-LA	57TL-20332P
8"	4'-5"	7'-8"	5'-3"	4484-LA	4484-TL2-332P
10"	4'-8"	8'-8"	6'-1"	5106-LA	5106-TL3-332

* COVER MODIFIED PER NOTE ⑤.



CITY OF NORTH BEND
3" TO 10" DOUBLE CHECK VALVE
ASSEMBLY FOR DOMESTIC AND
IRRIGATION SERVICES
(OUTSIDE INSTALLATION)

APPROVED:

MARK RIGOS, P.E.

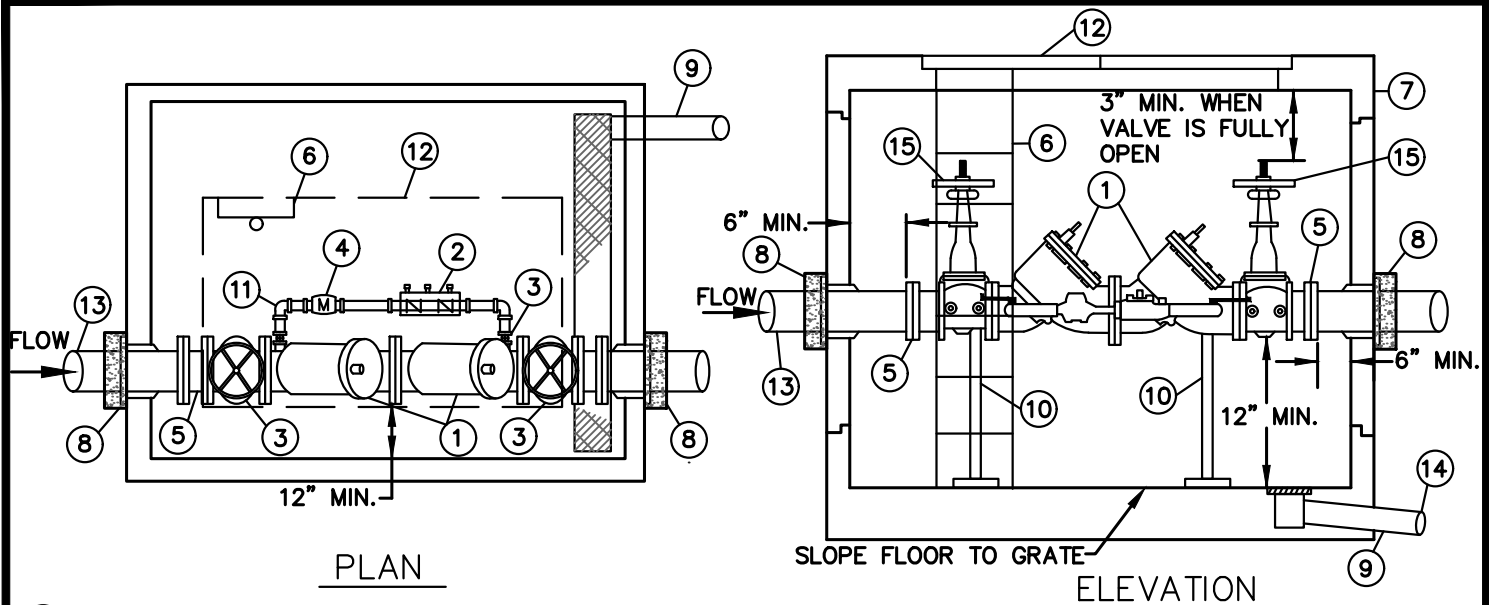
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DWG. NO.

W-44



- ① STATE APPROVED DOUBLE CHECK VALVE ASSEMBLY, COMPLETE WITH (2) RESILIENT SEATED O.S.&Y. VALVES AND (4) RESILIENT SEATED TEST COCKS, AND BRASS OR COPPER DETECTOR BY-PASS. FACE TEST COCKS TOWARD CENTER OF VAULT AND ACCESSIBLE.
- ② STATE APPROVED 3/4" DOUBLE CHECK VALVE ASSEMBLY, COMPLETE WITH (2) RESILIENT SEATED BALL VALVES AND (4) RESILIENT SEATED TEST COCKS. FACE TEST COCKS TOWARD CENTER OF VAULT.
- ③ EACH VALVE SHALL BE MARKED WITH MODEL NUMBER WITH DESIGNATION OF RESILIENT SEAT: SUCH AS "RS" OR "R", WHICH MUST BE CAST, MOLDED, OR AFFIXED ONTO THE BODY OR BONNET OF THE VALVE. ALL FERROUS BODIED VALVES SHALL BE COATED WITH A MINIMUM OF 4MLS. OF EPOXY OR EQUIVALENT POLYMERIZED COATING.
- ④ 3/4" METER (CUBIC FEET READING)
- ⑤ MEGAFLANGE
- ⑥ ONE GALVANIZED STEEL LADDER TO BE SECURED TO VAULT WITH LADDER-UP (BILCO MODEL LU-2). LADDER TO BE ATTACHED TO VAULT PER STANDARD DETAIL W-19.
- ⑦ CONCRETE VAULT WITH 2 LOCKING ALUMINUM LW HATCH DOORS (PART NO. HHD-42"x72"), RATED FOR H-30 LOADING, OFFSET WITH SLIP RESISTANT TREATMENT PER SECTION W4-17 OF THE ENGINEERING STANDARDS. COVER TO READ "WATER". VAULT SHALL BE EQUAL TO UTILITY VAULT CO. MODEL LISTED IN THE TABLE BELOW.
- ⑧ WATER TIGHT GROUT. RESTRAIN INLET/OUTLET PIPE WITH MEGALUG MID-SPAN RESTRAINT AND THRUST BLOCK ADJACENT TO VAULT SEE STANDARD DETAIL W-56.
- ⑨ DRAIN, SLOPE TO DAYLIGHT OR STORM DRAINAGE SYSTEM, MINIMUM DIAMETER 6".
- ⑩ TWO ADJUSTABLE PIPE STANCHIONS, BOLTED TO FLOOR.
- ⑪ ALL PLUMBING FOR BY-PASS TO BE COPPER AND BRASS.
- ⑫ ACCESS TO BE CENTERED OVER ASSEMBLY.
- ⑬ CL. 52 D.I., PEXFL WITH RETAINER GLANDS.
- ⑭ INSTALL WIRE MESH RODENT SCREEN OVER DRAIN OUTLET.
- ⑮ 2 VALVE SUPERVISORY SWITCHES, SPDT, PER FIRE DEPARTMENT REQUIREMENTS (1 SWITCH PER VALVE).

NOTES:

1. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.
2. TEE & GATE VALVES REQUIRED ON MAIN.
3. WHEN DOUBLE CHECK VALVE ASSEMBLY IS USED IN SAME LINE WITH DOMESTIC BUILDING METER, METERED DETECTOR BYPASS SHALL BE OMITTED.
4. ALL CLEARANCES SHOWN ARE MINIMUM.
5. VAULTS SHALL NOT BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC.
6. IN CENTRAL BUSINESS DISTRICT, 3" THROUGH 6" ASSEMBLIES SHALL CONNECT TO WATER MAIN WITH 8" PIPE.
7. FDC TO BE LOCATED DOWNSTREAM OF DCVA. FDC LINE & CHECK VALVE MAY BE ROUTED INSIDE THE DCVA VAULT PROVIDED ALL PROVISIONS IN STANDARD DETAIL W-48 ARE MET.
8. MINIMUM 2' OF LEVEL, UNOBSTRUCTED AREA
9. SECURE A VALVE MARKER, PER DETAIL W-55, TO EACH GATE VALVE HANDLE.
10. LONGER VALVE ASSEMBLIES MAY REQUIRE A LARGER VAULT TO MEET THE REQUIRED CLEARANCES. SUBMIT FOR APPROVAL.

SIZE	MIN. VAULT SIZE (INSIDE)			UTIL. VAULT CO. MODEL	UTIL. VAULT CO. COVER *
	W	L	H		
3"	4'-2"	4'-8"	3'-3"	675-WA	675-2-332P
4"	4'-6"	5'-3"	3'-8"	675-WA	675-2-332P
6"	4'-8"	6'-6"	4'-5"	675-WA	675-2-332P
8"	5'-0"	7'-8"	5'-3"	687-LA	687-TL-2-332
10"	5'-2"	8'-8"	6'-1"	5106-LA	5106-TL3-332

* COVER MODIFIED PER NOTE 7.



CITY OF NORTH BEND
3" TO 10" DOUBLE CHECK DETECTOR
ASSEMBLY FOR FIRE SPRINKLER
SYSTEMS
(OUTSIDE INSTALLATION)

APPROVED:

MARK RIGOS, P.E.

BY CITY

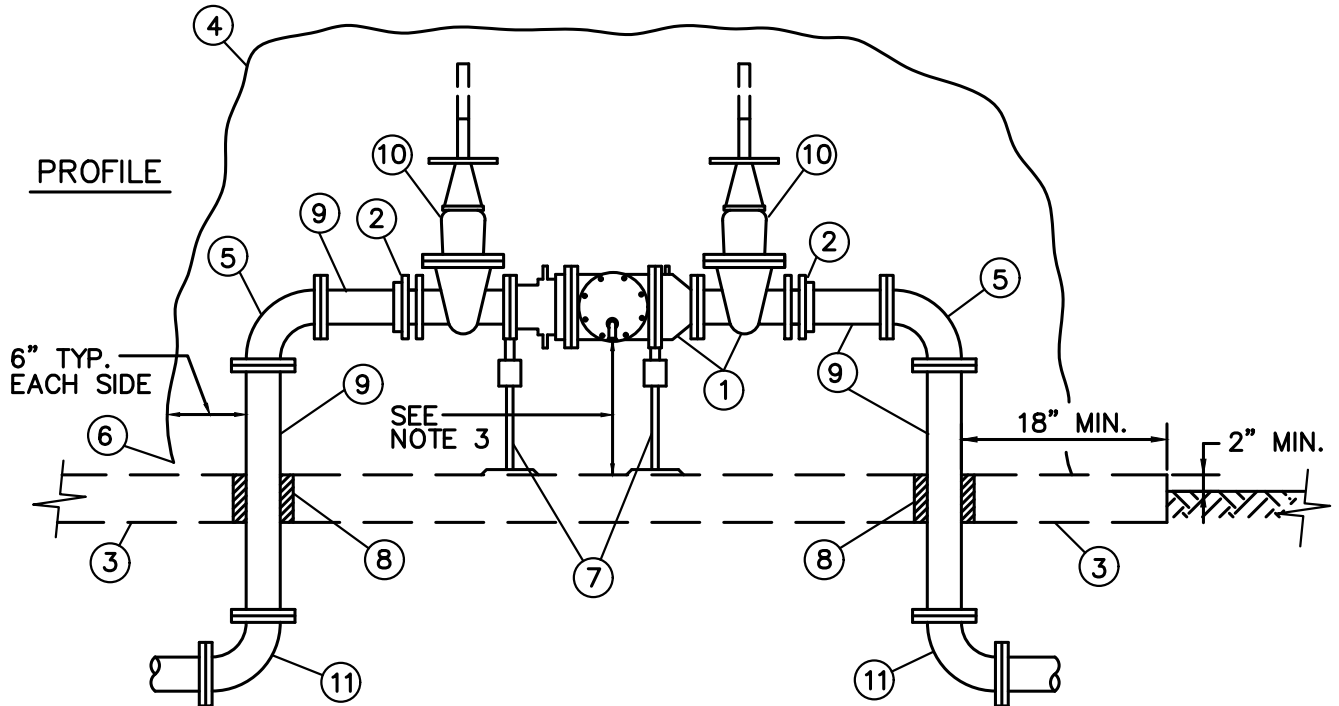
MAY 2018

DATE

DWG. NO.

W-45

NOTICE: OUTSIDE-INSTALLED RPBA IS NOT ALLOWED IN BURIED VAULTS. DEVELOPER SHALL PROVIDE UTILITIES WITH A DESIGN FOR AN ABOVE-GROUND ENCLOSURE THAT DRAINS TO DAY LIGHT FOR APPROVAL. CLEARANCES SHOWN BELOW SHALL APPLY TO THE ENCLOSURE.



- ① STATE APPROVED REDUCED PRESSURE BACKFLOW ASSEMBLY, COMPLETE WITH (2) RESILIENT SEATED O.S.&Y. GATE VALVES (2" AND SMALLER: FULL FLOW RESILIENT SEATED BALL VALVES) AND (4) RESILIENT SEATED TEST COCKS.
- ② MEGAFLANGE. (2" AND SMALLER: BRASS UNION, M.I.P.T.xF.I.P.T.).
- ③ 4" CONC. (2,000 PSI) SLAB EXTENDED 6" BEYOND ENCLOSURE (ALL DIRECTIONS). REINFORCED W/ 6x6 W2.9xW2.9 WWF.
- ④ APPROVED ENCLOSURE. CONTRACTOR TO VERIFY REQUIRED SIZE.
- ⑤ 90° BEND, FL (2" AND SMALLER: BRASS, F.I. P.T.).
- ⑥ ENCLOSURE DRAIN, SIZED IN ACCORDNCE WITH PNWS-AWWA CROSS CONNECTION CONTROL MANUAL (7TH ADDITION) FIGURE 6-1.
- ⑦ TWO ADJUSTABLE PIPE STANCHIONS, BOLTED TO SLAB.
- ⑧ PVC SLEEVE THROUGH SLAB.
- ⑨ CL. 52 D.I., PEXFL (2" AND SMALLER: BRASS NIPLE, M.I.P.T.)
- ⑩ EACH VALVE SHALL BE MARKED WITH MODEL NUMBER WITH DESIGNATION OF RESILIENT SEAT: SUCH AS "RS" OR "R", WHICH MUST BE CAST, MOLDED, OR AFFIXED ONTO THE BODY OR BONNET OF THE VALVE. ALL FERROUS BODIED VALVES SHALL BE COATED WITH A MINIMUM OF 4MLS. OF EPOXY OR EQUIVALENT POLYMERIZED COATING.
- ⑪ 90° BEND, RESTRAINED JOINT (2" AND SMALLER: BRASS, COMPRESSION x F.I.P.T.).

NOTES:

1. PROVIDE ELECTRICAL HEAT TAPE FREEZE PROTECTION.
2. WHEN THE REDUCED PRESSURE ASSEMBLY IS LOCATED INSIDE A BUILDING A SIZED DRAIN LINE SHALL BE PROVIDED FOR RELIEF PORT. THERE MUST BE AN APPROVED AIR GAP BETWEEN THE RELIEF PORT AND DRAIN.
3. ALLOW 12"+ NOMINAL DIAMETER OF ASSEMBLY CLEARANCE BELOW RELIEF PORT FOR REPAIR. ALSO PROVIDE 12" MIN. AIR GAP CLEARANCE FROM TOP OF DRAIN PIPE.
4. REDUCED PRESSURE BACKFLOW ASSEMBLY WILL BE ALLOWED TO BE INSTALLED IN VAULTS ONLY IN CASES WHERE NO OTHER MEANS OF INSTALLATION IS AVAILABLE AND AS APPROVED BY A CITY OF BELLEVUE WATER QUALITY TECHNICIAN.
5. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.
6. ALL CLEARANCES SHOWN ARE MINIMUM.
7. ENCLOSURES SHALL NOT BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC.
8. TEE AND GATE VALVES REQUIRED ON MAIN.
9. IN CENTRAL BUSINESS DISTRICT, 3" THROUGH 6" ASSEMBLIES SHALL CONNECT TO WATER MAIN WITH 8" PIPE.
10. MINIMUM 2' OF LEVEL, UNOBSTRUCTED AREA AROUND ENCLOSURES.
11. RPBA INSTALLATIONS THAT DIFFER FROM THE STANDARD DETAIL MUST BE APPROVED BY THE CROSS CONNECTION PROGRAM ADMINISTRATOR (425-452-5208) AND WILL BE REVIEWED ON A CASE-BY-CASE BASIS TO ENSURE THEY MEET CURRENT MINIMUM REQUIREMENTS FOR INSTALLATION AND FREEZE PROTECTION.



CITY OF NORTH BEND
REDUCED PRESSURE BACKFLOW
ASSEMBLY FOR DOMESTIC AND
IRRIGATION SERVICE
(OUTSIDE INSTALLATION)

APPROVED:

MARK RIGOS, P.E.

BY CITY

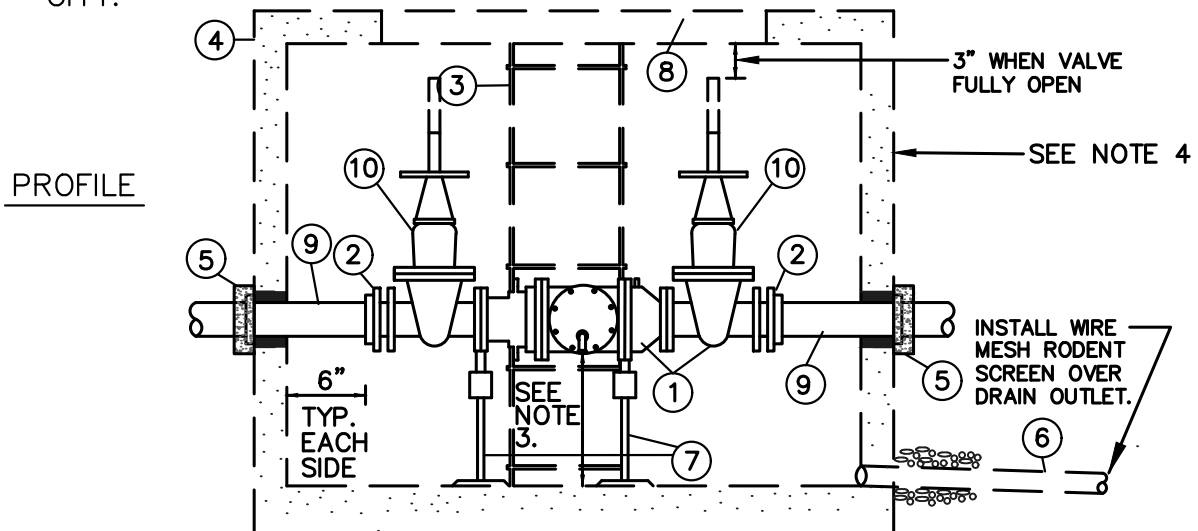
MAY 2018

DATE

DWG. NO.

W-46A

NOTICE: OUTSIDE-INSTALLED RPBA IS NOT ALLOWED IN BURIED VAULTS. DEVELOPER SHALL PROVIDE UTILITIES WITH A DESIGN FOR AN ABOVE-GROUND ENCLOSURE THAT DRAINS TO DAY LIGHT FOR APPROVAL. THE BURIED VAULT DETAIL SHOWN BELOW IS ONLY ALLOWED WHEN GIVEN SPECIAL APPROVAL BY THE CITY.



- ① STATE APPROVED REDUCED PRESSURE BACKFLOW ASSEMBLY, COMPLETE WITH (2) RESILIENT SEATED O.S.&Y. GATE VALVES AND (4) RESILIENT SEATED TEST COCKS. FACE TEST COCKS TOWARD CENTER OF VAULT AND ACCESSABLE.
- ② MEGAFLANGE
- ③ ONE GALVANIZED STEEL LADDER TO BE SECURED TO VAULT WITH LADDER-UP (BILCO MODEL LU-2). LADDER TO BE ATTACHED TO VAULT PER STANDARD DETAIL W-19.
- ④ CONCRETE VAULT WITH 2 LOCKING ALUMINUM LW HATCH DOORS (PART NO. HHD-36"x72") RATED FOR H-30 LOADING WITH SLIP RESISTANT TREATMENT PER SECTION W4-17 OF THE ENGINEERING STANDARDS. COVER TO READ "WATER". VAULT SHALL BE EQUAL TO UTILITY VAULT CO. MODEL LISTED IN THE TABLE BELOW.
- ⑤ WATER TIGHT GROUT. RESTRAIN INLET/OUTLET PIPE WITH MEGALUG MID-SPAN RESTRAINT AND THRUST BLOCK ADJACENT TO VAULT SEE STANDARD DETAIL W-56.
- ⑥ DRAIN, SLOPE TO DAYLIGHT WITH BORE SIGHTED DAYLIGHT DRAIN CLEARLY VISIBLE END TO END WITH STRAIGHT PIPE, SIZED TO MEET FLOW REQUIREMENTS OF RPBA RELIEF VENT.
- ⑦ TWO ADJUSTABLE PIPE STANCHIONS, BOLTED TO FLOOR.
- ⑧ ACCESS TO BE CENTERED OVER ASSEMBLY.
- ⑨ CL. 52 D.I., PEXFL WITH RETAINER GLANDS.
- ⑩ EACH VALVE SHALL BE MARKED WITH MODEL NUMBER WITH DESIGNATION OF RESILIENT SEAT: SUCH AS "RS" OR "R", WHICH MUST BE CAST, MOLDED, OR AFFIXED ONTO THE BODY OR BONNET OF THE VALVE. ALL FERROUS BODIED VALVES SHALL BE COATED WITH A MINIMUM OF 4MLS. OF EPOXY OR EQUIVALENT POLYMERIZED COATING.

SIZE	MIN. VAULT SIZE (INSIDE)			UTIL. VAULT CO. MODEL	UTIL. VAULT CO. COVER *
	W	L	H		
3"	4'-3"	4'-8"	3'-11"	575-LA	64-2-332P
4"	4'-3"	5'-3"	4'-7"	577-LA	57TL-2-332P
6"	4'-4"	6'-6"	5'-5"	4484-LA	4484-TL2-332P
8"	5'-2"	7'-7"	7'-1"	687-LA	687-TL-2-332
10"	5'-4"	8'-8"	8'-0"	5106-2X	5106-TL3-332

* COVER MODIFIED PER NOTE ④.

NOTES:

1. DAYLIGHT DRAIN MUST BE ABLE TO BE LINE SIGHTED, INSTALLED ABOVE MAXIMUM FLOOD LEVEL, AND BE ABLE TO HANDLE THE VOLUME OF WATER THAT CAN BE DISCHARGED FROM THE RELIEF VALVE PORT.
2. WHEN THE REDUCED PRESSURE ASSEMBLY IS LOCATED INSIDE A BUILDING A SIZED DRAIN LINE SHALL BE PROVIDED FOR RELIEF PORT. THERE MUST BE AN APPROVED AIR GAP BETWEEN THE RELIEF PORT AND DRAIN.
3. ALLOW 12"+ NOMINAL DIAMETER OF ASSEMBLY CLEARANCE BELOW RELIEF PORT FOR REPAIR. ALSO PROVIDE 12" MIN. AIR GAP CLEARANCE FROM TOP OF DRAIN PIPE.
4. REDUCED PRESSURE BACKFLOW ASSEMBLY WILL BE ALLOWED TO BE INSTALLED IN VAULTS ONLY IN CASES WHERE NO OTHER MEANS OF INSTALLATION IS AVAILABLE AND AS APPROVED BY A CITY OF BELLEVUE WATER QUALITY TECHNICIAN.
5. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.
6. MINIMUM CLEARANCE BETWEEN ASSEMBLY AND WALL ON LADDER SIDE OF VAULT IS 24". MINIMUM CLEARANCE FROM OPPOSITE WALL IS 12". ALL CLEARANCES SHOWN ARE MINIMUM.
7. VAULTS SHALL NOT BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC.
8. TEE AND GATE VALVES REQUIRED ON MAIN.
9. IN CENTRAL BUSINESS DISTRICT, 3" THROUGH 6" ASSEMBLIES SHALL CONNECT TO WATER MAIN WITH 8" PIPE.
10. MINIMUM 2' OF LEVEL, UNOBSTRUCTED AREA AROUND HATCHES.
11. RPBA INSTALLATIONS THAT DIFFER FROM THE STANDARD DETAIL MUST BE APPROVED BY THE CROSS CONNECTION PROGRAM ADMINISTRATOR (425-452-5208) AND WILL BE REVIEWED ON A CASE-BY-CASE BASIS TO ENSURE THEY MEET CURRENT MINIMUM REQUIREMENTS FOR INSTALLATION AND FREEZE PROTECTION.



CITY OF NORTH BEND
3" TO 10" REDUCED PRESSURE
BACKFLOW ASSEMBLY FOR DOMESTIC
AND IRRIGATION SERVICE
(BURIED VAULT INSTALLATION)

APPROVED:

MARK RIGOS, P.E.

BY CITY

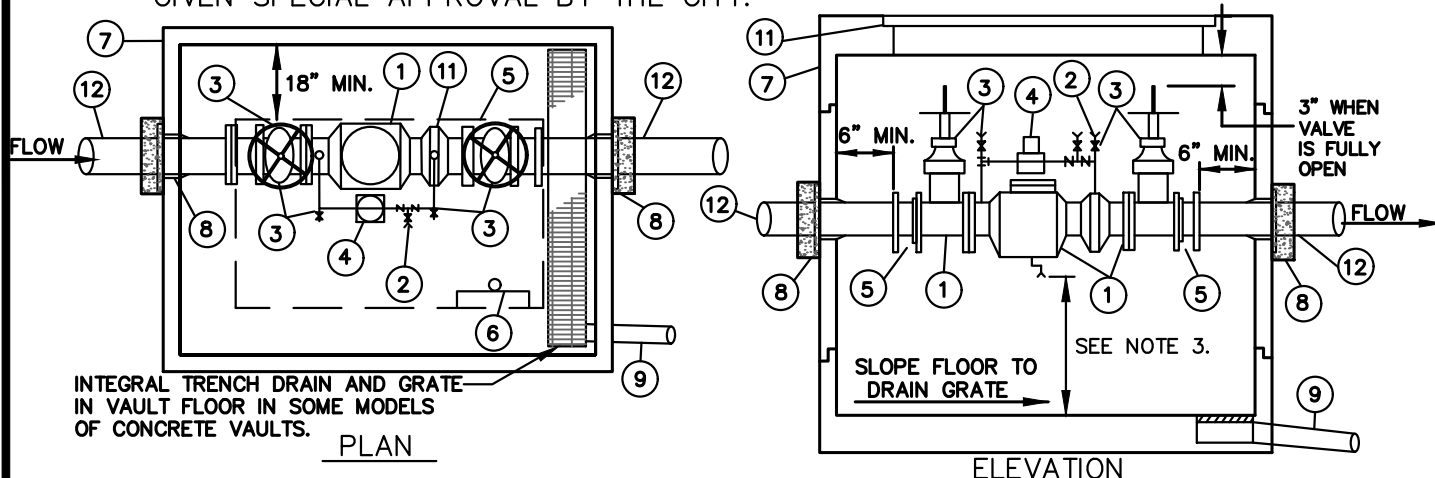
MAY 2018

DATE

DWG. NO.

W-46B

NOTICE: OUTSIDE-INSTALLED RPBA IS NOT ALLOWED IN BURIED VAULTS. DEVELOPER SHALL PROVIDE UTILITIES WITH A DESIGN FOR AN ABOVE-GROUND ENCLOSURE THAT DRAINS TO DAY LIGHT FOR APPROVAL. CLEARANCES SHOWN BELOW SHALL APPLY TO THE ENCLOSURE. THE BURIED VAULT DETAIL SHOWN BELOW IS ONLY ALLOWED WHEN GIVEN SPECIAL APPROVAL BY THE CITY.



- ① STATE APPROVED REDUCED PRESSURE BACKFLOW ASSEMBLY, COMPLETE WITH (2) RESILIENT SEATED O.S.&Y. GATE VALVES AND (4) RESILIENT SEATED TEST COCKS, AND BRASS OR COPPER DETECTOR BY-PASS, CENTERED IN VAULT.
- ② STATE APPROVED 3/4" REDUCED PRESSURE ASSEMBLY ON BY-PASS, COMPLETE WITH (2) RESILIENT SEATED BALL VALVES AND (4) RESILIENT SEATED TEST COCKS.
- ③ EACH VALVE SHALL BE MARKED WITH MODEL NUMBER WITH DESIGNATION OF RESILIENT SEAT: SUCH AS "RS OR "R", WHICH MUST BE CAST, MOLDED, OR AFFIXED ONTO THE BODY OR BONNET OF THE VALVE. ALL FERROUS BODIED VALVES SHALL BE COATED WITH A MIN. OF 4mils d.f.t. EPOXY OR EQUIVALENT POLYMERIZED COATING.
- ④ 3/4" METER (CUBIC FEET READING) AS REQUIRED.
- ⑤ MEGAFLANGE
- ⑥ ONE GALVANIZED STEEL LADDER TO BE SECURED TO VAULT WITH LADDER-UP (BILCO MODEL LU-2). LADDER TO BE ATTACHED TO VAULT PER STANDARD DETAIL W-19.
- ⑦ CONCRETE VAULT WITH 2 LOCKING ALUMINUM LW HATCH DOORS (PART NO. HHD-42"x72") RATED FOR H-30 LOADING WITH SLIP RESISTANT TREATMENT PER SECTION W4-17 OF THE ENGINEERING STANDARDS. COVER TO READ "WATER". VAULT SHALL BE EQUAL TO UTILITY VAULT CO. MODEL LISTED IN TABLE BELOW.
- ⑧ WATER TIGHT GROUT. RESTRAIN INLET/OUTLET PIPE WITH MEGALUG MID-SPAN RESTRAINT AND THRUST BLOCK ADJACENT TO VAULT SEE STANDARD DETAIL W-56.
- ⑨ DRAIN, SLOPE TO DAYLIGHT WITH BORE SIGHTED DAYLIGHT DRAIN CLEARLY VISIBLE END TO END WITH STRAIGHT PIPE, SIZED TO MEET FLOW REQUIREMENTS OF RPBA RELIEF VENT. INSTALL WIRE MESH RODENT SCREEN OVER DRAIN OUTLET.
- ⑩ TWO ADJUSTABLE PIPE STANCHIONS, BOLTED TO FLOOR.
- ⑪ ACCESS TO BE CENTERED OVER ASSEMBLY.
- ⑫ CL. 52 D.I., PEXFL WITH RETAINER GLANDS.
- ⑬ VALVE SUPERVISORY SWITCH, SPDT, PER FIRE DEPARTMENT REQUIREMENTS.

SIZE	MIN. VAULT SIZE (INSIDE)			UTIL. VAULT CO. MODEL	UTIL. VAULT CO. COVER *
	W	L	H		
3"	4'-9"	4'-8"	3'-11"	675-WA	675-2-332P
4"	5'-0"	5'-3"	4'-7"	675-WA	675-2-332P
6"	5'-1"	6'-6"	5'-5"	676-WA	676-2-332P
8"	5'-9"	7'-7"	7'-1"	687-LA	687-TL-2-332
10"	5'-10"	8'-8"	8'-0"	612-2X	612-3-332P

* COVER MODIFIED PER NOTE ⑦.

NOTES:

1. DAYLIGHT DRAIN MUST BE ABLE TO BE LINE SIGHTED, INSTALLED ABOVE MAXIMUM FLOOD LEVEL, AND BE ABLE TO HANDLE THE VOLUME OF WATER THAT CAN BE DISCHARGED FROM THE RELIEF VALVE PORT.
2. WHEN THE REDUCED PRESSURE ASSEMBLY IS LOCATED INSIDE A BUILDING A SIZED DRAIN LINE SHALL BE PROVIDED FOR RELIEF PORT. THERE MUST BE AN APPROVED AIR GAP BETWEEN THE RELIEF PORT AND DRAIN.
3. ALLOW 12"+ NOMINAL DIAMETER OF ASSEMBLY CLEARANCE BELOW RELIEF PORT FOR REPAIR. ALSO PROVIDE 12MIN. AIR GAP CLEARANCE FROM TOP OF DRAIN PIPE.
4. REDUCED PRESSURE BACKFLOW ASSEMBLY WILL BE ALLOWED TO BE INSTALLED IN VAULTS ONLY IN CASES WHERE NO OTHER MEANS OF INSTALLATION IS AVAILABLE AND AS APPROVED BY A CITY OF BELLEVUE WATER QUALITY TECHNICIAN.
5. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.
6. MINIMUM CLEARANCE BETWEEN ASSEMBLY AND WALL ON LADDER SIDE OF VAULT IS 24". MINIMUM CLEARANCE FROM OPPOSITE WALL 12". ALL CLEARANCES SHOWN ARE MINIMUM.
7. VAULTS SHALL NOT BE INSTALLED IN AREAS WITH VEHICULAR TRAFFIC.
8. TEE AND GATE VALVES REQUIRED ON MAIN.
9. IN CENTRAL BUSINESS DISTRICT, 3" THROUGH 6" ASSEMBLIES SHALL CONNECT TO WATER MAIN WITH 8" PIPE.
10. FDC TO BE LOCATED DOWNSTREAM OF RPBA. FDC LINE AND CHECK VALVE MAY BE ROUTED INSIDE THE RPBA VAULT PROVIDED ALL PROVISIONS OF STANDARD DETAIL W-48 ARE MET.
11. MINIMUM 2' OF LEVEL, UNOBSTRUCTED AREA AROUND HATCHES.
12. SECURE A VALVE MARKER, PER DETAIL W-55, TO EACH GATE VALVE HANDLE.
13. LONGER VALVE ASSEMBLIES MAY REQUIRE A LARGER VAULT TO MEET THE REQUIRED CLEARANCES. SUBMIT FOR APPROVAL.
14. RPBA INSTALLATIONS THAT DIFFER FROM THE STANDARD DETAIL MUST BE APPROVED BY THE CROSS CONNECTION PROGRAM ADMINISTRATOR (425-452-5208) AND WILL BE REVIEWED ON A CASE-BY-CASE BASIS TO ENSURE THEY MEET CURRENT MINIMUM REQUIREMENTS FOR INSTALLATION AND FREEZE PROTECTION.



CITY OF NORTH BEND
3" TO 10" REDUCED PRESSURE
DETECTOR ASSEMBLY FOR FIRE
SPRINKLER SYSTEMS
(OUTSIDE INSTALLATION)

APPROVED:

MARK RIGOS, P.E.

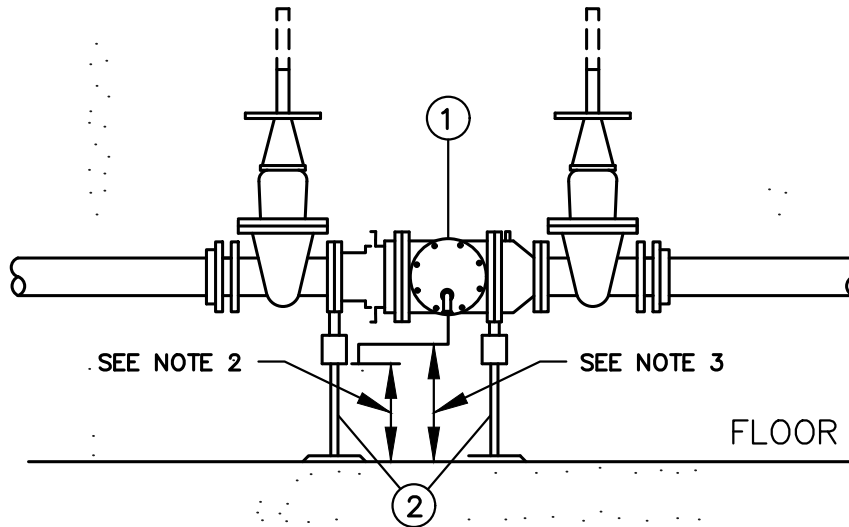
BY CITY

MAY 2018

DATE

DWG. NO.

W-47



- ① LINE-SIZED WA STATE APPROVED REDUCED PRESSURE BACKFLOW ASSEMBLY, COMPLETE WITH (2) RESILIENT SEATED O.S.&Y. GATE VALVES AND (4) RESILIENT SEATED TEST COCKS.
- ② TWO ADJUSTABLE PIPE STANCHIONS, BOLTED TO FLOOR. REQUIRED FOR ASSEMBLIES 2 1/2" AND LARGER.

NOTES:

- 1. WHEN THE REDUCED PRESSURE ASSEMBLY IS LOCATED INSIDE A BUILDING A SIZED DRAIN LINE SHALL BE PROVIDED FOR RELIEF PORT. THERE MUST BE AN APPROVED AIR GAP BETWEEN THE RELIEF PORT AND DRAIN.
- 2. ALLOW 12"+ NOMINAL DIAMETER OF ASSEMBLY CLEARANCE BELOW RELIEF PORT FOR REPAIR. MAXIMUM CLEARANCE OF 5'.
- 3. ASSEMBLY TO BE MAINTAINED BY OWNER AND ANNUAL CERTIFICATION REQUIRED.
- 4. SIDE CLEARANCES TO WALL;
VALVE SIZE 2" AND LESS: 6" CLEARANCE.
VALVE SIZE 3" AND ABOVE: 12" CLEARANCE.
- 5. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.
- 6. PROTECT AGAINST FREEZING OR DAMAGE. USE HEAT-TAPE IF AREA IS SUBJECT TO FREEZING.
- 7. INTERIOR WATER APPURTENANCES MUST CONFORM TO UNIFORM PLUMBING CODE REQUIREMENTS.
- 8. DEVICE TO BE INSTALLED NO HIGHER THAN 5 FEET ABOVE FLOOR.
- 9. RPBA INSTALLATIONS THAT DIFFER FROM THE STANDARD DETAIL MUST BE APPROVED BY THE CROSS CONNECTION PROGRAM ADMINISTRATOR (425-452-5208) AND WILL BE REVIEWED ON A CASE-BY-CASE BASIS TO ENSURE THEY MEET CURRENT MINIMUM REQUIREMENTS FOR INSTALLATION AND FREEZE PROTECTION.



CITY OF NORTH BEND

**REDUCED PRESSURE BACKFLOW
ASSEMBLY (INSIDE INSTALLATION)**

APPROVED:

MARK RIGOS, P.E.

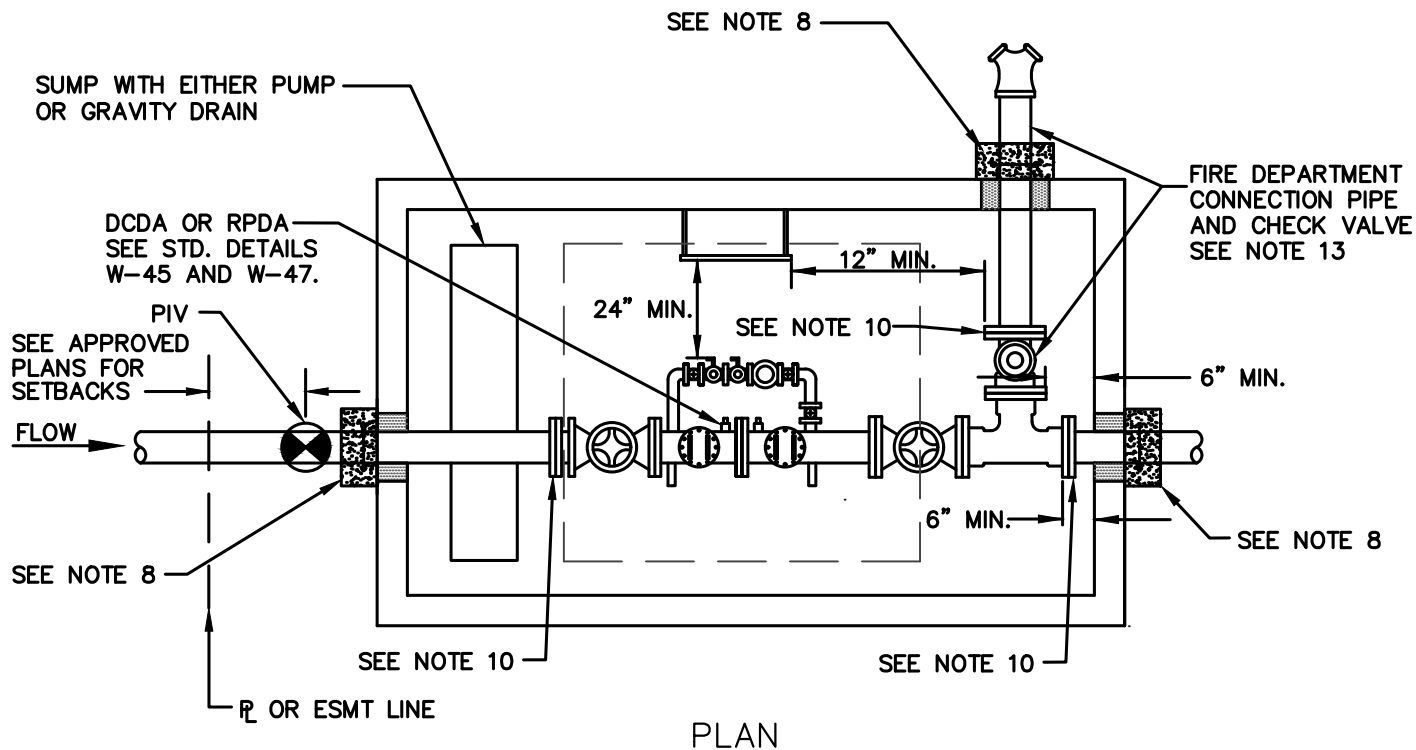
BY CITY

MAY 2018

DATE

DWG. NO.

W-48



NOTES:

1. FDC TO BE LOCATED DOWNSTREAM OF DCDA (DOUBLE CHECK DETECTOR ASSEMBLY) OR RPDA (REDUCED PRESSURE DETECTOR ASSEMBLY).
2. PROVIDE MINIMUM OF 6" CLEARANCE BETWEEN VALVES, FITTINGS AND THE VAULT WALL.
3. ALL DIMENSIONS SHOWN ARE MINIMUM ALLOWED.
4. INSTALL FDC LINE ON SIDE OF VAULT WITH GREATEST AVAILABLE SPACE, AS SHOWN.
5. WHEN FDC LINE IS ROUTED THROUGH THE VAULT, THE VAULT SIZE SHALL BE INCREASED TO MATCH THE SIZE REQUIRED FOR THE MINIMUM CLEARANCES.
6. ALL PIPE JOINTS SHALL BE RESTRAINED. CONCRETE BLOCKING IS REQUIRED AT CHANGES IN DIRECTION.
7. CORE DRILL (O.D. +2") VAULT IF KNOCK-OUTS ARE NOT PROVIDED.
8. SEAL PIPE PENETRATIONS WITH WATER-TIGHT GROUT. RESTRAIN INLET/OUTLET PIPES WITH MEGALUG MID-SPAN RESTRAINT AND THRUST BLOCK ADJACENT TO VAULT (DETAIL W-56).
9. WHEN PIV IS LOCATED IN VAULT, THE VAULT SIZE SHALL BE INCREASED TO MATCH THE SIZE REQUIRED TO ACCOMMODATE PIV INSTALLATION WITH 6" CLEARANCES ON VAULT INTERIOR. (LID TO BE CORE DRILLED - USE LINK SEAL/GROUT TO SEAL PENETRATION).
10. MEGAFLANGE ON PE CONNECTION TO FLANGED VALVES AND TEE.
11. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.
12. POSITION DCVA WITHIN HATCH TO ALLOW FOR VERTICAL REMOVAL.
13. CHECK VALVE TO INCLUDE BALL DRIP.



CITY OF NORTH BEND
REQUIREMENTS FOR FDC AND
CHECK VALVE ROUTED THROUGH
BACKFLOW ASSEMBLY VAULT-1

APPROVED:

MARK RIGOS, P.E.

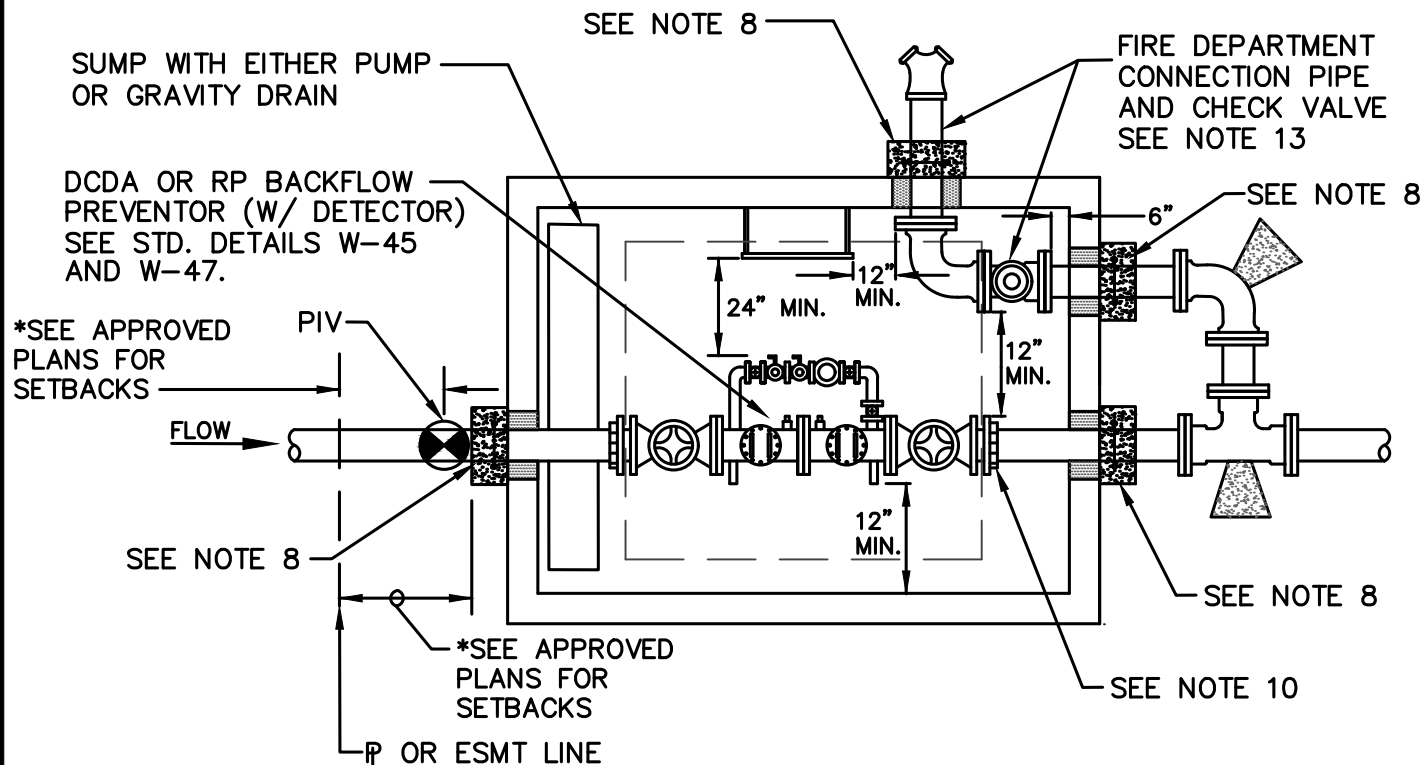
BY CITY

MAY 2018

DATE

DWG. NO.

W-49



NOTES:

1. FDC TO BE LOCATED DOWNSTREAM OF DCDA (DOUBLE CHECK DETECTOR ASSEMBLY) OR RPDA (REDUCED PRESSURE DETECTOR ASSEMBLY).
2. PROVIDE MINIMUM OF 6" CLEARANCE BETWEEN VALVES, FITTINGS AND THE VAULT WALL.
3. ALL DIMENSIONS SHOWN ARE MINIMUM ALLOWED.
4. INSTALL FDC LINE ON SIDE OF VAULT WITH GREATEST AVAILABLE SPACE, AS SHOWN.
5. WHEN FDC LINE IS ROUTED THROUGH THE VAULT, THE VAULT SIZE SHALL BE INCREASED TO MATCH THE SIZE REQUIRED FOR THE MINIMUM CLEARANCES.
6. ALL PIPE JOINTS SHALL BE RESTRAINED. CONCRETE BLOCKING IS REQUIRED AT CHANGES IN DIRECTION.
7. CORE DRILL (O.D. +2") VAULT IF KNOCK-OUTS ARE NOT PROVIDED.
8. SEAL PIPE PENETRATIONS WITH WATER-TIGHT GROUT. RESTRAIN INLET/OUTLET PIPES WITH MEGALUG MID-SPAN RESTRAINT AND THRUST BLOCK ADJACENT TO VAULT (DETAIL W-56).
9. WHEN PIV IS LOCATED IN VAULT, THE VAULT SIZE SHALL BE INCREASED TO MATCH THE SIZE REQUIRED TO ACCOMMODATE PIV INSTALLATION WITH 6" CLEARANCES ON VAULT INTERIOR. (LID TO BE CORE DRILLED - USE LINK SEAL/GROUT TO SEAL PENETRATION).
10. MEGAFLANGE ON PE CONNECTION TO FLANGED VALVES AND TEE.
11. TESTING IS REQUIRED BY A WASHINGTON STATE DEPARTMENT OF HEALTH CERTIFIED BACKFLOW ASSEMBLY TESTER UPON INSTALLATION AND ANNUALLY THEREAFTER. ASSEMBLY TO BE MAINTAINED BY OWNER.
12. POSITION DCVA WITHIN HATCH TO ALLOW FOR VERTICAL REMOVAL.
13. CHECK VALVE TO INCLUDE BALL DRIP.



CITY OF NORTH BEND REQUIREMENTS FOR FDC AND CHECK VALVE ROUTED THROUGH BACKFLOW ASSEMBLY VAULT-2

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

W-50



CITY OF NORTH BEND

RESERVED

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

W-51



CITY OF NORTH BEND

RESERVED

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

W-52



CITY OF NORTH BEND

RESERVED

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

W-53



CITY OF NORTH BEND

RESERVED

APPROVED:

MARK RIGOS, P.E.

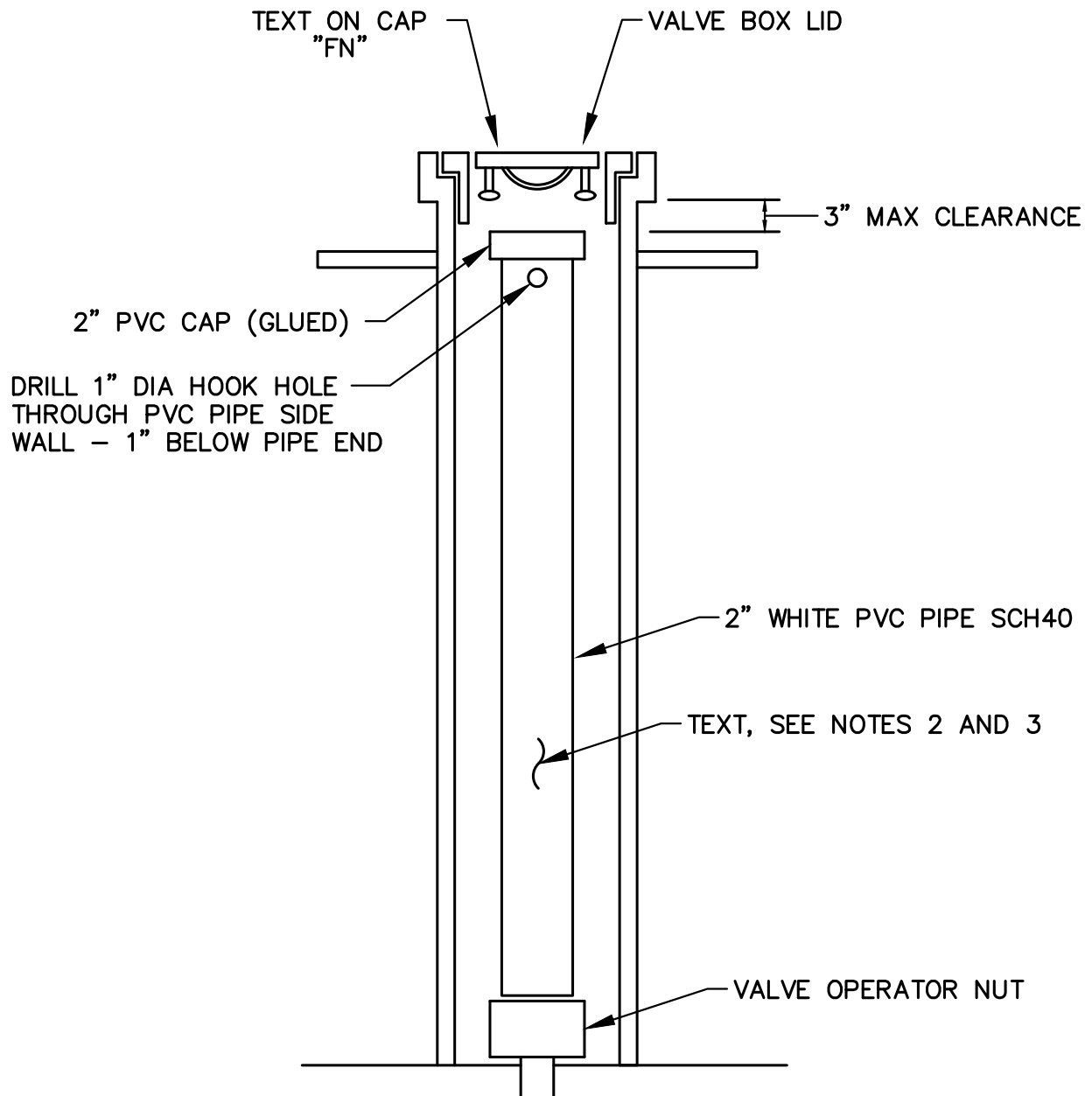
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MAY 2018

DATE

DWG. NO.

W-54



NOTES:

1. CUT 2" PVC SCH40 TO LENGTH TO REST ON OPERATOR NUT AND EXTEND WITHIN 3" OF TOP OF VALVE BOX .
2. TEXT ON PVC PIPE SHALL READ "FIRE LINE – DO NOT CLOSE VALVE."
3. TEXT SHALL BE PRINTED CLEARLY AND NEATLY WITH A BLACK PERMANENT INK MARKING PEN.



CITY OF NORTH BEND

FIRELINE VALVE MARKER

APPROVED:

MARK RIGOS, P.E.

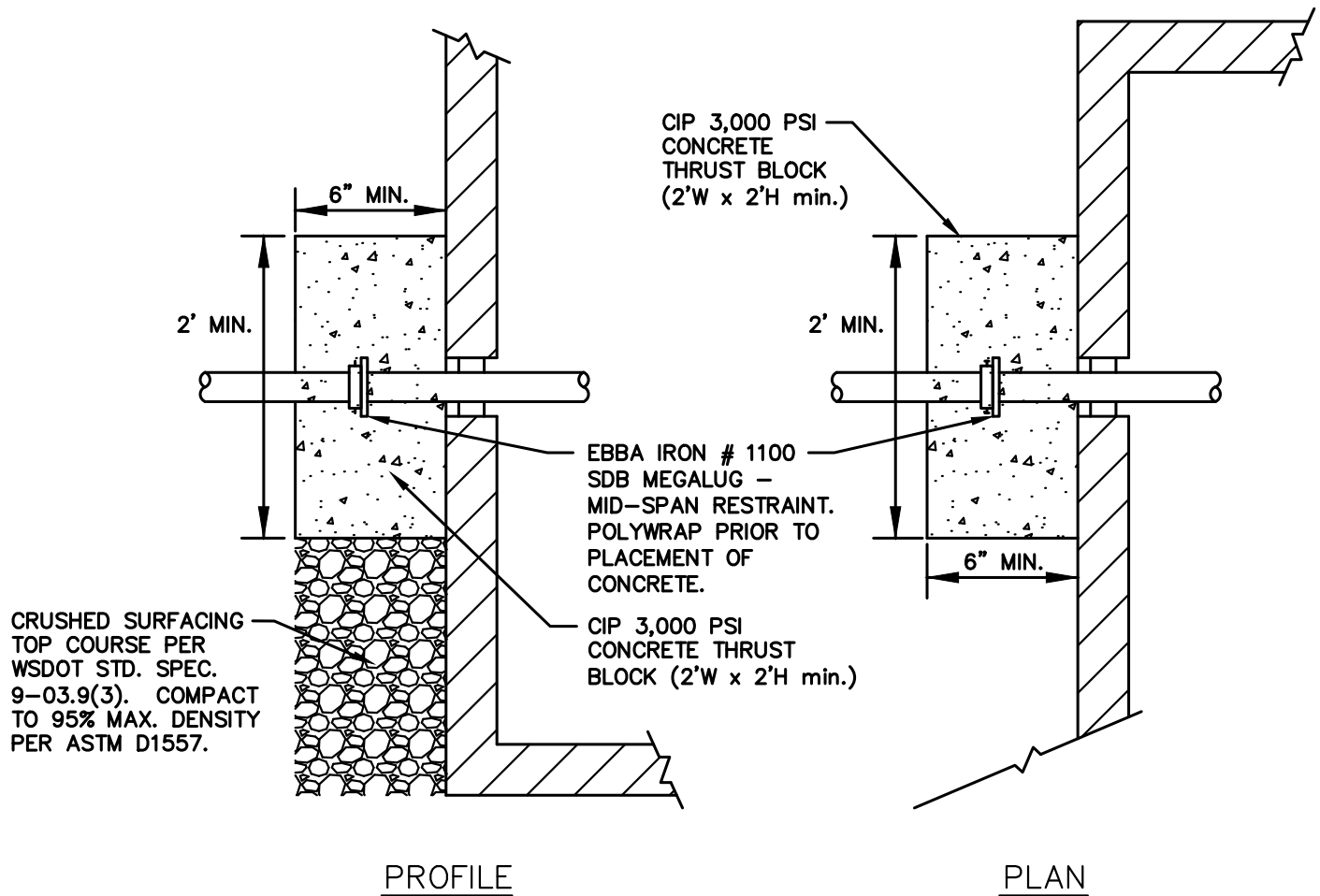
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MAY 2018

DATE

DWG. NO.

W-55



THRUST BLOCK ADJACENT TO VAULT

NTS



CITY OF NORTH BEND

THRUST BLOCK ADJACENT TO
VAULT

APPROVED:

MARK RIGOS, P.E.

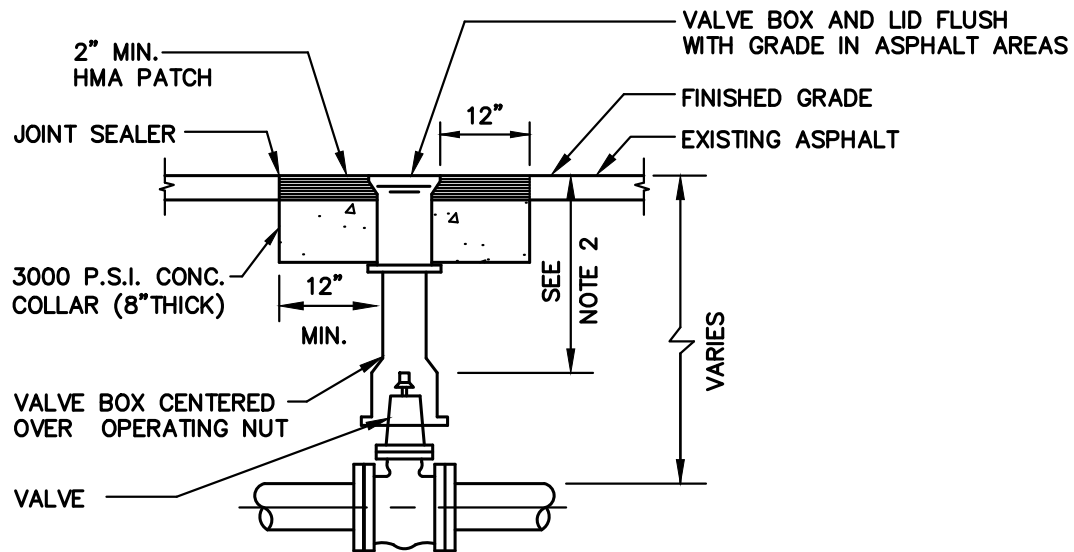
BY CITY

MAY 2018

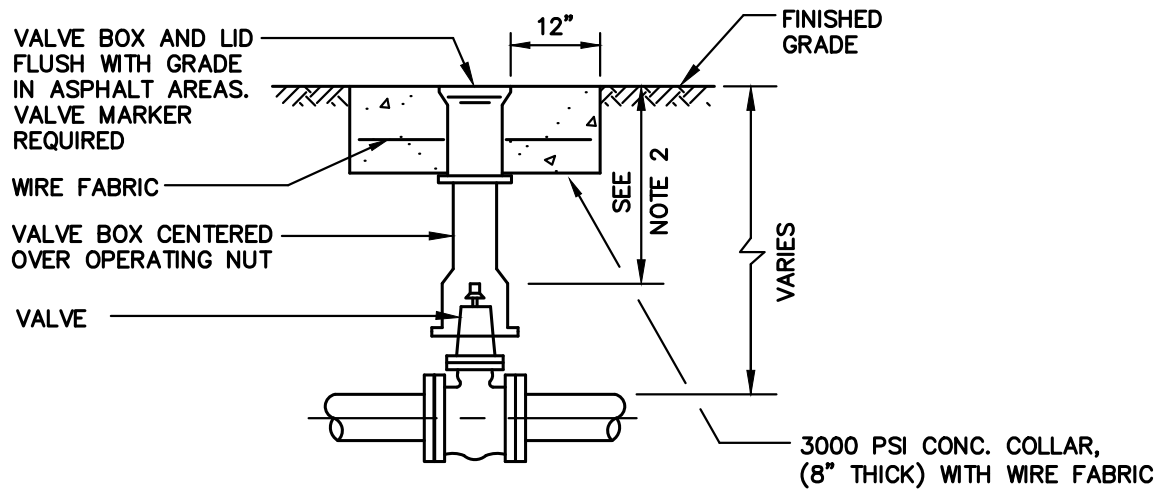
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DWG. NO.

W-56



VALVE BOX IN ASPHALT AREA



VALVE BOX IN UNIMPROVED AREA

NOTES:

1. EACH VALVE SHALL BE PROVIDED WITH AN ADJUSTABLE CAST IRON VALVE BOX OF 5 INCHES (5") INSIDE DIAMETER. VALVE BOXES SHALL HAVE A TOP SECTION WITH AN EIGHTEEN INCH (18") MIN. LENGTH. THE VALVE BOX SHALL BE OLYMPIC FOUNDRY #045 OR APPROVED EQUAL. VALVE BOX EARS SHALL BE PLACED IN LINE WITH PIPE IT SERVES.
2. 15" MINIMUM, 36" MAXIMUM FOR OPERATOR NUT. EXTENSION MAY BE REQUIRED.



CITY OF NORTH BEND

VALVE BOX
ADJUSTMENT DETAIL

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

W-57

SECTION 7

SANITARY SEWERS

Planning, Designing,
and Constructing



Sanitary Sewers for
the Collection,
Conveyance,

and Treatment of
Wastewater ...



SECTION 7 SANITARY SEWERS

7.01 General Requirements

A. General

These Engineering Standards set forth minimum standards for the planning, design, and construction of sanitary sewer collection facilities.

These standards do not include design of special facilities, such as Pump Stations or Sewage Lift Stations. These special facilities require unique design requirements and will be subject to individual review by the City.

Although these standards are intended to apply to physical development within the City, the standards will not apply for all situations. Compliance with these standards does not relieve the designer of the responsibility to apply conservative and sound professional judgement. These are minimum standards and are intended to assist, but not substitute for competent work by design professionals. The City may at its sole discretion due to special conditions and/or environmental constraints, require more stringent requirements than would normally be required under these standards.

B. References

Wherever references are made to the standards, specifications, or other published data of the various national, regional, or local organizations, such organizations may be referred to by their acronym or abbreviation only. As a guide to the user, the following acronyms or abbreviations which may appear, shall have the meanings indicated herein:

AASHTO	American Association of the State Highway and Transportation Officials.
ANSI	American National Standards Institute, Inc.
WSDOT	Washington State Department of Transportation
APWA	American Public Works Association
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
DOE	Washington State Department of Ecology
DOH	Washington State Department of Health
WAC	Washington Administrative Code

C. Governmental Agency Requirements

All construction on City, County or State roads or right-of-way shall be done in accordance with the agency's standards and requirements and in accordance with the franchise and/or permit requirements. The Contractor is responsible to determine these requirements prior to construction.

Where conflict exists between these Standards and permit requirements, the more stringent requirements as determined by the City shall take precedence.

7.02 Plan Submittal**A. General**

A submittal checklist is included in the appendices of these standards. Following the standards in accordance with the submittal checklist will help ensure a timely review of the proposed project and keep review costs to a minimum.

B. Sanitary Sewer General Plan Notes

A listing of General Notes that must be incorporated on the first sanitary sewer plan sheet are contained in the Appendix. All the notes on the list may not pertain to every project. The Developer should include only those notes that are relevant to the project and may omit non-relevant notes. However, do not renumber the remaining General Notes. If additional notes are needed for specific aspects, they should be added after the General Notes.

C. As-built Documentation

For all wastewater projects, the Developer or City Department responsible for the project shall provide as-built plans at completion of the project, in accordance with Section 3.20.

7.03 Sewer Planning and Design Standards**A. Planning Criteria**

Serve to Extreme of Property. Ensure adjacent properties can be provided sewer service (extend to extreme of property and design for the ultimate development of the tributary areas).

Sewer service shall be provided by a gravity system (unless approved by the City). Individual properties shall drain, by gravity side sewers, into a gravity collection system. In some cases, it may be necessary for an area to drain to a common low spot, which will require a sewage lift station to subsequently pump the sewage to a gravity sewer main. Said lift station shall be constructed per Section 7-07.

In those situations wherein a gravity line exists, but is not accessible by gravity from individual properties, individual pressure systems may be allowed to pump sewage into the gravity sewer line. The individual pressure systems shall meet the requirements herein.

B. Demand Projections

Demand projections will be taken from the current version of the City of North Bend Sewer System Comprehensive Plan.

C. Infiltration/Inflow (I/I) Allowances

For new systems an I/I allowance of 1100 gallons per acre per day (gpac) shall be used. On existing sewer systems, I/I allowance shall be determined through analysis.

D. System Parameters

- (1) New sewer lines shall be designed so that, under ultimate development, peak flow, including I/I, shall not exceed 50 percent capacity of the line. Existing lines can have peak flows to 75 percent capacity of the line. Engineering design submittals must conform to the City's required pipe sizes.
- (2) No storm drainage connections shall be made to the sanitary sewer system, unless approved by the City and only under special circumstances, i.e., covered parking or wash down areas around garbage collection dumpsters with an area less than 200 square feet.

Uncovered garbage dumpster areas less than 200 square feet may discharge to the sanitary sewer. Uncovered garbage dumpster areas greater than 200 square feet must discharge to the storm system after passing through a grease interceptor, designed per these Standards.

- (3) All new utilities shall comply with NBMC 14.12.030 C.

E. General Design Standards

- (1) All lengths and dimensions shall be horizontal distances, no slope distances on plans.
- (2) Indicate type of pavement restoration required by right-of-way authority having jurisdiction (if working in existing streets).
- (3) Dimension existing and new main locations from right-of-way line and/or property line, or label stations and offsets.
- (4) Check with Public Works Department to determine how surrounding development will affect design (e.g., serve to extreme of property if adjacent property has potential for future development).
- (5) On plans show existing manholes or give reference distances to existing manholes near project including manhole number and invert/rim elevations.
- (6) Existing sewer lines to be abandoned shall be filled completely with sand, concrete, or controlled density fill; or removed.
- (7) Manholes connected to lines being abandoned, shall be rechanneled with 3,000 psi cement concrete.
- (8) Side sewers and sewer mains shall not be used for the grounding of electrical systems or for the maintenance, integrity or continuity of any grounding attachment or connection.
- (9) Placement of surface appurtenances (manhole lids, water valve lids, etc.) in tire track of traffic lanes shall be avoided whenever possible.
- (10) Soil nails shall not be installed at or above pipes and shall include a minimum 5-foot clearance if installed below pipes.

F. Main Lines

- (1) Minimum pipe size shall be 8 inches.
- (2) Pipe Slope
 - (a) Minimum slope shall comply with Ecology standards, except 8-inch-diameter pipe shall have a minimum slope of 0.005 ft/ft.
 - (b) Maximum main line slope shall not induce velocities greater than 10 feet per second under daily peak flows.
 - (c) Where pipe are proposed on hills or steep slopes, the Director shall determine if the pipe location and configuration will be allowed. If allowed, the Developer's engineer shall propose design details for permanently securing and anchoring the pipe.
- (3) Plan View
 - (a) List pipe length, size, and material alongside of pipe, e.g., 150 LF 8-INCH PVC. Pipe material can be listed in a general note in lieu of listing along pipe.
 - (b) Pipe length is to be based on horizontal distance between center of manholes.
 - (c) Indicate direction of flow with arrows on end of pipe entering manhole.
- (4) Profile View
 - (a) List pipe length, size, material, and slope (%), e.g., 150 LF 8-INCH PVC S=1.25%. Pipe material can be listed in a general note in lieu of listing on profile.
 - (b) Slope is based on I.E. OUT of upstream manhole, I.E. INTO downstream manhole and horizontal distance between center of manholes.

G. Manholes

- (1) Maximum distance between manholes shall be 400 feet.
- (2) All manhole covers shall be set flush with ground surface, except where otherwise designated by the City. Manholes shall have bolt-locking covers.
- (3) Concrete perimeter seals shall be provided around all manhole adjustment sections per Standard Detail.
- (4) Existing and Terminal Manholes:

When connecting to an existing manhole, all requirements of these Engineering Standards must be met. The design shall call out all necessary revisions to the existing manhole, or if the existing manhole cannot be renovated to meet the standards, the manhole shall be removed and replaced with a conforming structure.

- (a) When there is a potential for future main line extension from terminal manhole, position side sewer connections to manhole to avoid conflict with future main line connection to manhole.
- (b) Terminal manholes (without side sewer connection) shall not be channeled. Slope manhole base to provide positive drainage toward pipe, use 3,000 psi cement concrete.
- (5) Where side sewer connects to manhole, invert of side sewer shall be equal to or above main sewer crown, but not to exceed 18 inches above invert of main sewer.
- (6) Drop in invert elevation across manhole shall be from 0.1 feet to 0.2 feet. In areas with sewer main slopes less than 0.50 percent, lesser drops are allowed, to be determined by the City. In areas with sewer main slopes greater than 10 percent, the drop should be designed to produce a slope across the manhole that is an average of the inlet and outlet pipe slopes. Maximum allowable drop in invert elevation across the manhole shall be 1.0 feet.

(7) Manhole Sizing

48" manhole:	Two connecting pipes, up to 12" diam. Three connecting pipes, up to 10" diam.
54" manhole:	Two connecting pipes, 15" diam. to 21" diam. Three connecting pipes, 10" diam. to 15" diam. Four connecting pipes, up to 12" diam.
72" manhole:	Two connecting pipes, 21" diam. to 24" diam. Three or four connecting pipes, 15" diam.

For other pipe configurations and hydraulic concerns, the size of the manhole will be determined on a case by case basis.

The minimum angle between the incoming and the outgoing pipe shall be 90°; pipe shall be radial with the center of manhole.

The above configurations shall provide adequate shelves and room for maintenance and performing video inspections.

- (8) Channels shall be centered in manhole.
- (9) Ladder rungs shall be placed on side of manhole with largest shelf.
- (10) Any manhole less than 5' deep (rim to invert) shall have a concentric cone. All other manholes shall be provided with eccentric cone.

- (11) Minimum manhole depths (invert to top of rim):

MANHOLE SIZE	PIPE SIZE	MIN MH DEPTH	COMMENTS
48"	6"	3.0'	See Standard Detail S-6
	8"	3.2'	
	10"-12"	3.5'	
54"	8"	3.7'	See Standard Detail S-6
	10"-12"	4.0'	
	15"-18"	4.5'	
72"	15"	8.0'	See Standard Detail S-3
	18"-24"	8.5'	
	27"	9.0'	

72-inch manholes over 11.5 feet in depth shall include 48-inch reducing section per Standard Detail S-2.

- (12) Glass fiber supported plastic or PVC-hard lined manhole channels will be allowed at contractor's option.
- (13) Drop Manholes
- (a) Minimum height of drop is 2.5 feet.
 - (b) Maximum height of drop is 20 feet.
 - (c) Maximum drop pipe diameter is 8 inch.
 - (d) Minimum manhole diameter is 54 inch for new drop manholes; two connections are allowed for 54-inch diameter or greater.
 - (e) Outside drop structures are required on new manholes, and connections to existing manholes.
 - (f) Inside drops are allowed on a case by case basis as approved by the City.
- (14) The burial of manholes or cleanouts is prohibited.
- (15) Manholes in easements shall be constructed to provide a stable, level grade for a minimum radius of 2.5 feet around the center of the access opening, per standard detail S-8.
- (16) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration or inflow of flood waters into the systems and discharges from the systems into flood waters. Manholes located in the curb and gutter line, flood plains, or flood-prone areas shall have a locking, sealed, gasketed ring and cover.

H. Pipe Class Protection – Cover

- (1) PolyVinyl Chloride (PVC) pipe class designation:
- (a) All sewer pipe (including side sewer stubs) shall be PVC conforming to ASTM-D3034 SDR 35 (4"-15") or ASTM-F679 (18"-27"), unless otherwise determined by the City.
 - (b) Depth of cover over PVC pipe shall be 3 feet minimum and 20 feet maximum. Pipe depths outside this range will require use of pressure class PVC conforming

to AWWA C900 (dimension ratio 18).

- (2) PVC pipe shall be encased in a steel or ductile iron casing when crossing under improvements where the ability to remove and replace pipe without disturbance to the improvement is needed. Casings are required when:
- (a) Crossing under rockeries over 4' high.
 - (b) Crossing under retaining wall footings over 4-foot wide.
 - (c) Crossing under reinforced earth retaining walls (both wall and reinforcing material).
 - (d) Casings shall extend a minimum of 5 feet past each edge of the improvement, or a distance equal to the depth of pipe, whichever is greater. The carrier pipe shall be supported by casing spacers where casing length exceeds 10 feet.

Minimum clearance between bottom of rockery and top of pipe or casing shall be 2 feet. The trench shall be backfilled with crushed rock.

- (3) Building setback requirements:
- (a) 5 foot minimum from covered parking.
 - (b) 10 foot minimum from buildings and retaining walls, or equal to depth of pipe, whichever is greater.
 - (c) 20 foot minimum easement shall be provided between buildings, on multi-family and commercial sites.
 - (d) When passing between any two buildings (residential or commercial, etc.) which are 25 feet apart or less, the easement width shall extend the full width between the buildings, and the depth of the sewer line shall not exceed 10 feet.

I. Clearances – Other Utilities

- (1) All clearances listed below are from edge-to-edge of each pipe.
- (2) Water services and sewer stubs shall have at least 5-foot horizontal clearance.
- (3) Check for crossing or parallel utilities. Maintain minimum vertical and horizontal clearances. Avoid crossing at highly acute angles (the smallest angle measure between utilities should be between 45 and 90 degrees).
- (4) Horizontal clearances from sanitary sewer:
- | | |
|--|---------|
| · Cable TV, Gas, Storm | 5 feet |
| · Power, Telephone, Fiber Optic, Water | 10 feet |
- (5) Vertical clearances from sanitary sewer:
- | | |
|---------------------------------|--------|
| · Cable TV, Gas, Storm | 1 foot |
| · Power, Telephone, Fiber Optic | 1 foot |
| · Water | 2 feet |

- (6) Where sewer crosses above or below water main, one full length of sewer pipe shall be used with the pipes centered for maximum joint separation. Washington Department of Ecology criteria will also apply.
- (7) Send letter and preliminary plan to existing utilities to inform them of new construction. Request as-built information and incorporate into plans. At minimum the following utilities should be contacted:
 - Cable television
 - Natural gas
 - Power
 - Storm drainage
 - Telephone, Fiber Optic
 - Water

J. Connections to Existing System

- (1) New sewer mains (8 inch and larger) shall connect to existing sewer main at existing manholes, or with new manhole on existing sewer per Standard Detail.
- (2) When connect to existing manhole, core-drill opening for pipe and rechannel manhole base.
- (3) Where new main is larger in diameter than existing downstream main, check that capacity of existing main is not exceeded by flow from new main.
- (4) When connecting to existing manhole, check that requirements of Section 7-03 D(7) are satisfied.
- (5) If connecting to existing manhole that has access less than 24 inches in diameter and/or concentric cone (manholes over 5-feet deep), manhole shall be upgraded to include new 24-inch ring and cover and/or eccentric cone.
- (6) If connection to existing manhole places a channel directly under access opening, move ladder and rotate cone section to place access over concrete shelf.
- (7) Connections to end of existing pipe:
 - (a) If end of pipe is known to have a bell, and new pipe is same material as existing, plans can specify connection by inserting spigot of new pipe into existing bell end, with “donut” gasket.
 - (b) If existing line is plain end, or must be cut, plans shall specify use of a coupling to connect new and existing lines.
- (8) Approved couplings for use on sewer mains include:
 - (a) Ductile iron mechanical couplings (equal to ROMAC) on ductile iron, concrete, vitrified clay, or pipes with differing materials or diameters.

- (b) On PVC or PE mains, PVC or PE couplings with compatible dimension ratio and gaskets to connect new and existing pipes shall be used.
- (c) Where a section of existing PVC pipe is replaced by “dropping-in” a new section of PVC pipe, the connections to existing pipe shall be made with PVC closure couplings (slip couplings).

K. Fats, Oils, and Grease Separation

Pretreatment requirements for wastewater are included in NBMC 13.32.

(1) Oil/Water Separator

Whenever an industrial or commercial business generates mineral/petroleum/non-biodegradable cutting oils exceeding 100 milligrams per liter to be discharged to the sanitary sewer, pre-treatment is required. An oil/water separation device shall be installed by the property owner as specified on various Standard Details. Selection and sizing of an oil/water separator shall be subject to approval of the City. Water discharged from any oil/water separator to the sanitary sewer system shall not contain in excess of 100 milligrams per liter of petroleum oil, non-biodegradable cutting oil or mineral products, and shall be in compliance with the City of North Bend regulations for discharge to the sanitary sewer.

- (a) Sizing of a separator facility shall be based upon maximum available flow to the separator and provision of a **45 minute retention time** in the separator at that flow, with a minimum capacity of at least 100 gallons.
- (b) The oil/water separator shall be covered with removable sections. Access and inspection covers, weighing not more than 30 lbs. and with suitable hand holds, are to be provided directly above inspection “tee” and oil/grit collection compartments.
- (c) Only waste water from floor drains and covered parking areas shall drain to the separator. The location and design shall minimize or eliminate the possibility of storm water reaching the separator -- areas over 200 square feet open to rainfall shall not drain to the separator. See Standard Details.
- (d) Allowable materials for construction are as follows:
 - Tank - concrete
 - Baffles - concrete, steel plate
- (e) The separator shall be located within 20 feet of drive for access by maintenance vehicle.
- (f) A sampling tee shall be located on the outlet as shown on the Standard Details. Access to the separator shall be maintained free for inspection and compliance determination sampling at all times.
- (g) The effluent discharged from any oil/water separator to the sanitary sewer shall not exceed 100 parts per million total oil.

- (h) When pretreatment is no longer required, the inlet and outlet pipes shall be permanently plugged, the separation chambers pumped out, and the vault removed, or filled with compacted crushed rock or controlled density fill.

(2) Grease Interceptor

Whenever a commercial and/or retail food preparation operation, regardless of size, generates animal/vegetable fats, oils or grease (F.O.G.) waste, which causes a visible sheen or accumulations in the effluent, to be discharged to the sanitary sewer, pretreatment is required. A grease interception device as specified by various Standard Details, and/or other biological, chemical, or other pretreatment approved by the City, shall be installed by the owner. Effluent discharged from any grease interceptor shall not contain a visible sheen or accumulations of F.O.G., and shall be in compliance with the City of North Bend regulations for discharge to the sanitary sewer.

- (a) Design of the grease interceptor shall conform to the Standard Details, and shall be subject to approval by the City. Size shall be determined by the City. Minimum capacity shall be 600 gallons except as noted by the City.
- (b) Fixtures in the kitchen area which discharge waste-water containing grease are to be connected to the grease interceptor. Such fixtures include dishwashers, pot sinks, range woks, janitor's sink, floor sinks, rotoclones. Toilets, urinals, and wash basins shall not flow through the interceptor.
- (c) The interceptor shall be located outside the building within twenty feet of drive for access by maintenance vehicles.
- (d) The interceptor shall be filled with clean water prior to startup of system.
- (e) Allowable materials for construction are as follows:
 - Tank - concrete
 - Baffles - concrete, plastic
- (f) Access to the interceptor shall be maintained free for inspection and compliance determination sampling at all times.
- (g) When pretreatment is no longer required, the inlet and outlet pipes shall be permanently plugged, the separation chambers pumped out, and the vault removed, or filled with compacted crushed rock or controlled density fill.

L. Easements

- (1) Show easements on all plans and identify width.
- (2) Show easements on all private property. If easement is defined as a constant width on each side of sewer main, then show a segment of the easement and label as "Typical" (typ).

- (3) The required utility easement width shall be: (1) the minimum value set forth below; or (2) determined by extending a line from the bottom of the excavation at the outside diameter for pipes, at a 1 H : IV slope until it intercepts the finished grade, whichever is greater.
- (4) The sewer pipe shall be located in the center of the easement.
- (5) For pipes up to 18 inches in diameter, the minimum easement width shall be 15 feet.
- (6) For pipes greater than 18 inches, the minimum easement width shall be 20 feet.
- (7) A 20-foot minimum easement shall be provided between buildings, on multi-family and commercial sites.
- (8) When passing between any two buildings (residential or commercial, etc.) which are 25 feet apart or less, the easement width shall extend the full width between the buildings and the depth of the sewer pipe shall not exceed 10 feet.
- (9) Sewer pipe shall be located 10 feet from edge of easement facing interior of lot, to ensure setback from building.
- (10) Also see Section 7.03 H(3), "Building Setback Requirements".
- (11) Easement Documentation Requirements:
 - (a) All easements shall be shown on the project plans and identified as "private" or "public", together with the width dimension and utility use, e.g., 20-Foot Public Sewer Utility Easement.
 - (b) All documents for public easements shall conform to these Standards, will be provided on the City's easement template and shall comply with King County Recorder's Office formatting requirements. Include the King County tax parcel number(s), site address, owner names and site legal description.
 - (c) Easements shall be dedicated to and approved by the City prior to acceptance of a public utility system. The Grantee shall be the "City of North Bend," a Washington municipal corporation, its heirs, successors and assigns." The City may require indemnification agreements to hold the City harmless where maintenance access across private property is deemed necessary.
 - (d) The description contained within the easement document shall be prepared and stamped by a land surveyor licensed in the State of Washington. The description shall be identified as an Exhibit, together with the title of the utility use, e.g., Permanent Public Sewer Utility Easement. The description shall be clearly written and referenced to the underlying property. The description shall be accompanied by an additional graphic exhibit which depicts a scaled drawing of the easement location relative to the subject parcel.
 - (e) Off-site easements shall be delivered to the City prior to issuing a Notification to Proceed with construction. Submittal of on-site easements may be delayed until completion of construction improvements.

- (f) Bills of Sale for all utility facilities appurtenant to public easements or tracts shall be given to the City.

M. Side Sewers

- (1) Side sewer stub shall extend from main line to 10 feet past edge of property line. 6-inch pipe shall be used inside the public right-of-way (unless expected flows require larger size line).
- (2) 4-inch minimum pipe may be used inside private property, for residential side sewers from end of 6-inch stub to building, for a single connection contained within the lot.

6-inch minimum pipe shall be used for private joint-use sewers, and when crossing a property outside the lot to be served.

Commercial side sewers shall be a minimum 6-inch pipe.

For multi-family developments, side sewers for each separate building must be at least 6 inches in diameter. For those buildings serving over ten units or for side sewers serving more than one building, side sewers shall be a minimum of 8 inches in diameter and must connect to a manhole.

- (3) Side sewer shall have minimum 5 feet of cover at property line. Greater depths may be required where elevation of lowest floor to be served is lower than surface elevation at property line. Ensure that stub can serve all property by gravity flow. When crossing beneath a ditch, side sewers shall have 30 inches of cover from the bottom of the ditch.
- (4) Joint-use side sewer stubs are not allowed where slope of side sewer is less than 2 percent. Provide a single stub to “low” end of each lot, and show invert elevation of each stub on the plan. 2009 Uniform Plumbing Code may also require a backwater valve.
- (5) Side sewers shall connect to main sewers with a wye, unless otherwise approved by the City. Side sewer stubs shall run perpendicular to the sewer main, in the right-of-way. On plan, indicate station of side sewer wye from nearest downstream manhole. Also indicate length of side sewer stub from main to plug at end of line. Call out invert at plugged-end of stub.
- (6) Minimum side sewer slope shall be 2 percent. Maximum slope shall be 100 percent. A minimum slope of 1 percent may be approved by the Director, for 6 inch or larger side sewers, upon showing no ability to install at 2 percent.
- (7) All side sewer clean-outs on commercial and multi-family projects shall include at-grade access with covers per the Standard Detail.
- (8) Maximum distance between side sewer clean-outs shall be 100 feet.
- (9) See Section 7-06 I, Joint-Use Side Sewer, for additional requirements for single-family residential joint-use side sewers.
- (10) For a side sewer connection to a building where a coupling is within the right-of-way and

when the edge of the building foundation is at or within 3 feet of the edge of right-of-way, the coupling shall be a ductile iron mechanical coupling, equal to Romac 501 style.

- (11) Cleanouts are required at buildings, at property lines, and 100-foot intervals and at horizontal changes in direction totaling 135 degrees.

N. Individual Pressure Systems

- (1) Where allowed, individual pressure systems may be installed to pump sewage from a property up into a public gravity sewer main. The pump installation must meet all applicable building, plumbing, and electrical codes and shall be approved prior to installation. The property owner shall be solely responsible for the installation, operation and maintenance of the pressure system, including the electrical service, pump, tank, controls, side sewer, and receiving device.
- (2) Connections to a gravity sewer main shall require a 6-inch PVC gravity side sewer. The transition between the HDPE pressure side sewer and the gravity side sewer shall require the installation of a Pressure Line Connection to Gravity Sewer connection as shown in the details, including installation of the 6-inch cleanout assembly at the property line.
- (3) A Grinder Pump Cleanout shall be installed within 16 inches of the grinder pump tank, in accordance with the details and installation notes.

7.04 Sewer Materials

A. General

All materials shall be new and undamaged. The same manufacturer of each item shall be used throughout the work. Where reference is made to other specifications, it shall be the latest revision at the time of construction, except as noted on the plans or herein. All materials not specifically referenced shall comply with applicable sections of ASTM, AWWA or the APWA/WSDOT Standard Specifications.

Approved manufacturers and model numbers of various materials are listed in Approved Materials List, Appendix 7-2. When specific manufacturers or models are listed, no substitutions will be allowed without prior approval by the City.

B. Gravity Sewer Pipe and Fittings

- (1) **PVC Pipe:**

All PVC pipe and fittings shall be integral wall bell and spigot, rubber gasket joint, solid wall PolyVinyl chloride (PVC) pipe, meeting the standard specifications of Section 9-05.12.(1).

- (2) **AWWA C900/C905 PVC Pipe:**

Where required, AWWA C900/C905 PVC pipe shall meet the standard specifications of Section 9-30.1(5). All fittings shall be PVC, compatible with pipe class called for in the plan, unless otherwise approved. PVC fittings shall conform to AWWA C900 and C905 with respect to joint dimensions and physical properties.

(3) Ductile Iron Pipe:

All ductile iron pipe material shall be new and undamaged. Unless otherwise approved by the Engineer, the same manufacturer of each item shall be used throughout the work. Materials shall meet the requirements of the following sections of the standard specifications as modified herein:

- Pipe 9-30.1
- Ductile Iron Pipe 9-30.1(1)
- Restrained Joints 9-30.2(6)

All ductile iron pipe shall be Class 52 with Protecto 401 Lining. Ductile iron fittings shall conform to the standard specifications of Section 9-30.2(1). Contractor shall provide Manufacturer's Certificate of Compliance in accordance with Section 1-06.3 Manufacturer's Certificate of Compliance of the Standard Specifications for all pipe to be used.

Flanged joints shall conform to ANSI B.16.1, Class 125 drilling pattern, rated for 250 psi working pressure.

C. Pressure Sewer Pipe

PVC pressure pipe shall conform to AWWA C900/C905 DR 18 unless otherwise called for in the plan. Requirements for AWWA C900/C905 pressure pipe shall be as shown herein under Section 7.03 B(2), Gravity Sewer Pipe and Fittings, AWWA C900/C905 PVC Pipe.

Ductile iron pipe shall be Class 52 with polyethylene or epoxy lining unless otherwise called for in the plan. Ductile iron fittings shall conform to the standard specifications of Section 9-30.2(1).

HDPE pipe shall meet the standard specifications of Section 9-30.1(6).

D. HDPE Pipe

Butt-fused welded HDPE pipe shall be considered by the City on a case-by-case basis under the following conditions:

- HDPE pipe is only used for transmission lines with no laterals.
- HDPE pipe is used for buried piping only.
- The use of HDPE pipe is reserved for situations in which conventional PVC sewer pipe may not be appropriate: non-linear alignments, low-head siphons, steep slopes in sensitive/protected areas, etc.
- HDPE pipe meets the standard specifications of Section 9-30.1(6).

E. Fittings

All fittings shall be of the same material as the pipe unless otherwise specified. For side sewers, a wye shall be installed in pipelines 6 inches or larger with 6 inch inside diameter for side outlet.

For side sewer connections to existing sewer lines, a flexible metallic side sewer saddle shall be used for hole-cuts. If any other type of fitting is required, the type and make shall be specified on the plans.

F. Caps and Plugs

All open ends shall be sealed with a plug or cap and gasket material approved by the City. The plug or cap shall be able to withstand all test pressures without leakage.

G. Bolts in Piping

Bolts shall be malleable iron, Cor-ten, or stainless steel.

Bolts and nuts for flanged pipe and fittings shall conform in size and length with ANSI/AWWA C115/A21.15. T-bolts shall be malleable iron Cor-ten in accordance with ANSI/AWWA C111/A21.11. Stainless steel bolts shall meet the requirements of ASTM A-307, Grade A. Shackle rods, nuts and washers shall be All Thread stainless steel 316SS.

Stainless steel nuts, bolts and washers shall be type 304.

H. Flange Gaskets

Gasket Material shall be neoprene, Buna N. chlorinated butyl, or cloth inserted rubber.

I. Manholes

Manholes shall be precast concrete sections, meeting the standard specifications of Section 9-05.50(2), with a confined O-ring rubber gasket joints per ASTM C-478 and ASTM C-443 with either a precast base or a cast-in-place base made from a 3,000 psi structural concrete.

Polypropylene safety steps shall be required in all manholes. Polypropylene safety steps shall be constructed from polypropylene, conforming to ASTM D-4101, injection molded around a 1/2-inch-diameter grade 60 steel reinforcing bar conforming to ASTM A-615. The polypropylene step shall be either cast-in-place or driven into preformed holes in the manhole wall. The step shall be capable of resisting pullout forces exceeding 1,500 pounds.

Steps and ladders dimensions shall conform to the Standard Detail S-13. Steps shall project uniformly from the inside wall of the manhole. Steps shall be installed to form a continuous vertical ladder with rungs equally spaced at 12-inch centers. Steps in precast base may be cast in place safety steps, or prefabricated galvanized hanging ladder per Standard Detail S-13 fabricated with #8 (1 inch) reinforcing bar and #7 smooth steel bar conforming with ASTM A-615, Grade 40, galvanizing conforming with ASTM A-123.

Concrete adjustment rings shall conform to the ASTM C-32, Grade MA.

Mortar used shall be composed of one part cement to two parts of plaster sand.

Outside drop structures shall be constructed with AWWA C-900 pipe and fittings, DR 18.

J. Manhole Lining

In instances where high velocity flows entering the manhole can potentially erode the interior wall(s), the City may require an epoxy based structural lining system be installed in the new or existing manhole. The epoxy based liner shall be installed per the manufacturer's specifications. Approved epoxy lining systems shall be Raven 404, Neopoxy, or an approved equal.

K. Manhole Ring and Cover

Ductile iron and cast iron rings and covers shall conform to the Standard Details and Section 9-05.15 of the standard specifications, as modified herein.

Casting shall conform to the requirements of ASTM A-536, Grade 80-55-06 for ductile iron and ASTM A-48, Class 30 for cast iron, and shall be free of porosity, shrinkage cavities, cold shuts, or cracks, or any surface defects which would impair serviceability. Repair of defects by welding or by the use of "smooth-on" or similar material will not be permitted.

Manhole rings and covers shall be machine-finished or ground-on seating surfaces so as to assure non-rocking fit in any position and interchangeability. At the request of the City, there shall be made available at the foundry standard rings and standard covers for use by inspectors in testing fit and seating.

New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharges from the systems into flood waters. For all manholes located in the curb and gutter line, flood plains, or flood areas in easements, the installation of a locking gasketed ring and cover will be required. Manhole covers shall have a blind pick hole for removal.

Locking bolts shall be 5/8 inch - 11 NC stainless steel type 304 socket (allen) head bolts, 2-inches long.

L. Concrete Bedding and Blocking

Concrete blocking shall meet the standard specifications of Section 7-09.3(21).

M. Oil/Water Separator

Oil/Water separator vaults shall be of precast concrete construction. Cement concrete shall have a minimum 28-day compressive strength of 4,500 pounds per square inch.

Deformed bars for steel reinforcement shall be in accordance with ASTM A-615, grade 60. Welded-wire fabric reinforcement shall be in accordance with ASTM A-185, grade 65. All interior piping shall be PVC sized to match side sewer line size. Baffles and weir shall be 1/2-inch-thick steel plates galvanized in accordance with ASTM A-123. Vault cover shall include one 24-inch square diamond plate access door and two 12-inch square diamond plate inspection covers centered over outlet tee and inlet. Cover shall be designed for AASHTO H-20 load. See the Standard Details for vault sizes and miscellaneous details.

N. Grease Interceptor

Grease Interceptor Vaults shall be of precast concrete construction. Cement concrete shall have a minimum 28-day compressive strength of 4500 pounds per square inch. Deformed bars for steel reinforcement shall be in accordance with ASTM A-615, grade 60. Welded-wire fabric reinforcement shall be in accordance with ASTM A-185, grade 65. All interior piping shall be PVC sized to match side sewer line size. Interior baffle shall be precast reinforced concrete, 4-inches thick. Concrete baffle shall be secured in place by slotted vault walls or with stainless steel angels as shown in the Standard Detail.

Vault cover shall include 24-inch-diameter bolt-locking manhole covers and frames located over inspection tees. Manhole covers shall not allow passage of air or gases. Vault cover shall be designed for AASHTO H-20 load with 30 percent impact factor. See the Standard Details for vault sizes and miscellaneous details.

O. Lids, Hatches, and Covers – Slip Resistance

Metal lids, hatches and access covers shall be constructed with a non-slip treatment having a coefficient of friction between 0.6 and 1.0 wet, as determined by ASTM C1028-89. Lids, hatches and access covers located on slopes of 4 percent or greater shall have a coefficient of friction between 0.8 and 1.0 wet, as determined by ASTM C1028-89. Prior to installation, the Contractor shall supply the Engineer with a shop drawing of the appurtenance specifying a coefficient of friction meeting or exceeding the above requirement.

P. Commercial Cleanout with Test Sampling Tee

Commercial cleanout and sampling tee shall consist of PVC pipe and fittings configured as shown in the Standard Detail. Cleanout access shall consist of a cast-iron material imbedded in 3000 psi concrete as shown in the Standard Detail. Sampling tee enclosure shall be a concrete meter box as specified in the Standard Detail.

Q. Backwater Valve

Backwater check valve installed on 4-inch to 8-inch-diameter side sewers shall be rubber flapper swing type check valve. Flapper shall be constructed from steel reinforced rubber with 45-durometer standard rubber hardness. Valve seat shall be at 45° angle to direction of flow. Flow area through valve shall equal full pipe area. Valve body shall be cast iron with flanged ends and bolted over to allow removal of flapper without removing valve from line.

Backwater valve shall be housed in 48 inch diameter precast concrete valve chamber with 48-inch by 24-inch concentric reducing cone, or plastic meter boxes, depending on depth. 24-inch frame and cover shall be marked “sewer.” See Standard Detail.

R. Barrier Fence

Barrier Mesh shall be manufactured from Low Density Polyethylene, stabilized against U.V. degradation, and with a special selection of pigments to ensure optimum visual performance under harsh weather conditions. Barrier Mesh shall be corrosion-free and resistant to salt water and most chemicals. Barrier Mesh shall present a visual target area of approximately 0.5 square meter per square meter of mesh.

S. Bedding and Backfill

(1) Pipe Bedding Materials

For PVC and Ductile Iron pipe, bedding for sewer mains shall be “pea gravel” meeting the specifications for a relatively round, processed, washed rock with:

100%	passing the 3/8-inch screen
0%	passing the #4 screen

If necessary on steep pipe runs, the pipe trench shall be constructed with trench dams of clay or CDF to prevent the migration of water through the pea gravel. Water collected in the trench shall be piped to a suitable discharge location.

For convenience, crushed rock bedding conforming to Section 9-03.9(3) Crushed Surfacing Top Course of the Standard Specifications may also be used as bedding material for pipe.

(2) Trench Backfill Materials

For transverse trenches (perpendicular to the roadway centerline) in paved areas, trench backfill conforming to Section 9-03.9(3) Crushed Surfacing Base Course of the Standard Specifications shall be used.

For longitudinal trenches (trenches parallel to the centerline of the roadway) in paved areas, backfill material (4 feet and deeper below finished grade) shall conform to Section 9-03.14(1) Gravel Borrow of the Standard Specifications. The Contractor may request to use excavated material as trench backfill and must demonstrate to the Engineer that the suitable excavated material conforms to Section 9-03.14(1) Gravel Borrow of the Standard Specifications and proper compaction levels can be achieved. Admixtures and/or additives may not be used to modify the moisture content in order to meet compaction specifications.

The top 4 feet of longitudinal trenches in paved areas shall be backfilled with crushed rock conforming to Section 9-03.9(3) Crushed Surfacing Base Course of the Standard Specifications.

In unpaved areas, trench backfill material shall conform to Section 9-03.14(1) Gravel Borrow of the Standard Specifications. The Contractor may request to use excavated material as trench backfill when it has been determined by the Engineer to be suitable and conforms to Section 9-03.14(1) Gravel Borrow of the Standard Specifications and proper compaction levels can be achieved.

(3) Structure Backfill Materials

In paved areas, backfill material (4 feet and deeper below finished grade) shall conform to Section 9-03.14(1) Gravel Borrow of the Standard Specifications. The Contractor may request to use excavated material as trench backfill when it has been determined by the Engineer to be suitable and conforms to Section 9-03.14(1) Gravel Borrow of the Standard Specifications and proper compaction levels can be achieved.

The top 4 feet around structures shall be backfilled with crushed rock conforming to Section 9-03.9(3) Crushed Surfacing - Top Course of the Standard Specifications.

In unpaved areas, structure backfill material shall conform to Section 9-03.14(1) Gravel Borrow of the Standard Specifications. The Contractor may request to use excavated material as structure backfill when it has been determined by the Engineer to be suitable and conforms to Section 9-03.14(1) Gravel Borrow of the Standard Specifications and proper compaction levels can be achieved.

(4) Foundation Gravel Materials

Foundation gravel for structures shall consist of one of the following aggregates as set forth in the Standard Specifications:

·	Ballast	9-03.9(1)
·	Permeable Ballast	9-03.9(2)
·	Gravel Backfill for Foundations (Class A or B)	9-03.12(1)
·	Foundation Material Class A and Class B	9-03.17

(5) Controlled Density Fill Materials

Controlled density fill (CDF, aka flowable fill) shall be a mixture of Portland Cement, admixture (optional), Fly Ash, aggregates and water. It shall be proportioned to provide a grouty, non-segregating, free flowing, self-consolidating and excavatable material that will result in a non-settling fill which has measurable unconfined compressive strength. CDF shall meet the standard specifications of Section 2-09.3(1)E.

T. Steel Casing

Steel casing shall be black steel pipe conforming to ASTM A-53. Before installing, coat casing exterior with shop-applied anticorrosive coating conforming to AWWA C210. Minimum coating thickness shall be 16 mils dry film thickness (DFT); however, thickness shall not exceed manufacturer's recommended thickness. Coating type shall be a polyamide epoxy-coal tar equal to Tnemec Hi-Build Tneme-Tar, Series 46H-413.

Casing wall thickness shall be 0.250 inch for casings 24 inches or less in diameter and 0.375 inch for casings over 24 inches in diameter.

Carrier pipe for sewage shall be PVC, SDR 35.

U. Casing Spacer

Casing spacers shall be installed in casings over 10 feet long. Where casing spacers are not used, the carrier pipe shall be more than 10 feet in length (no pipe joints inside casing).

Casing spacer shell shall be manufactured in two pieces from heavy gauge T-304 stainless steel or 14 gauge hot rolled pickled steel joined with ribbed flanges. The shell shall be lined with a PVC liner 0.090 inch thick with 85-90 durometer.

Carbon steel casing spacer shell and risers shall be coated with a heat fused PolyVinyl chloride

coating, or hot-dip galvanized.

PolyVinyl Chloride Coating Specifications:

- Durometer - Shore A2 (10 Sec.) (ASTM D-1706-61T) 80
- Max. operating temperature (constant) 150°(65°C)
- Electrical properties (ASTM D-149-61)
 - (short time .010") 1,380 V/Mil
- Resistance:
 - Salt spray (ASTM B-117) Excellent
 - Acids Good
 - Alkalis Good

All nuts and bolts shall be 18-8 stainless steel.

Runners shall be supported by risers made from heavy gauge T-304 stainless steel or 12-gauge hot rolled pickled steel. Runners shall be ultra high molecular weight polymer with high resistance to abrasion and sliding wear.

PROPERTY	ASTM METHOD	UNITS	VALUE
TYPICAL CASING SPACER DATA			
Specific Gravity	D-792	gm/cc	.934
Tensile Strength (Break)	D-638	PSI	3500
Elongation (Break)	D-638	%	380
Izod Impact	D-256	Ft-lbs/in of notch	No break
Hardness	D-2240	Shore D	67
Coefficient of Friction	D-1894	-	0.11 - 0.13
Heat Distortion Temp. 66 PSI	D-648	C	88
Coefficient of Thermal	D-696	F-1	5.5 x 10-5
ABRASION CHARACTERISTICS			
Taber Abrasion	D-1044	Mg/loss	N
Sand Slurry*			7

*Sand slurry condition - 7 hours in one part sand/one part water slurry at 1,725 rpm. Carbon steel - 100, Hifax - 15. The lower the value, the more resistant to abrasion.

Casing spacers shall be “center positioning” type. Height of risers and runners combined shall be sufficient to keep the carrier pipe bell, couplings, or fittings at least 0.75 inch from the casing pipe wall at all times and provide at least 1-inch clearance between runners and top of casing wall, to prevent jamming during installation.

V. Neoprene Foam Pad

Where approved by the City, a neoprene foam pad may be used for cushion between adjacent pipes which are not meeting minimum vertical clearance requirements. The approved material is the Dow Plastics Ethafoam[™] 220, or an approved equal meeting the same ASTM requirements.

W. Individual Pressure Systems

- (1) The grinder sewer pump system shall be a SAM-8 Simplex Grinder System built for Sammamish Plateau Water and Sewer District by PumpTech, IN., 12012 SE 32nd Street, Suite 2, Bellevue, WA 98005; phone: 425-644-8501. The SAM-8 Simplex Grinder package shall be as shown in the details and include the following items:
 - (a) Hydromatic HPG 200 M2-2 Series Hydro-Grind Sewage Pump with 20 feet of power cord.
 - (b) Stainless steel guide rail system.
 - (c) “Hydromatic Simplex Q” packaged control system for a simplex station consisting of the control panel, alarm light, and alarm horn. The panel shall have a 2-pole, 25-amp, 230-volt breaker for the pump, and a separate 1-pole, 10-amp, 120-volt breaker for the alarm. The panel shall be supplied with two exterior alarm buttons: “Push to Test” and “Push to Silence.”
 - (d) Three SJE Rhombus Sensor Float Control Switches, Part No. 1002170, with 30-feet of cable (30SWENO – Weighted Externally, Normally Open).
 - (e) A 23" x 60" fiberglass grinder tank supplied with galvanized steel cover (#11 gauge), stainless steel hold-down bolts, and an anti-flotation flange. The tank will also be provided with a 1-1/4 inch FPT hub connection for the pump discharge piping.
 - (f) The package shall be provided with the following loose items that are to be field located and installed:
 - (i) Two 1-1/4 inch hub connection (one for pump controls, one for float controls);
 - (ii) One 1-1/2 inch PVC vent;
 - (iii) One 1-1/2 inch hub connection for the vent;
 - (iv) Neoprene grommet for the building side sewer (size as required).
 - (g) The tank shall be supplied with a pump guide rail system for removal of pump unit, as manufactured by PumpTech, Inc. All exposed surfaces on guide rail system shall be stainless steel including the lift chain.
 - (h) All valves and piping shall consist of hydraulically sealed discharge flanges.
 - (i) The package system shall meet the requirements of the Washington State Dept. of Labor & Industries for residential grinder pumps.
- (2) **Pressure Side Sewer Pipe:**

Pressure side sewer pipe shall be high-density polyethylene plastic pipe (HDPE SDR 11), minimum diameter of 1-1/4 inches, with tracer wire. Pressure side sewer pipe shall be equipped with a gate or ball valve prior to the connection to the gravity side sewer.

(3) Fittings and Joints:

- (a) PVC Pipe and Fittings. Threaded, schedule 80 PVC pipe and fitting shall only be installed where PVC parts are required by the City's details. Compression couplings shall only be allowed as part of the Grinder Pump Cleanout as shown in the details.
- (b) HDPE Pipe and Fittings. All HDPE pipe and fittings shall be SDR 11 with electro-fusion welded socket joints. Butt welding shall only be allowed when joining two segments of pipe during installation of the 1-1/4-inch discharge line. Connection of the HDPE pipe to any threaded fittings will be with a full bore HDPE x 316 stainless steel transition fitting, 6 inches in length. Compression couplings are only allowed where shown in the Grinder Pump Cleanout detail.
- (c) Grinder Pump Discharge Piping. A 1-1/4-inch-diameter threaded brass nipple, 12 inches in length, shall be installed on the grinder tank discharge hub.
- (d) The Contractor that performs all HDPE joint welding shall be certified in electro-fusion socket-welding techniques.

(4) Grinder Pump Cleanout:

The Grinder Plum Cleanout shall be equipped with an in-line ball valve, tee with ball valve, and check valve and be housed in an underground utility box, with lid marked "SEWER."

7.05 Sewer Methods of Construction

A. General Construction Requirements

The improvements shall be constructed as shown on the plans and in accordance with these Standards, Standard Details, and Standard Specifications. Manufacturer's equipment shall be installed in compliance with specifications of the manufacturer, except where a higher quality of workmanship is required by the plans and specifications. All materials and work shall be in strict accordance with any applicable regulations of the State, County and local authorities. The Contractor shall arrange for such inspection by these agencies as may be required and shall submit evidence of their approval, if requested by the Engineer.

(1) Alignment and Staking

All work done under a Project shall be to the lines and grades shown on the plans, or to approved revisions.

(2) Inspections and Tests

- (a) The Engineer shall, at all times, have access to the work for the purpose of inspecting and testing, and the Contractor shall provide proper facilities for such access and such inspection and testing.
- (b) If any work is covered up without approval or consent of the Engineer, it must, if required by the Engineer, be uncovered for inspection.

- (c) Before a performance test is to be observed by the Engineer the Contractor shall make whatever preliminary tests are necessary to assure that the material and/or equipment are in accordance with the plans and specifications.
- (d) Written notice of deficiencies, adequately describing the same, shall be given to the Contractor upon completion of each inspection and the Contractor shall correct such deficiencies within seven days of the notice and before final inspection will be made by the Engineer, unless otherwise approved.

B. Grade Establishment

Sewer grades shall be established by means of laser beam, grade boards, lines, poles, plumb bobs or other means approved by the Engineer. The grades shall be checked at periodic intervals as directed by the engineer.

The Contractor shall replace all monuments, right-of-way markers, property stakes, etc., that are removed or disturbed, to the satisfaction of the Engineer, and in accordance with State law.

C. Manhole Excavation

Excavation for precast manholes shall be sufficient to provide a minimum of 12 inches between the manhole and the side of the excavation. The excavation shall be kept free from water until jointing has been completed. Surface water shall be diverted so as not to enter the excavation. The contractor shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.

D. Pipe Laying

Pipe laying shall be in accordance with the following.

Each pipe shall be laid with bells upgrade with the invert of the pipe to the alignment and grade shown on the plans. Care shall be exercised to insure close concentric joints and a smooth invert. Open ends of pipe and fittings shall be temporarily blocked and covered when laying is not in progress.

Water shall not be allowed in the trench during the pipe laying, joint making, and as long thereafter as is necessary, in the judgement of the Engineer, for the type of joint being used.

Existing sewage flow shall be diverted away from the segment being worked on by method approved by the Engineer.

Adjustment to the line and grade shall be done by scraping away or filling in and tamping material under the body of the pipe. Adjustment to the line and grade by wedging and blocking shall not be permitted.

The pipe shall be lowered into the trench by means of ropes, tripod, crane or any other suitable means. The pipe shall not be dropped or handled roughly. The pipe shall be checked for cracks and defects prior to use and any defective pipe rejected.

Wyes and standing services shall be installed as shown on the Standard Details and at such locations as are shown on the plans or as otherwise directed by the Engineer. These items shall not be covered until the Engineer has recorded their exact location.

E. Alignment Tolerance

Maximum deviation from established line and grade shall not be greater than 1/32 inch per inch of pipe diameter and not to exceed 1/2 inch.

No adverse grade in any pipe length will be permitted.

The difference in deviation from true line and grade between any two successive joints shall not exceed 1/3 of the amounts specified above.

F. Joints

Joint material shall be used in accordance with the recommendations of the manufacturer. Pipe handling after the gasket has been affixed shall be carefully controlled to avoid bumping the gasket and, thus knocking it out of position or contaminating it with dirt or other foreign material. Any gasket so disturbed shall be removed cleaned, re-lubricated and replaced.

Care shall be taken to properly align the pipe before joints are forced home. During insertion of the tongue or spigot, the pipe shall be partially supported by hand, sling, or crane as required to minimize lateral pressure on the gasket and to maintain concentricity until the gasket is properly positioned. Pipe deflection and straightening shall be held to a very minimum once the joint is home to prevent creep of the joint.

Sufficient pressure shall be applied in making the joint to assure that the joint is home as defined in the standard installation instructions provided by the pipe manufacturer. Sufficient restraint shall be applied to the line to assure the joints once home are held so, by tamping fill material under and alongside the pipe or otherwise. At the end of the day's work, the last pipe shall be blocked in such a manner as may be required to prevent creep during down time.

G. Pressure Sewer Mains and Valves

(1) Pressure Main Installation

Pressure pipe as specified on the plans shall be installed as recommended by the pipe manufacturer. Pressure sewer mains shall be laid so that no high point exists except at the discharge manhole or an air release assembly.

(2) Valve Installation

Before installation, valves shall be cleaned of all foreign material. Such blocking as the Engineer may deem necessary shall be provided. The valve and valve box shall be set plumb with the valve box centered on the valve. Valves shall be opened and shut under pressure to check operation without leakage. Where valve operating nut is more than three feet below finished grade, a stem extension conforming to the Water Standard Detail must be installed

The top of the valve box base section shall be located a minimum of 6 inches and maximum of 9 inches below finished grade. A polyethylene sheet, 8-mils thick, shall be placed between the top and base valve box sections to prevent metal to metal contact where the sections overlap.

Valve box top sections shall be adjusted flush with the finished pavement and, in those areas to be excavated for future roadway grades, enough adjustment shall be provided in the valve box to allow the top of the box to be adjusted to the required grade.

(3) Valve Box Marker Installation

Concrete marker posts shall be painted with two coats Rust-Oleum No. 2766 Hi-Gloss white paint. The marker shall be set on a line through the valve at right angles to the centerline of the road. The marker shall generally be set on the property line unless the Engineer decides another location is safer or more conspicuous. Distance to the valves shall be nearly stenciled on the post with 2-inch numerals. Valve markers shall be installed only in unimproved or unpaved areas.

H. Side Sewers

Side sewer locations as shown on the plan are approximate only.

All existing services shall be maintained during construction.

All existing side sewers shall be reconnected or replaced immediately after the trunk is laid. When replacing an existing trunk, side sewers shall be reconnected after the main is tested, when feasible.

Where applicable, all specifications contained herein for sewer materials and construction shall be held to apply to side sewers. Invert of the side sewer at the end of the stub shall be as shown on the plan or as directed by the Engineer.

Ends of the side sewer stubs shall be marked with a 2 x 4 stake, 12-feet long, with one end buried at the depth of the stub-end invert and extending vertically out of the ground. The portion of the stake above ground shall be painted white and marked with the word "SEWER" and the depth from pipe invert to ground surface, and the distance from the main to the end of the stub. An 8-gauge wire shall attach the end of the plugged stub to the 2 x 4 stake, at or above finished ground. See Standard Detail.

Slope of side sewers shall not exceed 100 percent and shall not be less than 2 percent, unless approved by the Director, to a minimum of one percent. All side sewers shall be capped.

Where change in slope is greater than 2 inches per foot, standard 1/8 bends shall be used.

I. Manholes

Manholes shall be constructed as shown in the Standard Details for standard manholes and drop manholes. Manholes shall be of precast reinforced concrete. Manhole ring and covers shall be adjusted to the elevation required by the Engineer prior to final acceptance of the work.

The manhole base section shall be placed on firm soil. If the foundation material is inadequate,

the Contractor shall use foundation gravel or bedding concrete under the normal base to support the manhole.

Manholes in easements shall be constructed to provide a stable, level grade for a minimum radius of 2.5 feet around the center of the access opening.

Manhole sections shall be placed and aligned so as to provide vertical sides and vertical alignment of the ladder steps. The completed manhole shall be rigid, true to dimension, and be watertight. Rough, uneven surfaces will not be permitted.

Where work is located in public right-of-way, not less than 10 inches (6-inch ring with 4 inches of riser section) nor more than 24 inches (6-inch ring with 18 inches of riser section) shall be provided between the top of the cone or slab and the top of the manhole frame.

The outside and inside of manhole adjusting bricks and the joints of any non-gasketed precast concrete sections shall be thoroughly wetted and completely filled with mortar, plastered and troweled smooth with 3/4 inch of mortar in order to attain a watertight surface. Mortar shall be placed between each level of adjusting bricks, riser rings, top of cone section, and bottom of iron ring.

All lift holes, if any, on precast items shall be completely filled with expanding mortar, smoothed both inside and out, to insure water-tightness. All steel loops, if any, on precast section must be removed, flush with the manhole wall. The stubs shall be covered with mortar and smoothed. Rough, uneven surfaces will not be permitted.

Channels shall be made to conform accurately to the sewer grade and shall be brought together smoothly with well-rounded junction, satisfactory to the Engineer. The channels shall be field poured after the inlet and outlet pipes have been laid and firmly grouted into place at the proper elevation. Allowances shall be made for a minimum of 0.1-foot drop in elevation across the manhole in the direction of flow. The maximum allowable drop in invert elevation across the manhole in the direction of flow shall be 1.0 feet. Channel sides shall be carried up vertically from the invert to three-quarters of the diameter of the various pipes. The concrete shelf shall be warped evenly and sloped 1 inch per foot to drain. Rough, uneven surfaces will not be permitted. Channels shall be constructed to allow the installation and use of a mechanical plug of the appropriate size. Prefabricated manhole bases with glass fiber supported plastic or PVC hard lined channels will be allowed at the Contractor's option.

All manholes located in unpaved areas shall include a concrete collar around the manhole adjusting bricks per Standard Detail S-8.

All rigid pipe entering or leaving the manhole shall be provided with flexible joints within 12 inches of the manhole structure and shall be placed on firmly compacted bedding. Special care shall be taken to see that the openings through which pipes enter the structure are completely and firmly filled with mortar from the outside to ensure water-tightness. All PVC pipe connections to manholes shall be made with gasketed coupling as approved by the City.

J. Connection to Existing Manhole

Connection to existing manhole shall be accomplished in such a manner that all existing services are maintained, that no refuse, broken brick, concrete or other extraneous matter enter into the existing sewer. The outfall shall be plugged or screened throughout the contractors operation at

the Engineer's option.

A circular opening shall be carefully core drilled in the manhole barrel on the proper alignment so that the new sewer will be in line with the center of the manhole, and at the height which will allow the new sewer to be placed at the proper grade. The opening shall be of such size as to provide clearance of not less than 1 or more than 3 inches between the outside of the pipe and the manhole wall. Pipe connections, channel forming, grouting of pipe and backfilling shall be as specified previously for standard manholes.

No additional pipe shall be connected until final set of the grout has occurred. When additional pipe is connected, care shall be taken to avoid shocks or other undue strains to the grouted pipe.

Any opening resulting from removal of existing pipe shall be filled with mortar to provide a watertight seal, unless new pipe is to be reconnected to that opening.

When any new sewer is connected to an existing manhole with an inside drop structure, the minimum angle between drop piping and existing access steps shall be 90° (1/4 of manhole circumference), or 45° for 6-inch pipe. Where minimum clearance cannot be met, the cone section shall be rotated and steps relocated to provide maximum possible clearance from drop tee and pipe. Cut existing steps flush with manhole wall and cover stubs with mortar to provide a smooth finish.

When any new sewer is connected to an existing manhole, the manhole shall be reconstructed to conform to current standards.

Upward adjustments of old, existing manholes must be done with all new parts including cone section so there is only one mismatched seam. The mismatched seam shall be reinforced with a concrete collar poured around the seam, 6 inches to 12 inches above and below the seam line, around the outside of the manhole, minimum 6-inches thick. The collar may also be sealed with the Wrapid Seal™ (or equivalent) manhole encapsulation system.

In addition, where the new manhole barrel section key is not compatible with the existing barrel section key, the new section key shall be broken off as shown in sanitary sewer Standard Detail S-9 "Manhole Section Adjustment."

K. Cleaning and Flushing

Prior to pipe testing, all pipes shall be cleaned in the following manner:

The Contractor shall furnish an inflatable rubber ball of a size that will inflate to fit snugly into the pipe to be tested. The ball may, at the option of the Contractor, be used without a tag line; or a rope or cord may be fastened to the ball to enable the Contractor to know and control its position at all times. The ball shall be placed in the last cleanout or manhole on the pipe to be cleaned and water shall be introduced behind it. The ball shall pass through the pipe with only the force of the water impelling it. All debris flushed out ahead of the ball shall be removed at the first manhole where its presence is noted. In the event cemented or wedged debris or damaged pipe stops the ball, the Contractor shall remove the obstruction.

L. Testing of Gravity Sewers

Method of testing gravity sewers shall be at the option of the Contractor unless otherwise specified herein.

(1) Water Test

Tests for water tightness shall be made by the Contractor in the presence of the Engineer. A test shall be made for every section of the sewer, including the side sewers, after completion of backfill. Where the groundwater table is so high as to preclude a proper exfiltration test, an infiltration test may be used. The exfiltration test shall be made by plugging the inlets of the lower manhole and filling the test section with water to a height of 6 feet above the crown of the sewer at the upper end of the sewer being tested.

The time of exfiltration tests shall be a minimum of 1 hour. The leakage (exfiltration or infiltration) during the test shall not exceed the following allowances:

Allowable Leakage in gal/100 linear feet/hr						
	Head above Crown on Lower End of Test Section					
Pipe Size	6 Ft.	8 Ft.	10 Ft.	12 Ft.	14 Ft.	16 Ft.
6"	0.6	0.7	0.7	0.8	0.8	0.9
8"	0.8	0.9	1.0	1.0	1.1	1.2
10"	1.0	1.1	1.2	1.3	1.4	1.5
12"	1.2	1.3	1.4	1.6	1.7	1.8
15"	1.5	1.7	1.8	2.0	2.1	2.3
18"	1.8	2.0	2.2	2.3	2.5	2.7
24"	2.4	2.6	2.9	3.1	3.4	3.6

Repair by chemical grouting will not be allowed.

Where the groundwater exceeds a height of 6 feet above the crown of the sewer at the upper end of the test section, the section shall be tested by infiltration. The infiltration test shall be conducted by placing a plug in the inlet sewer at the upper manhole and inserting an approved measuring device in the inlet sewer at the lower manhole. Prior to making measurements, care shall be taken to assure that the flow over or through the measuring device is constant. A minimum of four measurements shall be made over a period of one hour.

The acceptance water test shall be made after backfilling has been completed and compacted, and ATB has been placed in areas to be paved.

(2) Air Testing

The Contractor may use a low-pressure air test at his option. The following procedures shall be used on conducting the low-pressure air test. The Contractor shall furnish all facilities and personnel for conducting the test under the observation of the Engineer. The equipment and personnel shall be subject to the approval of the Engineer.

The requirements of this specification shall be considered satisfied if the time required in seconds for the pressure to decrease from 3.5 to 2.5 pounds per square inch greater than the average back pressure of any groundwater is at least as follows:

<u>Size of Pipe</u>	<u>Seconds per Lineal foot of Pipe</u>
4 inch	0.11
6 inch	0.25
8 inch	0.46
10 inch	0.72
12 inch	1.04
15 inch	1.63
18 inch	2.35
21 inch	3.20
24 inch	4.18

The use of air pressure for testing sewer lines creates hazards that must be recognized. The Contractor shall be certain that all plugs are securely blocked to prevent blowouts. An air supply regulator shall be installed on the air supply line to the sewer that shall permit a maximum of 10 psi in the line to be tested. All pressure shall be relieved from the sewer section being tested prior to removal of test plugs.

(3) Deflection Test for Flexible Pipe

Sanitary sewers constructed of flexible pipe shall be deflection tested not less than 30 days after the trench backfill and compaction has been completed, and ATB has been placed in areas to be paved.

Testing shall be conducted on a manhole to manhole basis and shall be done after the line has been completely flushed out with water.

Contractor shall locate and repair any sections failing to pass the test and to retest the section.

M. Television Inspection

The Developer shall provide the City with a DVD inspection of all sanitary sewers prior to final project acceptance.

If defects are found or suspected during the warranty period, the City may also require that the Developer provide video inspection of any or all sanitary sewers before expiration of the warranty.

The Contractor shall correct all deficiencies found during television inspection.

N. Testing of Pressure Sewer Mains

Prior to acceptance of the project, the pressure line shall be subjected to a hydrostatic pressure test of 100 psi at the high point of the line. Any leaks or imperfections developing or occurring under the test pressure shall be remedied by the Contractor before final acceptance of the project. Leakage shall be measured by approved means. Test pressure shall be maintained while the entire installation is inspected. The Contractor shall provide all necessary equipment and shall perform all work connected with the tests. Insofar as is practical, test shall be made with pipe joints and fittings exposed for inspection. Maximum allowable leakage shall be 0.05 gallons per hour per inch of pipe diameter per 100 feet of pipe.

O. Vacuum Testing of Precast Manholes

Vacuum testing (negative air pressure) may be required by the City in areas of high groundwater. Prior to backfilling, each manhole shall be tested using the vacuum testing method specified in ASTM C1244 to ensure that the manhole is watertight. Testing of manholes constructed on existing sewer lines where flow must be maintained will not be required.

Backfilling of the manhole prior to testing is permitted.

The Contractor shall furnish all equipment and labor required, including necessary piping/hoses, pneumatic plugs, test vacuum equipment (vacuum pump and vacuum plate/head), vacuum gauge, and second timer. The vacuum gauge shall have a maximum range of 0 to 30 inches of mercury (Hg) and the vacuum gauge intervals shall be in 1/2-inch increments.

The vacuum test shall be performed by the Contractor in the presence of City of North Bend personnel. The Contractor shall furnish test reports of each test to the Engineer.

Testing

If a coating or lining has been applied to the interior of the manhole, the vacuum test must not be performed until the coating or lining has been cured according to the manufacturer's recommendations. In addition, this existing manhole must be structurally sound prior to vacuum testing.

Drop connections shall be installed prior to testing.

The vacuum test shall include testing of the seal between the frame and the concrete cone, slab, or grade rings.

After cleaning the interior surface of the manhole, the Contractor shall place and inflate pneumatic plugs in all the connecting pipes with the exception of sewer services to isolate the manhole. Complete sewer services entering the manhole shall be a part of the manhole vacuum test.

The vacuum plate/head shall be placed on top of the manhole lid frame. The vacuum pump shall be connected to the outlet port with the valve open. When a vacuum of 10 inches of mercury has been attained, the vacuum pump shall be shut off. With the outlet valve closed, the time shall be measured for the vacuum to drop to 9 inches. Following are the **minimum** allowable test times for manhole acceptance at the specified vacuum drop:

Depth of Manhole (feet)	Time (Seconds)		
	48-Inch Dia.	60-Inch Dia.	72-Inch Dia.
4	10	13	16
8	20	26	33
12	30	39	49
16	40	52	67
20	50	65	81
24	59	78	97
26	64	85	105
28	69	91	113
30	74	98	121
Add for each additional 2 feet of depth:	5	6.66	8
Measurements taken from ASTM C1244			

All pneumatic plugs shall be removed from the manhole after the test.

Failure

Any manhole that fails the initial vacuum test must be repaired with an approved non-shrink grout material for manholes. The Contractor shall excavate the manhole and apply non-shrink grout on the interior and exterior of the manhole in the leaking area or the entire surfaces. Any repair between the pipes and the manhole (gasket waterstop area) requires the removal of the pipe by means of coring and the installation of a new pipe with waterstop (grouting the annular opening). Upon completion of the repairs, the manhole shall be retested as described in the above test procedures.

Any manhole that ultimately fails the vacuum test is rejected and shall be entirely removed and replaced with a new manhole. The new manhole shall not be backfilled until it has been tested and passed the above test procedures.

Acceptance

The manhole shall have passed the vacuum test if the manhole vacuum does not drop below 9 inches of mercury during the minimum specified test period.

P. Oil/Water Separator and Grease Interceptor

Oil/water separators and grease interceptors shall be constructed as shown in the Standard Details. Excavation for precast vault shall be sufficient to provide a minimum of 12 inches between the vault and the side of the excavation.

Vault shall be placed at proper depth to set vault cover flush with finish grade. If additional depth of cover is required over inlet or outlet piping, vault riser sections shall be installed to raise vault cover a maximum of 24 inches. Adjusting rings for manhole frame shall be manufactured from precast reinforced concrete. Total height of rings shall be from 8 inches minimum to 20 inches maximum.

The oil/water separator or grease interceptor shall be placed on firm soil. If the foundation material is inadequate, the Contractor shall use foundation gravel or bedding concrete under the normal base to support the separator.

Vault shall be placed and set plumb so as to provide vertical sides. The completed separator or interceptor shall be rigid and watertight.

The outside and inside of manhole adjusting rings, joints of precast concrete sections and the perimeter of precast baffle (grease interceptor) shall be thoroughly wetted and completely filled with mortar, plastered and troweled smooth with 3/4 inch of mortar in order to attain a watertight surface.

All lift holes, if any, on precast items shall be completely filled with expanding mortar and smoothed both inside and out, to insure water-tightness. All steel loops, if any, on precast section must be removed, flush with the vault wall. The stubs shall be covered with mortar and smoothed. Rough, uneven surfaces will not be permitted. Precast vault shall be provided with 8 inch diameter knockouts at all pipe openings or have openings core-drilled prior to installation.

All rigid pipe entering or leaving the structure shall be provided with flexible joints within 12 inches of the manhole structure and shall be placed on firmly compacted bedding. Special care shall be taken to see that the openings through which pipes enter the structure are completely and firmly filled with mortar from the outside to ensure water-tightness. All PVC pipe connections to vault shall be made with gasketed coupling as approved by the City.

Q. Commercial Clean-Out with Test Sampling Tee

Test sampling tees shall be placed outside the building no more than 24-inches downstream of a cleanout extended to grade, enclosed in a cast concrete meter box as shown in the Standard Detail. The enclosure shall be supported on minimum 2-inch-thick gravel base. The capped orifice shall be a maximum of 4 inches from finished grade. The sampling tee shall be installed so that it opens in a direction at right angles to and vertically above the flow of the pipe. The sampling tee shall be accessible at all times for compliance determination sampling.

The cleanout shall be brought to grade and provided with a cast iron ring and cover imbedded in 3,000 psi cement concrete as shown in the Standard Detail.

R. Preconstruction Photos for City Contracts

Before commencing any construction work as described in the plans and specifications, the Contractor shall provide photographs of pre-existing conditions of the area that will be disturbed during construction operations.

Photographs will be obtained as follows:

- Every 25 feet interval in easements.
- Every 50 feet interval in paved areas.
- And any other location as directed by the Engineer.

The photographs shall be taken with a digital camera with the photographs saved on a CD and provided to the City.

S. Trench Excavation

Before commencement of trenching provide a sediment trap for all downhill storm drain catch basins per City of North Bend standard detail. Plastic sheeting must be available on-site. In case of rain any stockpiled material must be covered and secured.

Clearing and grubbing limits may be established by the Engineer for certain areas and the Contractor shall confine his operations within those limits. Debris resulting from the clearing and grubbing shall be disposed of by the Contractor.

Trenches shall be excavated to the line and grade designated by the Engineer and in accordance with the Standard Details. Trenches shall comply with OSHA and WISHA requirements regarding worker safety.

The trench shall be kept free from water until joining has been completed. Surface water shall be diverted so as not to enter the trench. The Contractor shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out. The Contractor shall perform all excavation of every description and of whatever substance encountered as part of his trench excavation cost. Unsuitable material below the depth of the bedding shall be removed and replaced with satisfactory materials as determined by the Engineer.

Trenching operations shall not proceed more than 100 feet in advance of pipe laying except with written approval of the Engineer.

Providing sheeting, shoring, cribbing, cofferdams, and all aspects involved therein shall be the sole responsibility of the Contractor. Such trench/excavation protection shall comply with the requirements of Section 2-09 Structure Excavation and Section 7-08.3(1)B Shoring of the Standard Specifications, Chapter 49.17 RCW of the Washington Safety and Health Act, and Part N – Excavation, Trenching, and Shoring of Chapter 296-155 WAC.

When trenching operations take place in the public right-of-way, the pavement, and all other improvements, shall be restored as required by the Right-Of-Way Use Permit.

Prior to excavation through asphaltic concrete, or Portland cement concrete surface areas, the pavement shall be removed to a width of 24 inches greater than the top width of the trench. Prior to trenching through areas improved with lawn or through fences, rockeries, shrubs, plants, or other improvements, these improvements shall be removed, stored and protected. After the sewer installation is complete, the improved area shall be returned to a condition equal to or better than the area before the sewer installation. If any stored improvements are not suitable for reuse after construction, they shall be replaced with an improvement of equal or better quality.

T. Trenchless Construction

The use of trenchless construction methods such as pipe bursting and horizontal directional drilling shall be considered by the City on a case-by-case basis under the following conditions:

- (1) HDPE DR 26 or thicker-walled pipe required.
- (2) Romac 501 transition couplings are required at both ends.
- (3) The installed pipe must be electronically located and marked on the ground for

measurement in order to draw the as-built schematics.

- (4) The pipe must be video-taped following installation, with water running. The tape must be provided to the Inspector to approve the installation or require corrections.
- (5) Pipe bursting is not allowed on private property or Right-of-Way without the appropriate permission, such as an easement or Right-of-Way use permit.

U. Sheeting and Shoring

The Contractor shall provide and install sheeting and shoring as necessary to protect workmen, the work and existing utilities and other properties in compliance with OSHA and WISHA requirements. All sheeting and shoring above the pipe shall be removed prior to backfilling. Sheeting below the top of the pipe may be cut off and left in place.

All trenches and excavations more than 4 feet in depth shall be shored in compliance with applicable Federal and State regulations. Shoring shall be required in all street excavation. Sloping to the angle of repose will be permitted only in non-critical off-street areas.

Removal of the sheeting and shoring shall be accomplished in such a manner that there will be no damage to the work or to the other properties.

V. Trench Dewatering

When water is encountered to a degree that a successful trenching and pipe laying operation is hampered, dewatering will be the responsibility of the Contractor. Determination of the method to be used to dewater trenched areas will be the responsibility of the Contractor, but any method used must be in accordance with the specifications and requirements of the Washington State Department of Ecology and the Local Jurisdiction.

W. Bedding, Backfill, and Compaction

(1) Pipe Bedding Construction Requirements

Pipe bedding shall conform to Section 7-08.3(1)C Bedding the Pipes of the Standard Specifications as modified herein in order to provide uniform support along the entire pipe barrel, without load concentration at joint collars or bells.

Jetting is not an allowable method to compact the bedding materials.

(2) Trench and Structure Backfill Construction Requirements

Backfilling shall be accomplished in accordance with Section 2-09 Structure Excavation of the Standard Specifications as modified herein:

In paved areas, trench backfill material shall be compacted to 95 percent maximum dry density per Section 2-03.3(14)D Compaction and Moisture Control Tests of the Standard Specifications.

In unpaved areas, trench backfill material shall be compacted to 90 percent maximum dry density per Section 2-03.3(14)D Compaction and Moisture Control Tests of the Standard Specifications.

The Contractor shall arrange for compaction testing to be performed by a certified technician. The Contractor shall provide the Engineer with one copy of the compaction test report within 24 hours of the completion of the test.

Compaction tests shall be made at a maximum of 4-foot depth increments with a minimum of one test for any backfilling less than 4 feet in depth. The maximum space between trench tests shall not exceed 100 linear feet. At least one compaction test shall be performed at each backfilled structure or for every 50 CY of backfill placed. If the structure (e.g., manhole) is part of a pipeline trench, then trench compaction testing frequency governs.

For mechanical compaction methods ("hoe pack," vibratory roller, static roller, etc.), the maximum backfill lift shall not exceed 2 feet between the application of compaction equipment.

For manual compaction methods (all walk-behind equipment, "jump jack," etc.), the maximum backfill lift shall not exceed 1 foot between the application of compaction methods.

Jetting is not an allowable method to compact the trench backfill.

Surface restoration shall be as specified in the Right-of-Way Use Permit and as shown on the approved plans.

(3) Foundation Gravel Construction Requirements

Foundation gravel under manholes, catch basins, inlets, vaults, and other precast concrete structures shall be placed in layers not more than 6-inches thick and compacted to provide a firm and level base on which to place the structure. Unless shown otherwise on the Contract Plans, the minimum thickness of foundation gravel under precast concrete structures is 6 inches.

(4) Controlled Density Fill Construction Requirements

Controlled Density Fill (CDF) can be proportioned to be flowable, non-segregating, or excavatable by hand or machine. Desired flowability shall be achieved with the following guidelines:

- Low Flowability below 6-inch slump
- Normal Flowability 6 to 8-inch slump
- High Flowability 8-inch slump or greater

CDF shall be placed by any reasonable means into the area to be filled.

CDF patching, mixing and placing may be started if weather conditions are favorable, when the temperature is at 34 degrees F and rising. At the time of placement, CDF must have a temperature of at least 40 degrees F. Mixing and placing shall stop when

temperature is 38 degrees F or less and falling. Each filling stage shall be as continuous an operation as is practicable. CDF shall not be placed on frozen ground.

Trench section to be filled with CDF shall be contained at either end of trench section by bulkhead or earth fill.

When used to support existing asbestos cement (A.C.) pipe, the flowable CDF shall be brought up uniformly to the bottom of the A.C. pipe, as shown on the plans, or as directed by the Engineer.

Contractor shall provide steel plates to span utility trenches and prevent traffic contact with CDF for at least 24 hours after placement or until CDF is compacted or hardened to prevent rutting by construction equipment or traffic.

X. Adjust Existing Structure to Grade

(1) Manhole and Cleanout adjustment

Existing manholes and cleanouts affected by the overlay as shown in the Plan shall be adjusted to grade within three working days of overlay.

Adjustment of existing manholes shall be in accordance with Section 7-05.3(1) of the Standard Specifications. Cleanouts adjusted to grade shall conform to the Standard Detail.

(2) Valve Box Adjustment - Pavement Overlays and Sidewalks

(a) Raising the existing valve box cover less than 2 inches shall be accomplished by adjusting the existing top section of the valve box.

(b) Raising the existing valve box cover 2 inches or more, shall be accomplished by either adjusting the existing top section or by inserting a valve box paving riser into the existing valve box top. The paving riser shall be epoxied to the valve box.

(c) If the valve box base section needs to be extended, the contractor shall install a 4-inch-diameter cast iron soil pipe, with bell-end of the soil pipe inserted over the top of the existing valve box base section. The spigot-end of the soil pipe shall be located a minimum of 6 inches and maximum of 9 inches below finished grade. The valve box top section shall be slipped over the soil pipe and adjusted to final grade. A polyethylene sheet, 8-mils thick, shall be placed between the valve box and soil pipe to prevent metal to metal contact where the sections overlap.

Final box adjustment shall leave the top of the valve box no higher than final grade, and no lower than 0.5 inch below final grade.

In asphalt concrete pavement overlay areas, excavation of the valve box to be raised shall be accomplished by sawcutting or neat-line jackhammering the pavement a minimum of 12 inches around the perimeter of the valve box.

Final adjustment of valve boxes shall be made within 20 calendar days following the final overlay.

(3) Valve Box Adjustment - Unimproved Areas

Adjustment of valve box covers located outside paved areas or sidewalks can be accomplished using a 12-inch valve box adjusting sleeve inserted into the existing valve box top section.

Y. Abandoning Facilities

(1) Abandoning Pipe in Place

The Contractor shall completely fill the pipeline to be abandoned with sand, concrete, or controlled density fill; or remove it.

(2) Abandoning Structures

Abandonment of structures shall be completed only after piped systems have been properly abandoned. Structures within the public right-of-way, a public easement or which are part of the publicly-owned and maintained system must be:

- Removed completely according to Section 2-02 of the current Standard Specifications; or
- Abandoned according to Section 7-05.3 of the current Standard Specifications, except that controlled density fill may be used in lieu of sand if desired, provided no conflicts with new utilities or improvements arise.

Z. Lawn Removal and Replacement

Any lawn damaged by the Contractor outside of limits shown on the plan shall be restored to conditions existing prior to construction, contractor shall take care to limit the area of disturbance.

When lawn removal and replacement is called for, a sufficient width (at least 2-feet wider than outside width of backhoe wheels or tracks) of lawn turf shall be removed prior to beginning excavation so that heavy equipment does not run over the lawn.

The area of the sod to be removed shall be laid out in squares or strips of such size as to provide easy handling and matching. The sod shall then be carefully cut along these lines to a depth of 4 inches, taking care to keep cuts straight and strips of the same width. After the sod has been cut vertically, it shall be removed to a uniform depth of approximately 3 inches with an approved type of sod cutter.

This operation shall be performed in such manner as to ensure uniform thickness of sod throughout the operation.

Prior to installation of new sod, the scalped area shall be carefully shaped to proper grade and be thoroughly compacted. Wherever the construction operations have resulted in the placement of unsuitable or poorer soils in the area to be resodded, the surface shall be left low and covered with top soil.

The finished grade, after shaping and compacting the top soil, shall be thoroughly dampened prior to and immediately before replacing the sod. The sod shall be replaced to the required grade, taking care to butt each piece tightly against the adjacent one. Upon completion, the sod shall be dampened and rolled with a lawn roller.

All tools used shall be of the type specially designed for the work and be satisfactory to the Engineer. In no case shall sod be removed by the use of a mattock or other tools which will not meet requirements specified herein.

Sod shall be a 4-way blend of Ryegrasses.

AA. Boring Under Roots

Boring under the root systems of trees (and plants) shall be accomplished by excavating a trench or pit on each side of the tree and then hand digging or pushing the pipe through the soil under the tree. The pit walls shall be a minimum of 7 feet from the center of the tree and shall be sufficient depth to lay the pipe at the grade shown on the plan and profile.

BB. Highway and Railroad Crossings

Interstate, state, or county highway and railroad crossings require the placing of steel, cast iron or concrete pipe casing by jacking or tunneling and laying the carrier pipe within the casing.

CC. Boring and Jacking Steel Casing

The Contractor shall verify the vertical and horizontal location of existing utilities. If required to avoid conflicts and maintain minimum clearances, adjustment shall be made to the grade of the casing.

The pipe shall be bored and jacked where indicated. The Contractor shall remove or penetrate all obstructions encountered. If groundwater is found to be a problem during boring operations, the Contractor shall do all that is necessary to control the flow sufficiently to protect the excavation, pipe and equipment so that the work is not impaired. Any pipe damaged during the boring and jacking operation shall be repaired by the Contractor in a manner approved by the Engineer.

Special care shall be taken during the installation of the bored and jacked pipe to insure that no settlement or caving be caused to the above surface. Any such caving caused by the placement of the pipe shall be the Contractor's responsibility and he shall repair any area so affected as directed by the Engineer.

During the jacking operations, particular care shall be exercised to prevent caving ahead of the pipe which will cause voids outside of the pipe. If voids exist, the Contractor shall drill through the wall of the pipe and fill the voids with a pumped cement grout. All voids shall be filled to the satisfaction of the Engineer.

The carrier pipe shall be installed in the casing as shown on the drawings. Where length of the casing exceeds 10 feet, the Contractor shall support carrier pipe with casing spacers as shown in the Standard Detail. The casing pipe shall not be backfilled with sand and grout. The casing ends shall be sealed with manufactured rubber end seal device.

Boring pits shall be backfilled with select native material and compacted to 95 percent maximum dry density as determined by Section 2-03.3(14)D, "Compaction and Moisture Control Tests," of the Standard Specifications. The Contractor shall provide sufficient select backfill material to make up for the rejected material.

All disturbed ground shall be restored to its original condition or better.

DD. Working with Asbestos Cement Pipe

When working with asbestos cement pipe, the Contractor is required to maintain workers' exposure to asbestos material at or below the exposure limit as prescribed in WAC 296-62-07705 State/Federal Guidelines and Certification.

EE. Asbestos Cement Water Main Crossings

Where new utility line crosses below an existing AC main, the AC pipe shall be replaced with DI pipe to 3 feet past each side of trench as shown on the Standard Detail. Alternatively, where directed by the Engineer, the trench shall be backfilled with controlled density fill (CDF, aka flowable fill) from bottom of trench to spring line of the AC main.

FF. Clearances/Other Utilities

If the minimum vertical distance between utility pipes is less than 6 inches and such installation is approved by the City, a pad shall be placed between the pipes. The pad shall be O.D. x O.D. x 2.5-inches thick minimum or as required to protect the pipes. Above O.D. is equal to the outside diameter of the larger pipe. The pad shall be a polyethylene foam plank (Dow Plastics Ethafoam™ 220), or approved equal. Additional measures may be necessary to ensure system integrity and may be required as evaluated by the City on a case by case basis.

GG. Individual Pressure Systems

Sewer grinder pumps shall be installed in accordance with the manufacturer's recommendations, and all applicable building codes and state regulations. The grinder pump tank and control panel shall be installed for easy access in performing all maintenance and repair activities.

7.06 Side Sewer Regulations

A. General

The following requirements govern side sewer construction in the sewer service area. These standards apply to sewerage facilities from the point of connection to the public sewer system (end of a side sewer stub, mainline tee/wye, or a hole-cut into a sewer main) to the building.

B. Connection Required

Whenever connection to the sewer system is required, the property owner shall remove any connection to a cesspool, septic tank, or other on-site wastewater disposal facilities and direct connection should be made to the sewer system. Former facilities must be abandoned per King County Health Department regulations.

C. Responsibility of Side Sewer Contractor

The licensed side sewer contractor shall be responsible for complying with all requirements of the City related to side sewer construction, for any and all actions or omissions of his employees, and for any damage done to existing improvements and utilities encountered during any excavation.

D. Side Sewer Permit

(1) Permit Application Requirements

In making application for a side sewer permit, the owner or side sewer contractor shall furnish the City with a drawing showing:

- (a) The size and location of structures on the property.
- (b) The full course of the proposed side sewer from the public sewer in the street to the structure. Single-family residences are exempt from this requirement unless installing a joint use line.

If trenchless methods are being proposed for installing or rehabilitating a side sewer, provide documentation describing the method(s) and materials to be used.

Any street opening permits required to complete installation of a side sewer must be obtained prior to acceptance of the permit application.

The Applicant must show that any easements that may be required for installation of the side sewer have been obtained and recorded with King County.

All permit fees required by the City must be paid with the permit application.

(2) Permit Restrictions

- (a) No permit will be issued for side sewer connection before the public or private sewer system is accepted by the City.
- (b) No work shall be started on any private or side sewer without a permit.
- (c) No licensed side sewer contractor shall do any side sewer work under any other person's permit.
- (d) No side sewer work shall be done without approval and inspection by the City.

(3) Work on Private Property

The owner is the only person authorized to install and repair side sewers on his own property other than a licensed side sewer contractor.

(4) Work on Public Property

Only a licensed side sewer contractor may be issued a permit for side sewer work in a public right-of-way.

(5) Old Side Sewers for New Buildings

When an existing structure is removed and new structure is constructed, a new permit is required, and any existing side sewer that does not meet the current requirements of the City shall be replaced.

(6) Other Permits Required

The issuance of a side sewer permit by the City shall not relieve the permit holder from the responsibility of obtaining such other permits or licenses as may be required by the City of North Bend, the county, or other cities or towns in whose jurisdiction the side sewer is installed.

(7) Posting Side Sewer Permit

The contractor's side sewer permit shall be available at the job and must be readily accessible to the inspector. No inspection will be made unless such permit is readily available at the job site.

E. General Notification Requirements

All side sewer cleaning contractors and/or plumbers, side sewer contractors, and owners shall notify the City of such operations prior to cleaning existing side sewers (as distinguished from plumbing and septic tank facilities).

F. General Construction Requirements

(1) General

All materials and methods of construction for side sewers shall be equal to those used for sewer mainline construction, unless otherwise listed herein.

(2) Restoration of Thoroughfares and Right-of-Ways

It shall be the responsibility of the licensed side sewer contractor to cut the road surface, dig a trench, lay the pipe, make the connection to the wye or tee, backfill the trench and restore the roadway surfacing and vegetation within the limits of any thoroughfare or right-of-way, public or private. Such work shall be performed as quickly and with as little hindrance to traffic as possible, and in strict accordance with the requirements of the City, the county, or other city or town within whose jurisdiction said thoroughfares or right-of-way is located.

(3) Inspections

After the side sewer permit is obtained, arrangements for inspection of a side sewer installation shall be made with the City, 24 hours in advance by the side sewer contractor. The City reserves the right to set the time for inspections.

An extra charge shall be made by the City for each visit to any person who requests any inspection after regular hours on a workday, or on a weekend or holiday. The side sewer contractor will be billed for hours beyond that included in the permit fee.

(4) Site Safety

The following minimum requirements shall apply to safety practices to be followed by licensed side sewer contractors while performing permitted side sewer work in the sewer service area:

Barricades - Before beginning excavation in a public area there shall be at the site sufficient barricades to properly protect the work. The barricades shall be illuminated during the nighttime hours with a minimum of four flares or flashing signals.

Trench Covering - All excavations or trenches within a public area or within four feet of a public area must be temporarily covered at night and during hours of work site inactivity.

Ditch Pumps - During pipe laying, a ditch pump shall be available at the site.

Shoring - The contractor shall have immediately available for use sufficient shoring to adequately protect workers where unstable ground conditions are encountered, in accordance with OSHA and WISHA requirements.

Flagger - A flagger must be posted whenever work is underway in a public thoroughfare.

(5) Site Cleanup

The side sewer contractor shall remove all debris and excess excavation and shall repair all damage, public or private, in kind immediately after backfilling.

(6) Failure to Restore Excavations

If any excavation is left open beyond a reasonable length of time, the City may cause the excavation to be backfilled and the public way restored. Any cost incurred in such work shall be charged to the owner or side sewer contractor in charge of such work, and shall be payable immediately to the City upon written notification of the amount thereof given to the contractor or posted at the location of the work.

(7) Failure to Complete Side Sewer Work

If any work done under a side sewer permit is not in accordance with provisions of the requirements of the City and if the contractor or person doing the work fails and/or refuses to properly construct and complete such work, notice of such failure or refusal shall be given to the owner or occupant of the property. The City may cause the work to be stopped. If the work, in the opinion of the City, constitutes a hazard to public safety, health or the public sewer, such work may be completed by the City. The cost of such work and any materials and administrative services necessary therefor shall be charged to the owner and/or contractor and shall be payable by the owner and/or contractor immediately upon written notice given by the City of the amount thereof or by posting a notice thereof on the premises.

Such cost shall constitute a civil debt owing to the City jointly and severally by the persons who have been given notice as herein provided. The debt shall be collectable in the same manner as any other civil debt owing to the City.

G. Side Sewer Fittings Requirements

(1) Bends and Wyes

All changes of direction shall be made with bends, wye branches or a combination of wye branch and bends.

(2) Side Sewer Cleanouts

The following specifications shall apply for all side sewer cleanouts except as provided for in Section 7-06 I "Joint Side Sewer Cleanouts".

- (a) All changes of direction greater than forty-five degrees will be made with a wye branch and bends as required. Where wye branches are used, a cleanout should be included per the Standard Details.
- (b) A cleanout shall be required a minimum of 36 inches from all buildings unless permission to omit or change the location of such cleanout has been received from the City.
- (c) Cleanouts, including those for commercial properties shall be installed at locations designated by the City but in no case shall distance between cleanouts exceed 100 feet.
- (d) A cleanout shall be the same diameter as the pipe down grade to which it connects.
- (e) On long runs of pipe, manholes may be installed, or be required, in lieu of cleanouts.
- (f) Suitable rings and covers of a type designated by the City shall be used for all cleanouts on commercial and multi-family property and such rings shall be cast in a concrete block per the Standard Details.
- (g) All cleanouts shall extend to the ground surface.

(3) Test Tees

A test tee shall be provided at the point of connection to the sewer main and at any other required point or points in order to insure that all portions of the side sewer or private sewer can be tested.

(4) Side Sewer Acceptance

It shall be the responsibility of the side sewer contractor to install all risers, cleanouts, casting, concrete blocks, etc., required before the installation will be approved by the

City.

H. Joint-Use Side Sewer

(1) Pipe Size for Joint Side Sewers

If a side sewer serves two residential structures, 6-inch pipe shall be used from the public or private sewer in the street to each wye at the confluence of the separate side sewers. Six-inch pipe shall be used when crossing a property outside the lot to be served.

(2) Joint Side Sewer Cleanouts

A maximum of two residential structures may be connected to a single side sewer. A 6-inch cleanout extending to within eighteen inches of the ground surface will be required at the wye where the upper connection is made.

(3) Joint-Use Maintenance Easement Agreement

Joint-use maintenance easement agreements are required when a property owner requires service through another property, or when two or more services are provided off of a common side sewer.

I. Connection Requirements

(1) Sewer Taps

Sewer hole-cuts (6-inch minimum diameter) on 8-inch diameter and larger concrete, metallic and clay pipe shall be performed by a qualified coring contractor at the Contractor's expense in the presence of the Inspector. Contact Public Works to schedule an inspection appointment 48 hours in advance (not including weekends and holidays).

Cores shall be made at the 10 o'clock or 2 o'clock positions. The pipe coupon shall be provided to the Inspector. The cored hole shall be free of lips, burrs and other defects that may catch debris. Jagged, non-circular, improperly sized and/or mis-located cores and cracked or otherwise damaged pipe sections shall require that the damaged pipe section be replaced with a PVC tee and mechanical, Romac-style couplings on concrete, metallic and clay pipe, and rigid PVC couplings on PVC pipe. Flexible rubber couplings (e.g., Fernco and Caulder couplings) are not allowed on the sewer main or side sewer.

(2) Connecting Pipe Material

If the type of wye or tee provided in the sewer system does not match the proposed side sewer pipe joint detail, a short transition piece shall be jointed to the wye branch or tee by means of a gasket of the type used in the sewer system where possible. If this gasket type is not available, careful caulking with an approved caulking material made especially for that purpose may be used. The balance of the side sewer shall then be constructed with compression-type flexible gaskets up to the point of connection with the house plumbing.

(3) Tee or Wye Connections

All tee and wye connections must be clean and visible during inspection. The first length of pipe installed at the tee or wye shall not be more than 2-feet long.

(4) Connection to Plumbing

Connection to the house soil pipe shall be made by means of a flexible clamp type coupling or other approved method.

J. Excavations

(1) Measurements Furnished by the City

Excavations shall be made at the measurements furnished by the City for the location of the wye, tee, or side sewer stub.

(2) Main Sewer Check

The licensed side sewer contractor must check the depth of the main sewer at manholes on each side of wye location before starting to excavate for side sewer.

(3) Prospecting For Stub

If the wye, tee, stub, or riser is not located at the measurements as furnished, the contractor shall prospect 4 feet in all directions from the distance and depth given. If such prospecting fails to disclose the stub, the contractor shall immediately contact the City and report the circumstances. Upon receipt of such report, a City representative will promptly visit the site and render further assistance.

K. Laying Pipe

(1) Grade

All sewers shall be laid true to grade with the bell up grade.

(2) Foundation Clearance

Side sewers parallel to the foundation wall of any building shall be laid not less than 30 inches therefrom.

(3) Minimum Cover for Side Sewer

In addition to minimum cover required by 7-03 H:

- (a) Minimum cover for side sewers crossing a ditch in the public way shall be 2'-6", below the bottom of the ditch.
- (b) On private property where less than minimum cover can be maintained, approvals may be obtained from the City for installing by using alternate pipe materials.

- (c) Minimum cover for side sewers at the property line shall be 5 feet.

L. Inspection and Testing

(1) Covering Work

No trench shall be filled nor any sewer or drain covered until the work has been inspected and approved by the City.

(2) Test Stubs and Branches

The side sewer contractor must test, by flushing or other means, the existing stub or branch from main to property line to see that it is in operative condition before connecting the side sewer. The contractor will accept responsibility that the existing stub or branch is open and in a usable condition when completed. If the existing stub or branch is not found open and usable, the City must be notified before proceeding with the connection.

M. Special Requirements

(1) Gap Drains

Where back flush of sand filters of swim pools are required to be disposed of in the sanitary sewer, a gap drain will be required. Diatomaceous earth filter backwash is not allowed to be disposed of in the sanitary sewer.

(2) Gravity Flow

In any structure in which the plumbing is too low to permit gravity flow to the sewer system or private sewer, the sewage shall be lifted by artificial means and discharged into the sewer system or private sewer. When only the lower floor of a structure is too low for gravity flow, the remaining floors must flow by gravity.

(3) Pumped Side Sewers

All pump installations must meet all building codes and the current edition of the Uniform Plumbing Code.

All pump systems, check valves, cleanouts, and pipe located outside the public easement or right-of-way shall be privately owned and maintained by the property owner.

(4) Backwater Valves

Wherever a situation exists involving an unusual danger of backup, such as any structure where the plumbing drain is below the rim of the next upstream manhole, a backwater valve and a holding tank may be required per the current edition of the Uniform Plumbing Code. The effective operation of the backwater sewage valve shall be the responsibility of the owner of the side sewer. Before any installation of this nature is made, the owner will be required to comply with provisions of this regulation concerning the agreement to hold the City harmless from damage or injury.

(5) Sampling Manholes

When required by the City, the property owner shall install and maintain at their expense a manhole in the side sewer to facilitate observation, sampling, and measurement of the wastes therein. Such a manhole shall be located, if feasible, where it is accessible and safely entered from a public street. It shall be constructed and installed in accordance with plans approved by the City and shall be arranged so that flow measuring and sampling equipment and a shutoff gate or a screen may be conveniently installed.

N. Side Sewer Demolition

Any property owner who plans to demolish or remove any structure connected to the public sewer system shall notify the City and obtain a side sewer permit prior to the commencement of such work.

Side sewer demolition shall be performed prior to removal of building foundation. The side sewer for each building shall be excavated and removed from the house connection to the property line or the main as specified by the City. The Contractor shall cap the end of the side sewer to remain in place. Side sewer demolition shall be performed in the presence of the City of North Bend Sewer Maintenance Engineering Technician (inspector). The inspector will inspect the stub to determine whether the side sewer can be reused. If the inspector determines that the side sewer cannot be reused, the property owner shall either abandon the side sewer or upgrade the portion of side sewer on private property through a side sewer permit or through a sewer system extension agreement. The City will be responsible for repair or replacement of the portion of the side sewer located within public rights-of-way and public easements.

When a property is redeveloped, the property owner shall abandon side sewers that are no longer needed. In addition, the property owner shall abandon all unused provisional side sewers within the scope of the redevelopment project. The allowable methods of side sewer abandonment are as follows:

- Cap the side sewer at the main, then abandon side sewer in right-of-way by either removing the pipe, or filling pipe with controlled density fill.
- Install a cured-in-place spot repair liner in the main line to cover the side sewer opening. The spot repair liner shall extend a minimum of one foot upstream and downstream of the edge of the side sewer opening. Fill side sewer pipe to be abandoned with controlled density fill.
- Other trenchless technology proposed by the property owner, subject to City review and approval.
- For single-family sites, the City may allow the property owner to cap the side sewer at the edge of right-of-way.

O. Specifications not Covered by These Regulations

In the event a construction or installation specification relating to side sewers is not covered by this regulation, the City may require compliance with other manuals or standards as it sees fit.

7.07 Lift Stations

A. Objective

This section is intended to present information and provide an outline of the minimum general standards to be accomplished in planning and designing a sewage lift station installation within the City of North Bend service area. The City will only consider a lift station if a gravity system cannot be constructed.

Private pressure lines are not permitted within public right-of-way. If a gravity system is not feasible and a pressure system has been approved, the private pressure lines must discharge into a gravity pipe on private property and gravity flow into the public system with a standard side sewer connection.

The Developer shall submit to the City for review and approval, complete sewage lift station plans and design calculations which provide for the utility building, lift station, electrical service, SCADA controls, and auxiliary generator/transfer switch together with all accessories for a complete, automatically operating installation. The utility building is to be designed and constructed on site to meet local codes and approvals for permanent structures.

Design material and drawings shall provide all civil, mechanical and electrical details and align with all applicable codes and regulations, and good engineering practice.

B. Design Calculations

The Developer shall perform a study and make the determination to assure that the lift station installation is sized to serve the overall sewage flows generated within the potential service area. The flow study shall include the Developer's project boundary area as well as adjacent and future service areas. The service areas shall be the areas that could be served by the installation of the lift station, and as may be further described in the City's Comprehensive Sewer Plan.

The station's design flow capacity shall be based on an average daily per capita flow with related peaking factors and inflow/infiltration allowances, as specified in the City's Comprehensive Sewer Plan.

Documentation of present and future service area flow rates for lift station size and capacity determination shall be provided to the City.

The effects of the minimum flow conditions shall be estimated to ensure that retention of the sewage in the wet well will not create a nuisance and that pumping equipment will not operate too infrequently.

Lift station capacity shall meet the maximum rate of flow expected. At least two pumping units shall be provided at each lift station installation. The pump shall have sufficient capacity and capability to efficiently handle the peak hourly design flow with one pump out of service and to ensure a minimum velocity of 3 feet per second in the force main.

The force main shall be sized for a minimum velocity of 3 feet per second and a maximum of 8 feet per second. The minimum diameter of the force main shall be 6 inches.

The capacity of the receiving gravity sewer shall exceed the flow expected.

Three copies of the Design Report shall be submitted to the City for review. As a minimum, the report shall include:

- (1) Project description
- (2) Projected flows
- (3) Connection point with downstream capacity
- (4) Wet well sizing
- (5) Run time calculation and cycle time
- (6) Pump station head calculation
- (7) Pump selection with pump curves
- (8) Force main size, length and material
- (9) Electrical load study
- (10) Generator sizing
- (11) Odor potential calculations
- (12) Wet well buoyancy calculations
- (13) Force main surge calculations

The Design Report shall be approved by the City prior to starting the design of the lift station.

C. Location and Site Layout

The Developer shall furnish a site layout for the lift station installation.

The lift station shall be located as far as practicable from present or proposed built-up residential areas. Sites for sewage lift stations shall be of sufficient size to accommodate all expected operations and repair and replacement and for future expansion or addition, if applicable.

The easement/dedication for the lift station site shall be submitted to the City for review prior to construction of the lift station. Lift station sites not located within the plat boundary shall be deeded to the City.

The Developer shall coordinate electrical power required to the site with the electrical utility.

As a minimum, the lift station site shall provide for the following:

- (1) Wet well, located outside the pump house with:
 - (a) Concrete pad around top of wet well
 - (b) Locking heavy duty aluminum hatch (H-20 loading)
 - (c) Safety system mount (see standard city detail)
 - (d) Corrosion protection
 - (e) Water level controls, including radar sensor and floats
 - (f) Space and appurtenances for equipment removal and replacement
- (2) Inlet manhole, located upstream of wet well
- (3) Pump House with:
 - (a) Standby power, including automatic transfer switch
 - (b) Electrical equipment

- (c) Convenience receptacles, white, duplex, 20A, GFCI, in cast aluminum weatherproof boxes with full in-service covers, two inside and two outside
 - (d) Alarms and telemetry
 - (e) Control panel
 - (f) Interior and exterior lighting
 - (g) Ventilation
 - (h) Intake and exhaust louvers (with sound attenuation) for the generator
 - (i) Interior floor drain with P-trap, draining to wet well
 - (j) Concrete floor
 - (k) CMU block walls with pitched roof, gutters, and downspouts
 - (l) Steel entry doors
 - (m) Storage areas with shelves and work spaces
- (4) Valve vault, including flow meters, with locking heavy duty aluminum hatch (H-20 loading)
 - (5) Odor control, as applicable for location and capacity
 - (6) Cuts and fills to provide level site for maintenance
 - (7) Cement concrete driveway, minimum width of 15 feet and asphalt pavement or cement concrete for access and maintenance areas
 - (8) Site Utilities:
 - (a) Drainage
 - (b) One-inch water service with reduced pressure backflow preventer and hose bib. RPBA may be inside pump house, or an above-ground hot box enclosure on concrete. Furnish 50 feet of 3/4-inch heavy-duty rubber hose
 - (c) Electrical service
 - (d) Natural gas meter
 - (e) Telephone or other communication line
 - (9) 6-foot-high black powder coated frame and posts together with black vinyl chain link fence with vertical vinyl slats in-laid for screening, enclosing the site with 4-foot-wide access man gate and separate vehicle access gate, 20-foot-wide minimum opening. Install information/address sign on fence, visible from street.
 - (10) Landscaping per City requirements.

D. Lift Station

The sewage lift station shall be a complete, pre-designed, package submersible lift station with all components supplied by Romtec Utilities, Inc. (supplier), as approved by the City. The developer shall be responsible for all costs for coordination, station siting and dedication of land, 3-phase electrical service, pre-design, design, review, submittals, permitting, inspections, site work and installation, startup, testing, training, warranties, spare parts, incidentals, and operations and maintenance manuals.

Construction shall be in compliance with OSHA, UL, ASTM, NEC, WAC, and other applicable codes and regulations. The station shall be designed, constructed and anchored to comply with

current IBC standards. All system components shall be factory tested by the manufacturer prior to delivery.

The lift station shall have, as a minimum, two sewage pumps. The pumps shall have sufficient capacity and capability to efficiently handle the peak hourly design flow with one pump and to ensure a minimum velocity of 3 feet per second in the force main. Design calculations and pump curves indicating the same shall be provided with the submittal information.

The sewage lift station supplier shall check the station during installation to determine if the installation is correct. Written confirmation of each visit and recommendations shall be provided to the City.

The sewage lift station supplier shall provide a minimum of 8 hours of training for City personnel at the station site during start-up.

The sewage lift station supplier shall provide four complete copies of maintenance and operation material to the City.

The lift station shall include:

- (1) Concrete wet well & related equipment. Wet well shall be constructed of 4,000 psi reinforced concrete, minimum of 6 feet in diameter, coated inside and outside for corrosion protection. All hardware and piping inside the wet well shall be stainless steel. All joints shall be rubber-gasketed. Each penetration shall be equipped with a Kor-n-Seal connection. The wet well base slab shall be pre-fabricated and self-cleaning. The wet well shall be leak tested. Incoming flows shall be directed to the bottom of the wet well. The wet well hatch shall be H20 rated heavy duty non-slip aluminum, large enough to accommodate pump guide bars, brackets, and lifting chain, a sensor mounting bracket, and precast cable trench. Hatch shall be equipped with lift-assist (hydraulic or spring).
- (2) Submersible pumps, “N-pump” manufactured by Flygt, with flotation pump controls. Pumps shall have stainless steel guide brackets. Pumps shall be furnished with all motors, power cable, pump bases, guide bars and brackets, discharge piping, fittings, anchors, anchor bolts and sleeves, fusion bond epoxy coated RFCA couplings, and other appurtenances as required for complete installation and satisfactory operation. Discharge piping shall be ductile iron.
- (3) Concrete valve vault, with Kor-n-Seal connections. Valve vault shall be equipped with swing check valves, pressure gauges, flow meters, and plug valves for each discharge line, and tee to combine the discharge pipes inside the vault, prior to connection to the force main. All connections shall be restrained. The vault hatch shall be H20 rated heavy duty non-slip aluminum. Vault shall be equipped with a floor drain. A minimum of 12 inches of open working space shall be provided around all pipe connections in the vault.
- (4) Control panel (inside pump house). The City has prepared sealed engineering drawings and specifications for use as electrical/control/telemetry design standards for all developer-constructed sanitary sewer lift stations. The developer’s design team shall acquire the latest version of these documents from the City and revise them according to the specific motor sizes and any optional pieces of equipment, such odor control systems, unit heaters, etc. Specific instructions regarding revisions to the drawings are included

on the drawings. The design engineer for the developer shall complete the title block for each sheet and prepare all necessary design calculations in order to complete and seal the drawings.

- (5) Electrical service, with pump disconnect panel and electrical junction box.
- (6) Odor control. If required, odor control storage tank shall be installed outside pump house, on concrete pad.
- (7) Natural gas fueled auxiliary generator and automatic transfer switch (inside pump house). Generator shall be designed for full station load (e.g., all pumps running together with other station accessories).
- (8) Warranty. The sewage lift station supplier shall provide complete system warranty for 2 years from startup.
- (9) After installation, the station startup shall be performed by the installing contractor under the supervision of the sewage lift station supplier's authorized representative. Startup shall include 2 days of on-site field service: 1 day of full system testing and 1 day of full system training. Services shall include, but not limited to, inspection of the completed package lift station installation to ensure that is has been constructed and performs in accordance with the supplier's instructions and recommendations, supervision of all field-testing and activation of the warranty.

E. Wet Well

(1) General

The wet well shall be precast concrete manhole sections. Joints between precast wall sections shall be confined O-ring or as otherwise approved. The poured in place slab top shall be designed with the wet well to exceed buoyant forces and shall have a cast in place flush mount safety system sleeve per City Standard Detail.

The wet well shall be provided with stainless steel or polypropylene manhole steps as specified for manholes. The wet well shall be checked to ensure all joints are watertight to prevent infiltration and exfiltration of the wet well.

The wet well floor, walls and underside of the top shall be coated to comply with the following:

Surface Preparation: Allow a minimum of 28 days cure time for concrete. Sweep blast to provide a surface profile. Surface shall be clean, dry and free of contaminants.

Exterior Surfaces: The exterior surface of the wet well shall be coated with 30 mils minimum of coal tar epoxy.

Interior Surfaces:

- Filler and Surfacer: Tnemec Series 218 Filler and Surfacer. Applied as needed. After the application of the prime coat, the bugholes and surface

voids shall be filled to ensure that the finish coat is monolithic and pinhole free.

- Finish: Tnemec Series 435 Perma-Glaze Applied in two coats at 15-mils dry film thickness each. Color light gray.
- Total System: 30-mils dry film thickness.

Comply with all conditions of the manufacturer's specifications for preparation and application.

G. Electrical Service/Controls and Telemetry System

The City has prepared sealed engineering drawings and specifications for use as electrical/control/telemetry design standards for all developer-constructed sanitary sewer lift stations. The developer's design team shall acquire the latest version of these documents from the City and revise them according to the specific motor sizes and any optional pieces of equipment, such odor control systems, unit heaters, etc. Specific instructions regarding revisions to the drawings are included on the drawings. The design engineer for the developer shall complete the title block for each sheet and prepare all necessary design calculations in order to complete and seal the drawings.

(1) General

Codes and regulations exist at the federal, state, and local level dictating minimum acceptable requirements for electrical systems. The following standards shall be used as a basis for design and review:

- National Electric Code (NEC)
- Occupational Safety & Health Act (OSHA)
- State & Local Building Codes
- National Electrical Code (NEC)
- National Electrical Manufacturers Association (NEMA)
- Underwriters' Laboratory (UL)
- Insulated Power Conductor Engineering Association (IPCEA)
- American National Standards Institute (ANSI)
- Institute of Electrical & Electronic Engineers (IEEE)

(2) Electrical Service

The local electric utility will be the primary source of electrical power. The Developer shall ascertain proper coordination between the nominal secondary delivery voltage supplied by Puget Sound Energy (PSE) or Tanner Electric Coop and the connection to the lift station equipment. The electrical service shall be 480/277V 4-wire, 3-phase, 60 hertz, with a solid neutral terminal at the disconnect or as may otherwise be required by the local utility. This shall be confirmed with the local utility and confirmed by the suppliers.

All installation shall be approved by the local utility and shall be in conformance with the NEC (current issue) UL, OSHA and County and State electrical codes.

The City shall be furnished with a certificate of final inspection by the inspecting agency.

All wire shall be stranded copper.

All conduit shall be rigid galvanized (RGS). All underground RGS conduits, elbows, and fittings shall be coated with 20 mils (minimum) of PVC coating or a half-lapped wrap of Scotchwrap No. 51. See Detail LS4.

All underground conduits shall be covered with a strip of yellow polyethylene tape placed 6-inches below finished grade and directly above the conduit.

All conduit shall have a minimum of 2 feet of cover.

Instrumentation conduits, elbows and fittings shall be RGS over their entire length.

Heating strips shall be provided for outside electrical enclosures.

H. Standby Power System

(1) General

Standby power generation equipment shall be provided at the lift station site, which will operate the lift station in the event of a commercial power outage.

The standby system shall be designed with capacity and rating to safely start and operate the entire connected lift station load, including all pumps and ancillary loads. All applicable codes shall be followed, including NEC and UPC.

The generator set shall be complete in every respect and shall include, but not be limited to the following:

- (a) Generator, control panel & circuit breaker.
- (b) Engine, radiator and exhaust system.
- (c) Generator set (inside pump house) providing noise attenuation in compliance with Washington State Administrative Code, Chapter 173-60.
- (d) Automatic transfer switch – single electric motor style.
- (e) Block heater.
- (f) Battery and rack.
- (g) Battery charger.
- (h) Conduit, wire and piping.

The generator set and transfer switch shall be a natural gas fueled City approved generator set and transfer switch.

The generator set shall include the following:

Engine

- (a) Single phase, 1500 watt block heater (115 VAC)

Generator Set

- (a) Mainline circuit breaker
- (b) 5-year basic power warranty

Accessories

- (a) Batteries
- (b) Battery Charger, 2 amp, 12 VDC, 120 Vac Input
- (c) Vibration Isolators, Pad Type

Control Panel

- (a) Annunciator relays (12)
- (b) Run relay package (3)
- (c) Low coolant level shutdown
- (d) Anti-condensation space heater, 120 Vac
- (e) Oil temperature gauge
- (f) Wattmeter
- (g) Emergency stop switch

Fuel Systems

- (a) Natural gas unless approved by the City. All piping shall be black iron, except for flexible vibration isolation connections at pipe ends with shut off ball valves.

Alternator

- (a) Anti-condensation heater, 120 Vac

Control Features

- (a) Run-stop-remote switch
- (b) Remote starting, 12-volt, 2 wire
- (c) Coolant temperature gauge
- (d) Field circuit breaker
- (e) DC voltmeter
- (f) Running time meter
- (g) Lamp test switch
- (h) Oil pressure gauge
- (i) Fault reset switch
- (j) Cycle cranking
- (k) 12-light engine monitor with individual 1/2 amp relay signals and a common alarm contact for each of the following conditions:
 - (i) Run (Green Light)
 - (ii) Pre-Warning For Low Oil Pressure (Yellow Light)
 - (iii) Pre-Warning For High Coolant Temp (Yellow Light)
 - (iv) Low Oil Pressure Shutdown (Red Light)
 - (v) High Coolant Temperature Shutdown (Red Light)
 - (vi) Overcrank Shutdown (Red Light)

- (vii) Overspeed Shutdown (Red Light)
- (viii) Switch Off (Flashing Red Light- Indicates Generator Set Not In Automatic Start Mode)
- (ix) Low Coolant Temperature (Yellow Light)
- (x) Two Customer Selected Faults (Red Light)

AC Meter Package

Order with NFPA 110 monitor to meet code requirements.

- (a) AC voltmeter (dual range)
- (b) AC ammeter (dual range)
- (c) Voltmeter/ammeter phase selector switch with an off position
- (d) Dual scale frequency meter/tachometer
- (e) AC Rheostat (panel mounted) for + 5 percent voltage adjust

The transfer switch shall include the following:

- (a) Sized for full station and auxiliary equipment load plus 25 percent.

Pole Configuration

- (a) Poles - 3 (Solid Neutral)

Frequency

- (a) 60 Hertz

Application

- (a) Appl - Utility to Genset

System Options

- (a) Three phase, 3-wire or 4-wire

Listing

- (a) Listing - UL 1008

Programmed Transition

- (a) Program Transition, 1-60 sec.

Applications Modules

- (a) Monitor - Phase Sequence/Balance

Suitable guards shall be provided on all electrical parts to minimize the personal shock hazard.

Generator shall be broken-in sufficiently to permit application of full load immediately upon installation.

Generator supplier shall provide all tools for the generator set as recommended and required by the manufacturer.

Generator installation shall be checked by the supplier after installation to determine that the installation is correct. Written confirmation shall be provided to the City. Generator supplier shall perform a full load test for 2 hours after installation is complete. Provide resistive load bank for this test. Generator supplier shall provide a minimum of 4 hours of training for City personnel at the station site during startup.

Generator manufacturer shall provide four copies of the maintenance and operation manual. These manuals shall be complete and shall include all information necessary to allow City personnel to maintain the generator.

Generator mounting pad shall be reinforced concrete to carry the weight of the unit and shall extend a minimum of 6 inches beyond generator housing. All formed edges to be 1/2 round or 3/4-inch chamfer. A minimum of 2 feet of open spaced shall be provided around all sides of the pad for access and maintenance.

Natural gas line shall be equipped with external fuel shutoff valve.

I. Force Main

- (1) The force main shall be a minimum 6-inch-diameter ductile iron Class 52 polyethylene or epoxy lined; PVC C900/C905 DR 18; or high-density polyethylene (HDPE) if approved by the City and provided with a continual positive slope. There shall be no intermediate high point between the lift station and the force main discharge point, unless properly protected with sewage air and vacuum release assembly. Minimum cover over the force main shall be 4'-0". All pipes (gravity and pressure) entering and leaving the wet well shall have flexible couplings within 18 inches of the structure. Install force main location boxes as required, shown on Detail LS-8.

Discharge of the force main to the gravity sewers shall be made at a manhole with the force main penetration core drilled and the force main aligned to discharge towards the downstream pipe. The invert of the force main shall be 0.1 feet above the invert of the downstream pipe. Channel the manhole as required. The discharge manhole shall be coated for corrosion protection, and equipped with corrosion resistant steps, ladder, and handholds.

A bypass pump connection equipped with a Cam Lock fitting and cap shall be located near the wet well in a location specified by the City, or within the valve vault. See Detail LS-2.

A surge valve shall be installed on the force main to discharge into a manhole or the wet well if high head conditions will occur as determined by the City.

(2) Testing Force Main

(a) Cleaning

All force mains shall be cleaned prior to connection of force main to pumping facilities. Contractor to provide cleaning plan for City review and approval.

(b) Test Specifications

All force mains shall be tested prior to acceptance of work. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished, installed and operated by the Developer. Feed for the pump shall be from a barrel or other container within the actual amount of “makeup” water, so that it can be measured periodically during the test period.

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

The pipeline shall be subjected to a pressure and leakage test of a minimum of 200 pounds per square inch for a period of not less than 1 hour. The test pressure shall be applied at the low end of the section tested.

Prior to calling for the City to witness the pressure test, the Developer shall first perform a satisfactory pressure test. The allowable leakage rate per thousand feet of each size pipeline is as follows:

Pipe Size	Allowable Leakage
	Gal. per Hour per 1,000 Ft. @ 200 psi
6"	0.64
8"	0.85
10"	1.06
12"	1.28

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

(c) Preliminary Tests

Developer shall conduct preliminary tests and assure himself that the section to be tested is in an acceptable condition before requesting the City to witness the test.

(d) Thrust Blocks and Anchor Blocks

Fittings shall be “blocked” with poured-in-place concrete, with a firm minimum bearing against an undisturbed earth wall. Timber blocking will not be

permitted. Thrust blocks shall be poured as soon as possible after setting the fittings in place to allow the concrete to “set” before applying the pressure test. The concrete thrust blocks shall be in place and backfilled before beginning the pressure test. Anchor blocks shall be allowed to set sufficiently to develop the necessary bond strength between the reinforcing rods and the concrete anchor before beginning the pressure test. A visqueen barrier shall be provided to protect glands, bolts and other miscellaneous materials required for this type of connection from the concrete. Fittings that must be blocked against an undisturbed earth wall shall be restrained with restrained joint pipe and fittings.

J. Lift Station Test Program

The Developer shall perform, as a minimum, the following tests and provide the City written documentation of the date performed and results obtained. Pump tests shall meet or exceed specified capacity. The City shall be informed of the testing schedule 48 hours prior to the test and shall be present during testing.

- (1) Pump capacity by drawdown test
- (2) Control panel operation
- (3) Generator load test
- (4) Automatic transfer reconciled to auxiliary power and back to utility power
- (5) Telemetry control to terminal strip
- (6) Telemetry control to SCADA system
- (7) Pump vibration analysis

Fill water for testing shall be obtained in accordance with City cross-connection control practices.

APPENDIX 7-1**SEWER STANDARD DETAILS**

STANDARD MANHOLE.....	S – 1
TYPE 2 MANHOLE, 72" AND 96"	S – 2
TYPE 3 MANHOLE, 72" AND 96"	S – 3
OUTSIDE DROP STRUCTURE.....	S – 4
SADDLE MANHOLE	S – 5
MANHOLE UNDER 5 FEET DEEP	S – 6
NEW MANHOLE ON EXISTING SEWER.....	S – 7
MANHOLE GRADE ADJUSTMENT	S – 8
MANHOLE SECTION ADJUSTMENT	S – 9
MANHOLE CONE ADJUSTMENT (CONCENTRIC TO ECCENTRIC).....	S – 10
24" LOCKING MANHOLE RING AND COVER.....	S – 11
RESERVED.....	S – 12
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APPENDIX 7-2**SEWER APPROVED MATERIALS LIST**

The following manufacturers have been approved for use for sanitary sewer construction. Where specific manufacturers are listed no other manufacturer may be used without prior approval by the Utility.

DUCTILE IRON PIPE

All manufacturers that meet the performance requirements specified under the material section of the Standards.

DUCTILE IRON FITTINGS

All manufacturers that meet the performance requirements specified under the material section of the Standards.

GALVANIZED IRON PIPE

All manufacturers that meet the performance requirements specified under the material section of the Standards.

JOINT RESTRAINT SYSTEMS

American Ductile Iron Pipe (Flex-Ring)
EBAA Iron (MEGALUG 1100 Series)
EBAA Iron (MEGAFLANGE 2100 Series)
Griffin Pipe Products Company (Snap-Lok, Bolt-Lok)
Pacific States Cast Iron Pipe Co, (Thrust Lock)
Romac (Grip Ring), 600 Series, RomaGrip
Romac (Bell Restraint) 611 with 316SS stainless steel nuts and bolts
Star National Products (Shackle Products) - All rods and hardware shall be 316SS stainless steel.
Cooper B-Line B3373 for PCV – 316SS stainless steel pipe clamps (embedded in concrete blocks)
B3373F for Cast iron, Ductile iron, or C-900 – 316SS stainless steel pipe clamps (embedded in concrete blocks)
US Pipe (TR FLEX)
Uni-Flange Corporation Series 1400, or Series 1450 with 316SS stainless steel nuts and bolts

PIPE CLAMP FOR SEWER SOIL CEMENT PIPE ANCHORS

Cooper B-Line B3373 for PCV– Hot Dipped Galvanized (embedded in Soil Cement)
B3373F for Cast iron, Ductile iron, or C-900 – Hot Dipped Galvanized (embedded in Soil Cement)

COUPLINGS

Romac (400 and 501 Series), Dresser, Smith-Blair (Rockwell), Mueller MaxiFit, Mueller MaxiStep

REPAIR CLAMPS

Romac Industries, Models SS1 and SS2

CASING (COATING FOR STEEL CASING)

Tnemec Hi-Build Tneme-Tar, Series 46H-413

CASING SPACERS

Pipeline Seal and Insulator Co.:

8" band, carbon steel with fusion-bonded coating, Model C8G-2
12" band, carbon steel with fusion-bonded coating, Model C12G-2

Cascade Waterworks Mfg. Co.:

Stainless Steel or hot-dip galvanized carbon steel Casing Spacers (catalog number depends on size)

Advance Products & Systems, Inc.:

8" band, stainless steel, Model SSI8
12" band, stainless steel, Model SSI12

8" band, carbon steel with fusion-bonded coating, Model SI8
12" band, carbon steel with fusion-bonded coating, Model SI12

CASING END SEALS

Pipeline Seal and Insulator Co.:

Standard Pull-on (Model S)
Custom Pull-on (Model C)

Cascade Waterworks Mfg. Co.:

CCES End Seal

Advance Products & Systems, Inc.

Molded End Seal, Model AM

VALVES

All manufacturers that meet the performance requirements specified under the material section of the Standards.

VALVE BOXES

Olympic Foundry Inc.: #VB045 Lid, Top and Base Section

RICH (VanRich Casting Corp.): Top section and lid #045 with RICH Standard Base

Inland Foundry Co., Inc.: Valve Box Paving Riser #2052-3, #2052-4, #2053-5
12-inch Adjusting Sleeve #044A

METER BOXES

6" Cleanout Service	Olympic Foundry SM30
8" Cleanout Service	Olympic Foundry SM30
Valve Chamber	Carson Industries Model #1527-18 BCFXL Meter Box with 1527 Meter Box Cover (formerly Mid-States Plastic Model MSBCF 1324-18 (Substitution for check valve assembly))

PVC PIPE (ASTM D-3034) 4" - 15"

All manufacturers that meet the performance requirements specified under the material section of the Standards.

PVC PIPE (ASTM F-679) 18" - 27"

All manufacturers that meet the performance requirements specified under the material section of the Standards.

PVC PIPE (AWWA C900) 4" - 12"

All manufacturers that meet the performance requirements specified under the material section of the standards.

PVC PIPE (AWWA C905) 14" – 48"

All manufacturers that meet the performance requirements specified under the material section of the Standards.

BUTT-FUSED WELDED HDPE PIPE

All manufacturers that meet the performance requirements specified under the material section of the Standard Specifications.

ABS PIPE AND FITTINGS

All manufacturers that meet the performance requirements specified under the material section of the Standards.

PRECAST MANHOLE SECTIONS

Pacific International Pipe and Engineering, Inc.
Associated Sand and Gravel Company

POLYPROPYLENE MANHOLE STEPS

Lane International Corporation, P-13938
M.A. Industries, Inc., PS-2-PF

MANHOLE FRAMES AND COVERS

Inland Foundry Co.
Olympic Foundry

CLEAN-OUT FRAMES AND COVERS

Inland Foundry Co.
Olympic Foundry

PVC BY CONCRETE MANHOLE ADAPTERS

A.C. x PVC Brant Adapter
Kor-N-Seal Company, Kor-N-Seal Connector
GPK Products, Inc., GPK PVC Manhole Adapter

AWWA C900/C905 FITTINGS AND MANHOLE ADAPTERS

Head Manufacturing (Idaho)
Vassallo (Florida)

OIL/WATER SEPARATORS

100 gallon	Utility Vault Co, Inc, No. 25-SA
450 gallon	Utility Vault Co, Inc, No. 660-SA
750 to 900 gallon	Utility Vault Co, Inc, No. 577-SA
1,100 gallon	Utility Vault Co, Inc, No. 4484-SA
1,500 gallon	Utility Vault Co, Inc, No. 5106-SA
2,200 gallon	Utility Vault Co, Inc, No. 612-SA
3,000 to 4,000 gallon	Utility Vault Co, Inc, No. 712-SA
5,000 gallon	Utility Vault Co, Inc, No. 814-SA

GREASE INTERCEPTORS

Utility Vault Co, Inc., See Standard Detail.

LADDER-UP

Bilco, Model LU-2 (steel safety post, hot dip galvanized)

VAULT HATCH/DOOR AND NON-SLIP TREATMENT

L.W. Products Company, Inc., Models HHD and HHS (H-30 rated locations)
Hatches shall include recessed padlock hasp sized to accept City of North Bend Wastewater Division padlocks.

Metal lids, hatches and access covers shall be constructed with a gray non-slip treatment by one of the approved products below:

<u>Manufacturer</u>	<u>*COF</u>	<u>Product</u>
LW Products	.95	Thermion Arc Metal Spray
SlipNOT Metal Safety Flooring	.99	SlipNOT Grip Plate
IKG Industries	>.80	MEBAC 1 (Metal Bonded Anti-Slip Coatings)
Grating Pacific LLC	.92	ALGRIP Safety Floor Plates

*COF – coefficient of friction as determined by ASTM C1028-89

BACKWATER VALVES

APCO Rubber Flapper Swing Check, 100 Series

MECHANICAL SEWER PLUGS

SIDU Manufacturing Company, Inc.
Sewer Equipment Company of America
SRECO Flexible
Graham Hand Tite (Plastic)

PREFABRICATED PLASTIC MANHOLE CHANNELS

GU Manhole Liners Ltd.

INSIDE DROP CONNECTION FOR RETROFIT AND NEW CONSTRUCTION

Reliner – Duran, Inc. – B-8 and B-10 drop bowels

CONTROLLED DENSITY (FLOWABLE) FILL

Stoneway, CADMAN

RECYCLED CONCRETE (FOR USE AS CRUSHED SURFACING BASE COURSE MATERIAL)

Stoneway Recycling
Renton Recycling (with certification that the material is free of contaminants)

LINK SEAL

Vault wall pipe penetration seals shall be Link Seal Model C-316 (EDPM) with stainless steel hardware.

EXPANSION ANCHOR BOLTS INTO CONCRETE

Expansion anchor bolts shall be wedge style “Power Stud,” “Power Bolt” Hilti KB3-HPG in stainless steel or galvanized steel.

NEOPRENE FOAM PAD (FOR CUSHION BETWEEN ADJACENT PIPES)

Dow Plastics Ethafoam™ 220

APPENDIX 7-3**SEWER STANDARD PLAN NOTES**

Sanitary Sewer General Notes:

1. All work shall conform to City of North Bend Public Works Standards and the Developer Extension Agreement.
2. All new manholes shall have a minimum inside diameter of 48 inch and shall conform to the Standard Details.
3. Sanitary sewer pipe shall be PVC conforming to ASTM-D3034 SDR 35 (4"-15") or ASTM F-679 (18"-27"). Bedding and backfill shall be as shown in the Standard Details.
4. Where shown as C900-PVC, the sewer pipe shall have dimension ratio (DR) 18 and conform to AWWA C900 or AWWA C905.
5. All side sewers shall be 6-inch-diameter pipe at a minimum 2 percent slope, unless otherwise noted on the Standard Details.
6. Side sewer stations are referenced from nearest downstream manhole.
7. Lot corners must be set and side sewer locations verified in the field prior to construction.
8. All side sewer stubs shall be capped with a watertight cap and gasket. Cap location shall be marked with a 2 x 4 stake, 12-feet long, with one end buried at depth of the plug invert and extending at least 3 feet vertically out of the ground. The portion of stake above ground shall be painted white and marked with the word "SEWER" and the depth from pipe invert to ground surface. Connect pipe to stake with an 8-gauge wire at or above finished ground level.
9. The locations of all existing utilities shown hereon have been established by field survey or obtained from available records and should therefore be considered approximate only and not necessarily complete. It is the sole responsibility of the contractor to independently verify the accuracy of all utility locations shown, and to further discover and avoid any other utilities not shown hereon which may be affected by the implementation of this plan. The Publics Work Director shall be immediately notified if a conflict exists.
10. All testing and connections to existing mains shall be done in the presence of a representative of the City of North Bend Public Works Department.
11. All trenches shall be compacted, and ATB in place in paved areas, prior to testing sewer lines for acceptance.
12. Side sewer shall be tested for acceptance at the same time the main sewer is tested.
13. Tops of manholes within public rights-of-way shall not be adjusted to final grade until just prior to paving.
14. All manholes in unpaved areas shall include a concrete seal around adjusting rings.

15. Contractor shall adjust all manhole rims to flush with final finished grades, unless otherwise shown.
16. All sewer main extensions within the public right-of-way or in easements must be “staked” by a surveyor licensed in Washington State for “line and grade” and cut sheets provided to the Engineer, prior to starting construction.
17. Contractor shall install, at all connections to existing downstream manholes, screens or plugs to prevent foreign materials from entering existing sanitary sewer system. Screens or plugs shall remain in place throughout the duration of construction and shall be removed along with collected debris at the time of final inspection and in the presence of a representative of the City of North Bend Public Works Department.
18. Surface restoration of existing asphalt pavement shall be as required by the right-of-way use permit.
19. Contractor shall maintain a minimum of 10-feet horizontal separation between all water and sewer lines. Any conflicts shall be reported to the Utility and the Engineer prior to construction.
20. It shall be the Contractor’s responsibility to insure that no conflicts exist between sanitary sewer lines and proposed or existing utilities prior to construction.
21. Minimum cover over sewer pipe shall be five feet, unless otherwise shown.
22. The Contractor shall use a vacuum street sweeper to remove dust and debris from pavement areas as directed by the Engineer. Flushing of streets shall not be permitted without prior City approval.
23. Before commencement of trenching, the Contractor shall provide filter fabric for all downhill storm drain inlets and catch basins that will receive runoff from the project site. The Contractor shall periodically inspect the condition of all filter fabric and replace as necessary. For all construction during the rainy season, downhill basins and inlets must be protected with catch basin inserts. Simply placing filter fabric under the grate is not acceptable.
24. Side sewer demolition shall be performed prior to removal of building foundation. The side sewer for each building shall be excavated and removed from the house connection to the edge of the public right-of-way, or property line. The Contractor shall cap the end of the side sewer to remain in place. Side sewer demolition shall be performed in the presence of a City of North Bend sewer utility representative.
25. Avoid crossing water or sewer mains at highly acute angles. The smallest angle measure between utilities should be 45 to 90 degrees.
26. At points where existing thrust blocking is found, minimum clearance between the concrete blocking and other buried utilities or structures shall be 5 feet.
27. Where new utility line crosses below an existing AC main, the AC pipe shall be replaced with DI pipe to 3 feet past each side of the trench as shown on the standard detail. Alternatively, where directed by the Engineer, the trench shall be backfilled with controlled density fill (CDF, aka

flowable fill) from bottom of trench to bottom of the AC main.

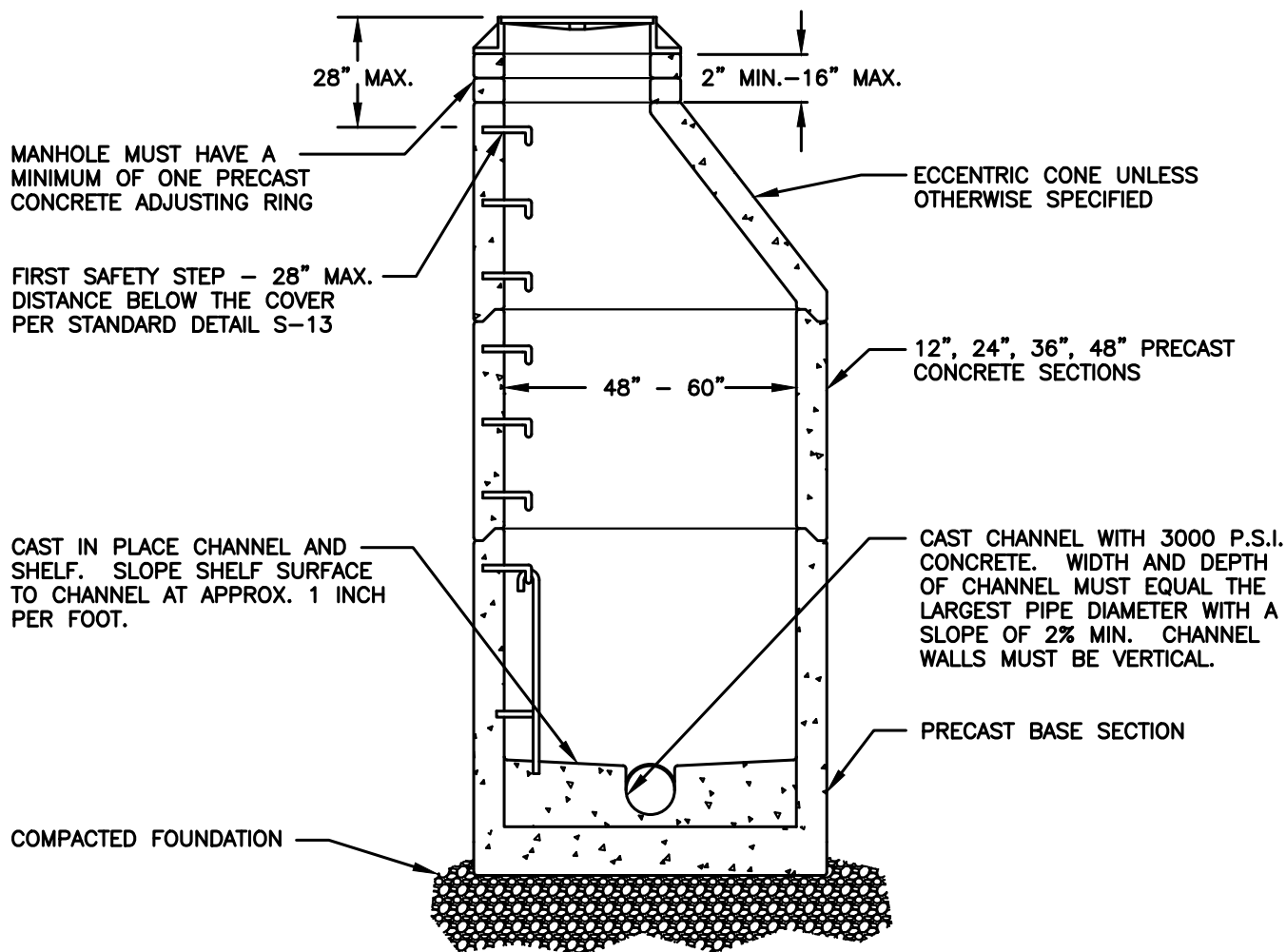
28. Call 1-800-424-5555 or 811 72 hours before construction for utility locations.
29. Manholes, catch basins, and vaults are considered to be permit-required confined spaces. Entry into these spaces shall be in accordance with Chapter 296-809 WAC.
30. The Contractor shall provide color CCTV equipment to include television cameras, a television monitor, cables, power sources, side-launch capable if necessary, and other equipment. Focal distance shall be adjustable through a range from 6 inches to infinity. The CCTV equipment shall include a distance measuring instrument (DMI) to measure the horizontal distance traveled by the camera. The DMI readout shall appear continuously on the video produced by the inspection and shall be accurate to less than 1 percent error over the length of the section of pipeline being inspected. For storm or sanitary sewers, the length is measured from the centerline of the manhole or catch basin to the centerline of the next manhole or catch basin.

The CCTV inspection system shall be performed utilizing one of the following video camera systems:

- Remote-focus stationary lens cameras;
- Rotating lens cameras; or
- Pan-and-tilt cameras.

The camera and television monitor shall produce a minimum (480 lines-per-inch) resolution. The contractor shall inspect the pipeline during optimum low-flow level conditions, as pre-approved by the Utility Inspector. The contractor shall coordinate with the Utility Inspector prior to video inspection. The television camera utilized shall be specifically designed and constructed for sewer inspection. All video inspections shall be recorded in .mpg file format on a disk (either external hard drive, thumb drive or DVD). The video shall be taken after installation, cleaning, and pressure test to insure that no defections exist. The project will not be accepted until all defects have been repaired.

31. When work is to occur in easements, the Contractor shall notify the easement grantor and North Bend Public Works in writing a minimum of 48 hours in advance of beginning work (not including weekends or holidays). Failure to notify grantor and North Bend Public Works will result in a Stop Work Order being posted until the matter is resolved to the satisfaction of North Bend Public Works. A written release from the easement grantor shall be furnished to the Utilities Inspector prior to permit signoff.
32. The Contractor shall restore the Right-of-Way and existing public sewer easement(s) after construction to a condition equal or better than condition prior to entry. The Contractor shall furnish a signed release from all affected property owners after restoration has been completed.



GENERAL NOTES — APPLIES TO ALL MANHOLES:

1. PRECAST SECTIONS SHALL BE REINFORCED PER ASTM SPECS FOR CORRESPONDING SEWER PIPE.
2. POLYPROPYLENE SAFETY STEPS SHALL BE PER STANDARD DETAIL S-13.
3. ALL HOLES FOR PIPE SHALL BE BLOCKED OUT AT THE TIME OF CASTING THE SECTION.
4. ALL MANHOLE SECTIONS SHALL BE FURNISHED WITH RUBBER GASKET JOINT PER ASTM C-478 AND ASTM C-443.
5. MANHOLES OVER 10' DEEP SHALL BE FURNISHED WITH A MIN. WALL THICKNESS OF 5".
6. MANHOLE DIAMETER IN ACCORDANCE WITH CITY OF NORTH BEND STANDARDS.
7. WHERE AWWA C900 PVC PIPE IS USED, CONNECTION SHALL BE MADE WITH PVC MANHOLE ADAPTER SIZED FOR THE O.D. OF AWWA C900 PVC PIPE. ADAPTER LENGTH SHALL MATCH OR EXCEED THE MANHOLE SECTION WALL THICKNESS.
8. GROUT ALL JOINTS INSIDE, OUTSIDE AND IN BETWEEN TO ACHIEVE WATERTIGHT CONSTRUCTION. FINISH SMOOTH THE INSIDE OF STRUCTURE. USE NON-SHRINK GROUT ONLY.
9. WHERE STANDARD MANHOLE CANNOT BE INSTALLED, THE CUSTOM MANHOLE SHALL BE DETAILED ON THE CONSTRUCTION PLANS.
10. PIPE CONNECTION TO MANHOLE: KOR-N-SEAL OR EQUAL FOR CORE-DRILLED SECTIONS, OR SAND COLLAR FOR SECTIONS WITH KNOCKOUTS. WITH ENGINEER AND CITY OF NORTH BEND APPROVAL.



CITY OF NORTH BEND

STANDARD MANHOLE

APPROVED:

MARK RIGOS, P.E.

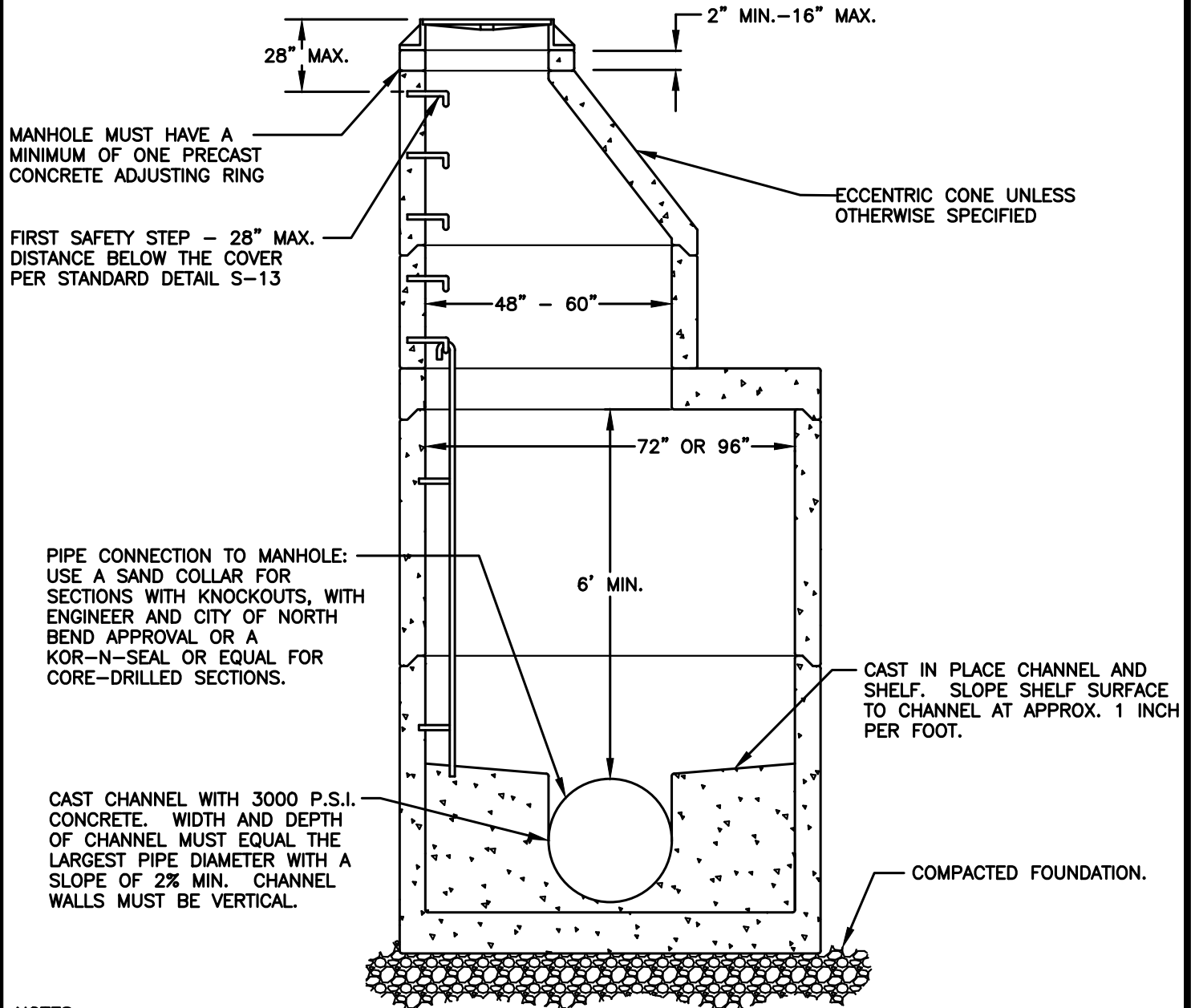
BY CITY

MAY 2018

DATE

DWG. NO.

S-1



NOTES:

1. MANHOLE SHALL CONFORM TO THE GENERAL NOTES AND ALL APPLICABLE REQUIREMENTS OF STANDARD DETAIL S-1.
2. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C-478 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE STANDARD SPECIFICATIONS.
3. PRECAST BASES SHALL BE FURNISHED WITH KNOCKOUTS. KNOCKOUTS SHALL HAVE WALL THICKNESS OF 2" MINIMUM. UNUSED KNOCKOUTS DO NOT NEED TO BE GROUTED IF LEFT IN INTACT. PIPE SHALL BE INSTALLED ONLY IN FACTORY KNOCKOUTS UNLESS CORE-DRILLED HOLES ARE APPROVED BY THE CITY.
4. KNOCKOUT OR CORE-DRILLED HOLES SHALL EQUAL THE PIPE OUTSIDE DIAMETER PLUS MANHOLE WALL THICKNESS. MINIMUM DISTANCE BETWEEN HOLES SHALL BE 12".
5. FOR HEIGHTS OF 12' OR LESS, MINIMUM SOIL BEARING VALUE SHALL EQUAL 3,300 POUNDS PER SQUARE FOOT. FOR HEIGHTS OVER 12', MINIMUM SOIL BEARING VALUE SHALL EQUAL 3,800 POUNDS PER SQUARE FOOT.
6. GROUT ALL JOINTS INSIDE, OUTSIDE AND IN BETWEEN TO ACHIEVE WATERTIGHT CONSTRUCTION. FINISH SMOOTH THE INSIDE OF STRUCTURE. USE NON-SHRINK GROUT ONLY.



CITY OF NORTH BEND

TYPE 2 MANHOLE
72" AND 96"

APPROVED:

MARK RIGOS, P.E.

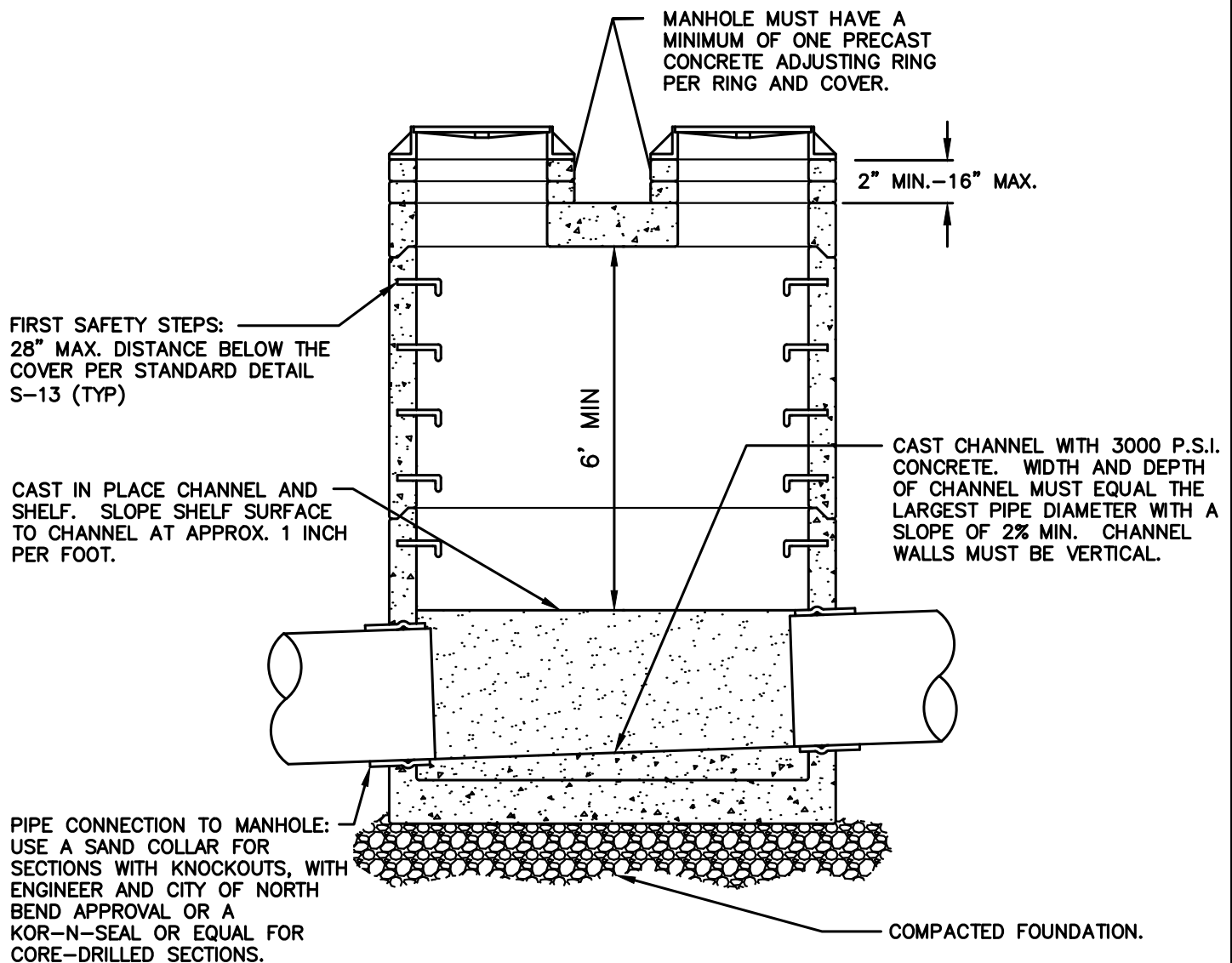
BY CITY

MAY 2018

DATE

DWG. NO.

S-2



NOTES:

1. MANHOLE SHALL CONFORM TO THE GENERAL NOTES AND ALL APPLICABLE REQUIREMENTS OF STANDARD DETAIL S-1.
2. PROVIDE TWO 24" RING AND COVERS, ONE LOCATED OVER THE MAJOR INCOMING AND OUTGOING PIPES.
3. MANHOLES SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C-478 UNLESS OTHERWISE SHOWN ON PLANS OR NOTED IN THE STANDARD SPECIFICATIONS.
4. PRECAST BASES SHALL BE FURNISHED WITH KNOCKOUTS. KNOCKOUTS SHALL HAVE WALL THICKNESS OF 2" MINIMUM. UNUSED KNOCKOUTS DO NOT NEED TO BE GROUTED IF LEFT IN INTACT. PIPE SHALL BE INSTALLED ONLY IN FACTORY KNOCKOUTS UNLESS CORE-DRILLED HOLES ARE APPROVED BY THE CITY.
5. KNOCKOUT OR CORE-DRILLED HOLES SHALL EQUAL THE PIPE OUTSIDE DIAMETER PLUS MANHOLE WALL THICKNESS. MINIMUM DISTANCE BETWEEN HOLES SHALL BE 12".
6. FOR HEIGHTS OF 12' OR LESS, MINIMUM SOIL BEARING VALUE SHALL EQUAL 3,300 POUNDS PER SQUARE FOOT. FOR HEIGHTS OVER 12', MINIMUM SOIL BEARING VALUE SHALL EQUAL 3,800 POUNDS PER SQUARE FOOT.
7. GROUT ALL JOINTS INSIDE, OUTSIDE AND IN BETWEEN TO ACHIEVE WATERTIGHT CONSTRUCTION. FINISH SMOOTH THE INSIDE OF STRUCTURE. USE NON-SHRINK GROUT ONLY.



CITY OF NORTH BEND

TYPE 3 MANHOLE
72" AND 96"

APPROVED:

MARK RIGOS, P.E.

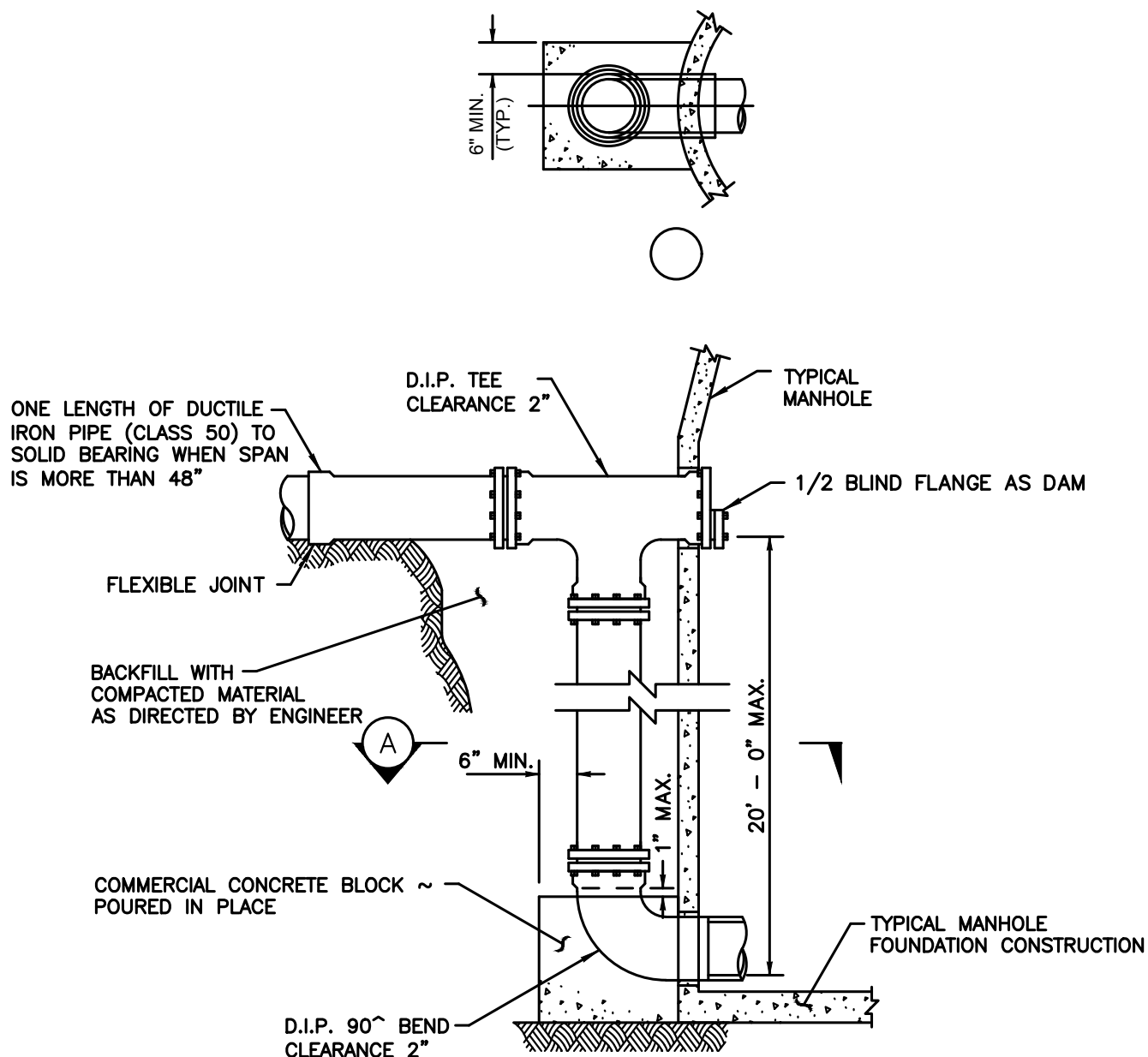
BY CITY

MAY 2018

DATE

DWG. NO.

S-3



NOTES:

1. OUTSIDE DROP STRUCTURES SHALL BE INSTALLED ONLY WHERE APPROVED BY THE CITY. MANHOLE SHALL CONFORM TO GENERAL NOTES AND ALL APPLICABLE REQUIREMENTS OF STANDARD DETAIL S-1.
2. OUTSIDE DROP SHALL BE CONSTRUCTED USING CLASS 50 DI PIPE AND FLANGED DI FITTINGS.
3. CHANNEL BASE WITH 3000 PSI CONCRETE. WIDTH AND DEPTH OF CHANNEL MUST EQUAL THE LARGEST PIPE DIAMETER WITH A SLOPE OF 2% MIN. CHANNEL WALLS MUST BE VERTICAL. SLOPE SHELF TO CHANNEL AT 1" PER FOOT MIN.
4. CORE DRILL OPENINGS FOR NEW PIPE WHEN DROP IS INSTALLED ON EXISTING MANHOLE. USE KOR-N-SEAL CONNECTORS OR EQUAL.



CITY OF NORTH BEND

OUTSIDE DROP STRUCTURE

APPROVED:

MARK RIGOS, P.E.

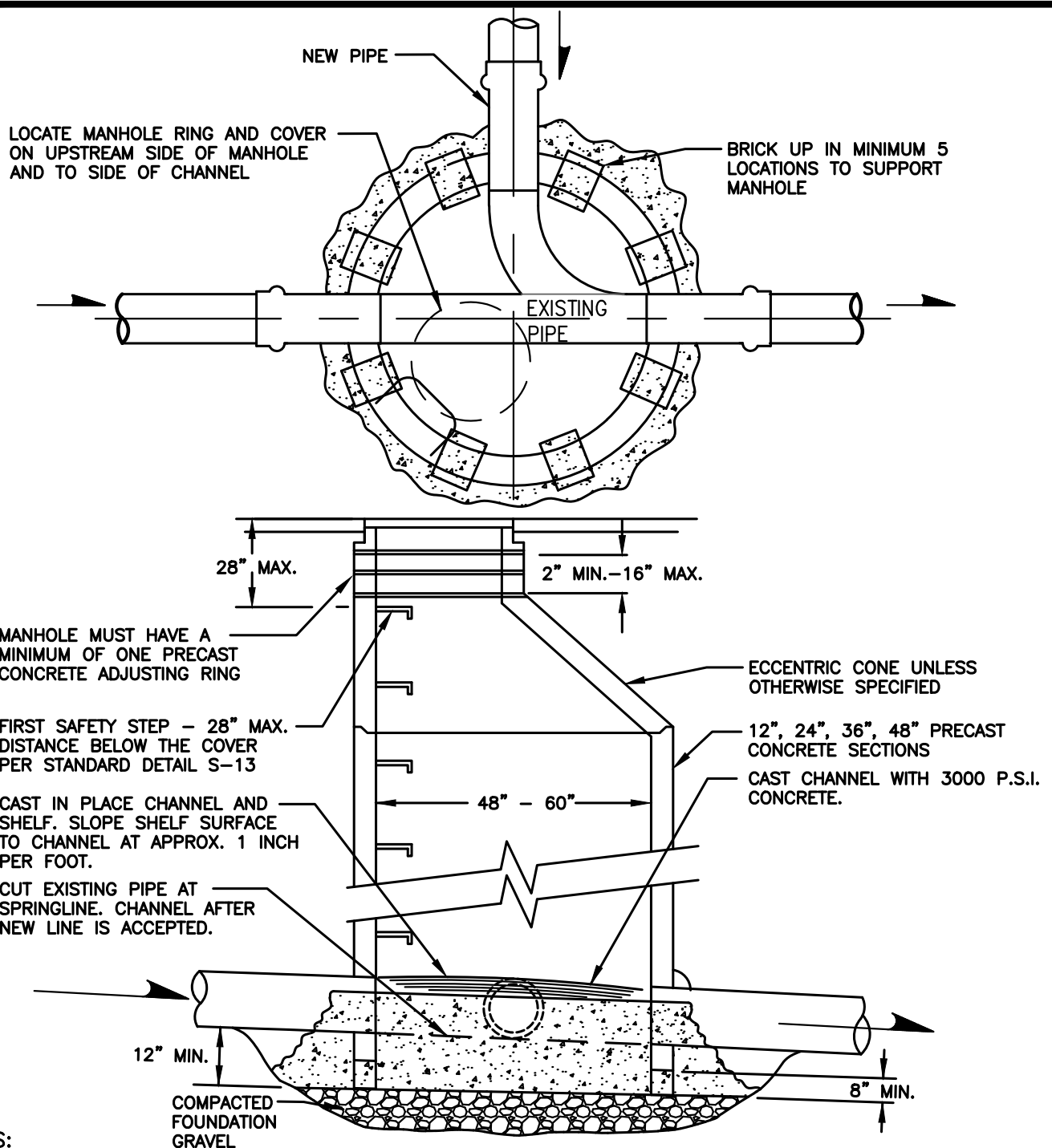
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MAY 2018

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DWG. NO.

S-4



NOTES:

1. MANHOLE SHALL CONFORM TO THE GENERAL NOTES AND ALL APPLICABLE REQUIREMENTS OF STANDARD DETAIL S-1.
2. THE ENTRY ANGLE OF THE NEW SEWER CONNECTION, RELATIVE TO THE EXISTING SEWER MAIN INLET, SHALL BE 90 DEGREES OR LESS.
3. IF NEW SEWER CONNECTION IS A MAINLINE, THE INVERT OF THE NEW PIPE SHALL BE SET AT THE SPRINGLINE OF THE EXISTING MAINLINE.
4. IF NEW SEWER CONNECTION IS A SIDE SEWER, THE INVERT OF THE NEW PIPE SHALL BE SET AT OR ABOVE THE CROWN OF THE EXISTING MAINLINE NEW CONNECTION NOT TO EXCEED 18" ABOVE THE MAINLINE INVERT.
5. PVC PIPE CONNECTION TO MANHOLE: KOR-N-SEAL OR EQUAL FOR CORE-DRILLED SECTIONS, OR SAND COLLAR FOR SECTIONS WITH KNOCKOUTS, WITH ENGINEER OR CITY OF NORTH BEND APPROVAL.
6. GROUT ALL JOINTS INSIDE, OUTSIDE AND IN BETWEEN TO ACHIEVE WATERTIGHT CONSTRUCTION. FINISH SMOOTH THE INSIDE OF STRUCTURE. USE NON-SHRINK GROUT ONLY.



CITY OF NORTH BEND

SADDLE MANHOLE

APPROVED:

MARK RIGOS, P.E.

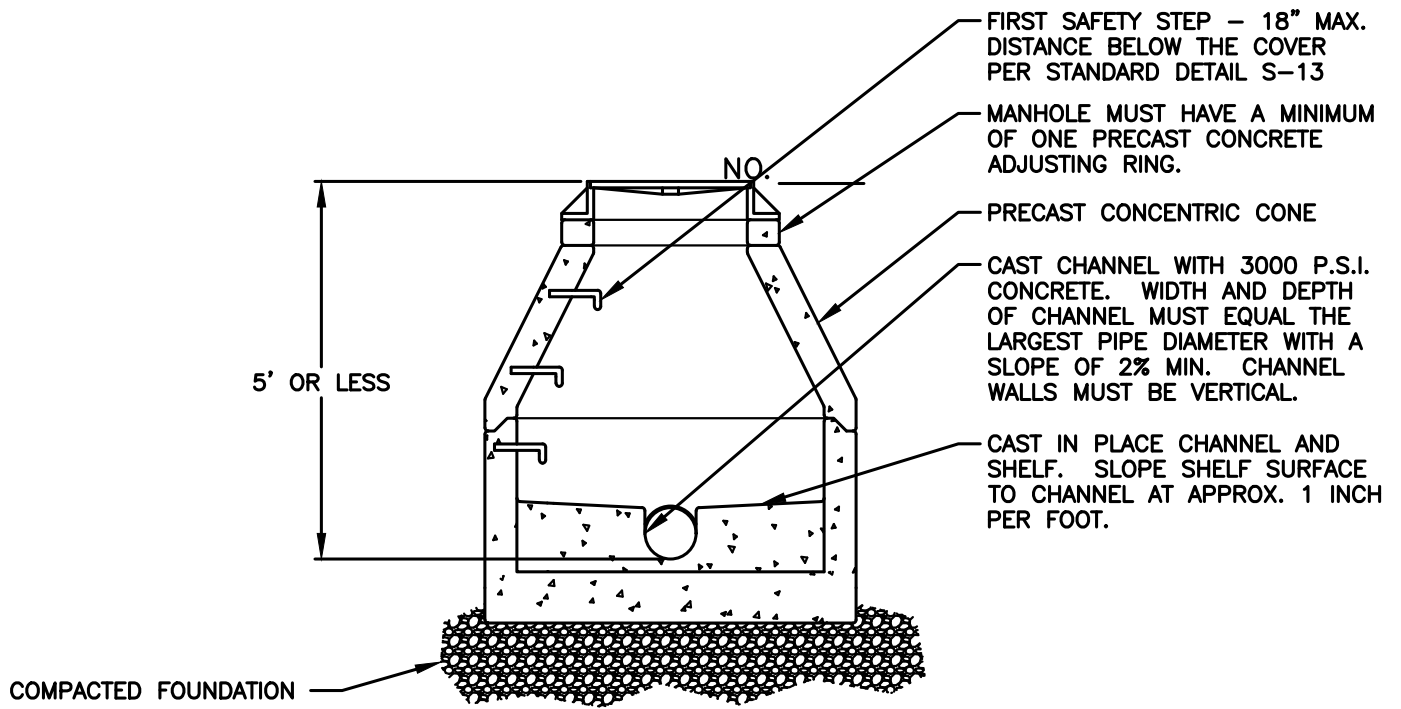
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DWG. NO.

S-5



NOTES:

1. MANHOLE SHALL CONFORM TO THE GENERAL NOTES AND ALL APPLICABLE REQUIREMENTS OF STANDARD DETAIL S-1.
2. PIPE CONNECTION TO MANHOLE: KOR-N-SEAL OR EQUAL FOR CORE-DRILLED SECTIONS, OR SAND COLLAR FOR SECTIONS WITH KNOCKOUTS, WITH ENGINEER AND CITY OF NORTH BEND APPROVAL.
3. GROUT ALL JOINTS INSIDE, OUTSIDE AND IN BETWEEN TO ACHIEVE WATERTIGHT CONSTRUCTION. FINISH SMOOTH THE INSIDE OF STRUCTURE. USE NON-SHRINK GROUT ONLY.



CITY OF NORTH BEND

MANHOLE UNDER 5 FEET DEEP

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

S-6

MANHOLE MUST HAVE A
MINIMUM OF ONE PRECAST
CONCRETE ADJUSTING RING.

FIRST SAFETY STEP - 28" MAX.
DISTANCE BELOW THE COVER
PER STANDARD DETAIL S-13

CAST CHANNEL WITH 3000 P.S.I.
CONCRETE. WIDTH AND DEPTH
OF CHANNEL MUST EQUAL THE
LARGEST PIPE DIAMETER WITH A
SLOPE OF 2% MIN. CHANNEL
WALLS MUST BE VERTICAL.

CAST IN PLACE CHANNEL AND
SHELF. SLOPE SHELF SURFACE
TO CHANNEL AT APPROX. 1 INCH
PER FOOT.

PRECAST BASE SECTION

USE PVC PIPE FOR ALL
INLETS AND OUTLET.

COMPACTED FOUNDATION

USE ROMAC COUPLINGS OR
EQUAL TO CONNECT TO EXIST
SEWER MAINLINE

NOTES:

1. MANHOLE SHALL CONFORM TO THE GENERAL NOTES AND ALL APPLICABLE REQUIREMENTS OF STANDARD DETAIL S-1
2. THE ENTRY ANGLE OF THE NEW SEWER CONNECTION, RELATIVE TO THE EXISTING SEWER MAIN INLET, SHALL BE 90 DEGREES OR LESS.
3. IF NEW SEWER CONNECTION IS A MAINLINE, THE INVERT OF THE NEW PIPE SHALL BE SET AT THE SPRINGLINE OF THE EXISTING MAINLINE.
4. IF NEW SEWER CONNECTION IS A SIDE SEWER, THE INVERT OF THE NEW PIPE SHALL BE SET AT OR ABOVE THE CROWN OF THE EXISTING MAINLINE. NEW CONNECTION NOT TO EXCEED 18" ABOVE THE MAINLINE INVERT.
5. PVC PIPE CONNECTION TO MANHOLE: KOR-N-SEAL OR EQUAL FOR CORE-DRILLED SECTIONS, OR SAND COLLAR FOR SECTIONS WITH KNOCKOUTS, WITH ENGINEER AND CITY OF NORTH BEND APPROVAL.
6. GROUT ALL JOINTS INSIDE, OUTSIDE AND IN BETWEEN TO ACHIEVE WATERTIGHT CONSTRUCTION. FINISH SMOOTH THE INSIDE OF STRUCTURE. USE NON-SHRINK GROUT ONLY.



CITY OF NORTH BEND

NEW MANHOLE ON
EXISTING SEWER

APPROVED:

MARK RIGOS, P.E.

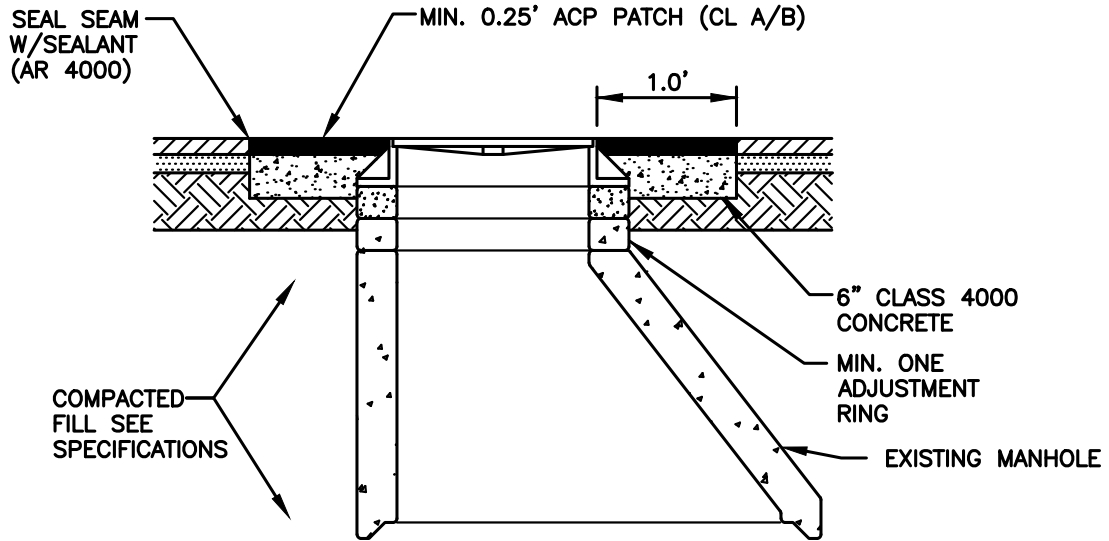
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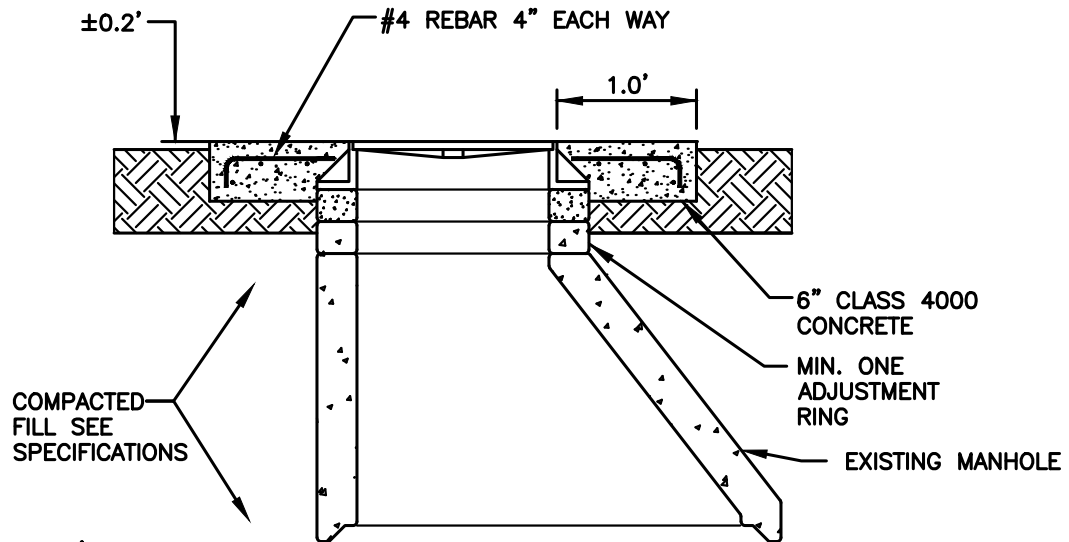
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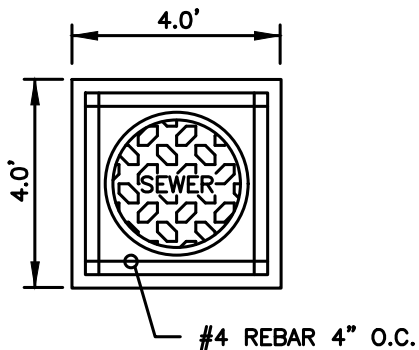
S-7



MANHOLE IN ASPHALT



MANHOLE OUTSIDE ASPHALT



NOTES:

1. ON MANHOLE OUTSIDE ASPHALT ADD REINFORCING STEEL AS SHOWN ABOVE. DEFORMED BAR TO MEET ASTM A615 GRADE 60.
2. ON MANHOLE OUTSIDE PAVED AREAS, CONCRETE COLLAR TO BE 4' x 4' SQUARE.



CITY OF NORTH BEND

MANHOLE GRADE ADJUSTMENT

APPROVED:

MARK RIGOS, P.E.

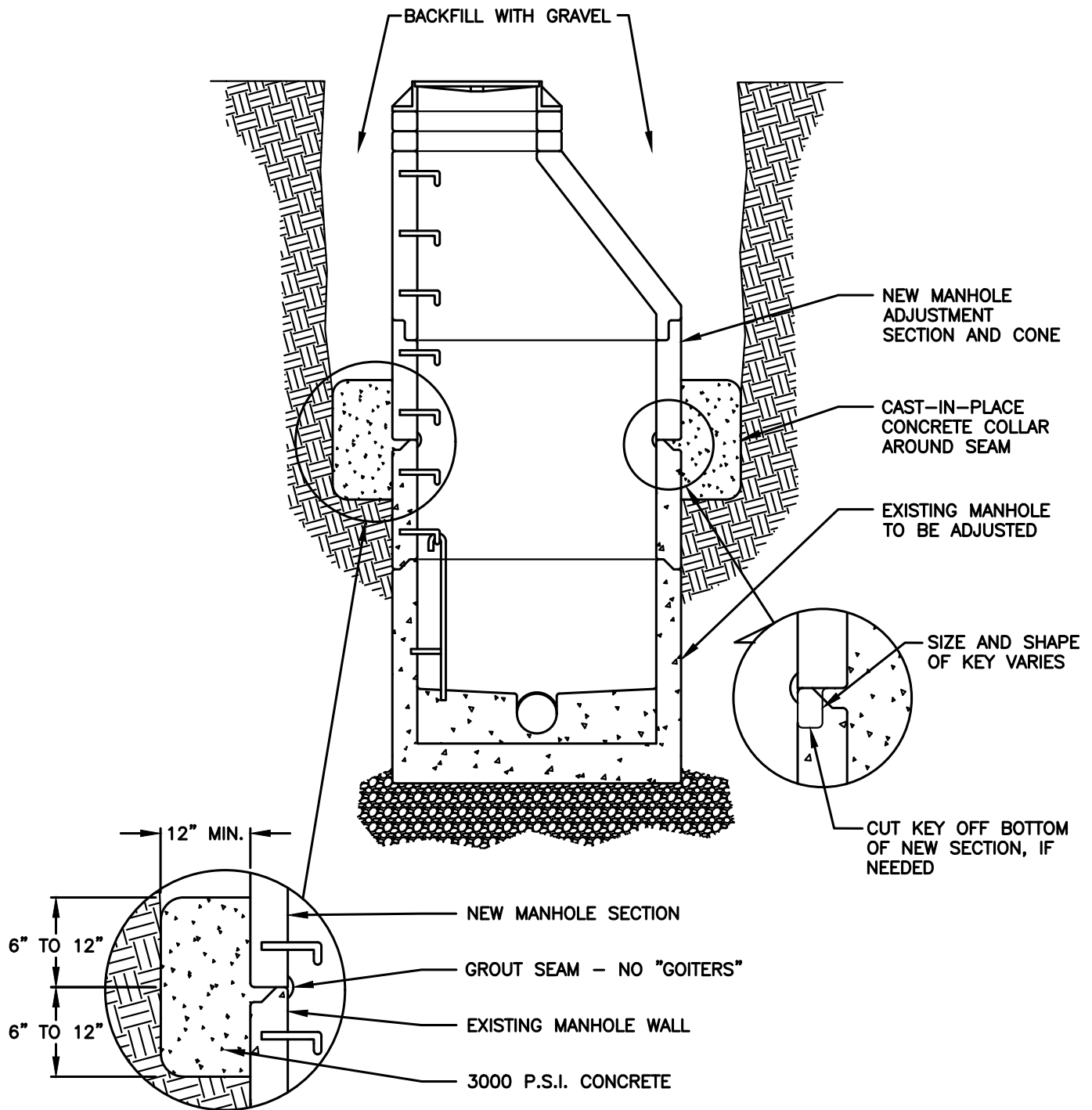
BY CITY

MAY 2018

DATE

DWG. NO.

S-8



NOTES:

1. MANHOLE SHALL CONFORM TO THE GENERAL NOTES AND ALL APPLICABLE REQUIREMENTS OF STANDARD DETAIL S-1.
2. WHERE DEPTH OF MANHOLE NECK EXCEEDS 24", ADJUST MANHOLE TO GRADE BY INSTALLING NEW MANHOLE BARREL SECTION AND CONE ON EXISTING MANHOLE BARREL.
3. WHERE KEY SECTIONS OF NEW AND EXISTING MANHOLES ARE NOT COMPATIBLE, CUT KEY OFF BOTTOM OF NEW SECTION AND PROVIDE A CAST-IN-PLACE CONCRETE COLLAR AROUND MANHOLE PERIMETER. CAST COLLAR WITH 3000 P.S.I CONCRETE.
4. GROUT ALL JOINTS INSIDE, OUTSIDE AND IN BETWEEN TO ACHIEVE WATERTIGHT CONSTRUCTION. FINISH SMOOTH THE INSIDE OF STRUCTURE. USE NON-SHRINK GROUT ONLY.



CITY OF NORTH BEND

MANHOLE SECTION ADJUSTMENT

APPROVED:

MARK RIGOS, P.E.

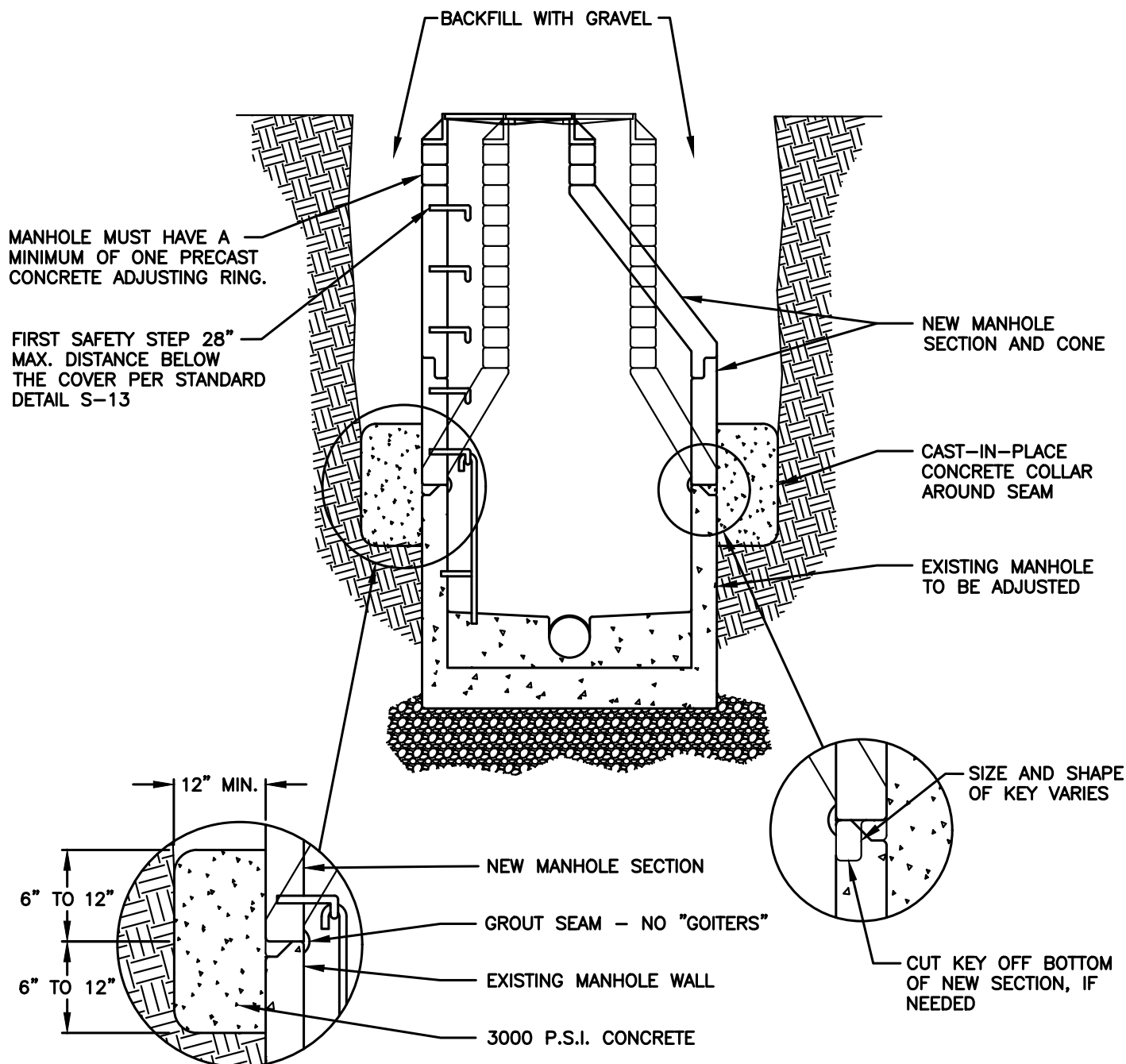
BY CITY

MAY 2018

DATE

DWG. NO.

S-9



NOTES:

1. MANHOLE SHALL CONFORM TO THE GENERAL NOTES AND ALL APPLICABLE REQUIREMENTS OF STANDARD DETAIL S-1.
2. WHERE DEPTH OF MANHOLE WITH CONCENTRIC CONE EXCEEDS 5 FEET, ADJUST MANHOLE TO GRADE BY INSTALLING NEW ECCENTRIC CONE AND BARREL SECTION ON EXISTING MANHOLE BASE SECTION
3. WHERE KEY SECTIONS OF NEW AND EXISTING MANHOLES ARE NOT COMPATIBLE, CUT KEY OFF BOTTOM OF NEW SECTION AND PROVIDE A CAST-IN-PLACE CONCRETE COLLAR AROUND MANHOLE PERIMETER. CAST COLLAR WITH 3000 P.S.I. CONCRETE.
4. SAFETY STEPS IN PRECAST BASE SECTION MAY BE CAST IN PLACE OR A PREFABRICATED LADDER GROUTED OR BOLTED IN PLACE. SEE STANDARD DETAIL S-13.
5. GROUT ALL JOINTS INSIDE, OUTSIDE AND IN BETWEEN TO ACHIEVE WATERTIGHT CONSTRUCTION. FINISH SMOOTH THE INSIDE OF STRUCTURE. USE NON-SHRINK GROUT ONLY.



CITY OF NORTH BEND

**MANHOLE CONE ADJUSTMENT
(CONCENTRIC TO ECCENTRIC)**

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

S-10



1. COVER SHALL HAVE THE WORD "SEWER"
CAST IN 3" RAISED LETTERS.
2. ONLY FOR USE IN PUBLIC RIGHT-OF-WAY
(PAVED AREAS AND SIDEWALKS).
3. RING AND COVER SHALL BE RATED HS-20.
4. RING AND COVER MATERIAL IS DUCTILE IRON,
ASTM A536 - GRADE 80-55-06 OR CAST
IRON, ASTM A30 - CLASS 25.
5. OLYMPIC FOUNDRY MH30A, OR EQUAL.
6. DUCTILE OR CAST COVER SHALL HAVE
MINIMUM WEIGHT OF 150 LBS.
7. DUCTILE OR CAST RING SHALL HAVE
MINIMUM WEIGHT OF 210 LBS.
8. ALL LIDS TO BE LOCKING UNLESS
APPROVED OTHERWISE BY CITY OF NORTH
BEND.
9. PROVIDE A BLIND PICK NOTCH FOR ALL
SEWER LIDS, OPEN HOLES ARE NOT
PERMITTED.



S-11



CITY OF NORTH BEND

RESERVED

APPROVED:

MARK RIGOS, P.E.

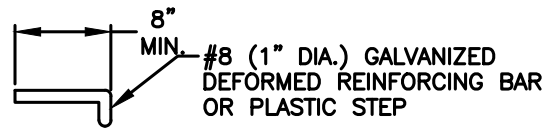
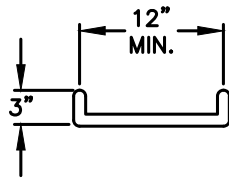
BY CITY

MAY 2018

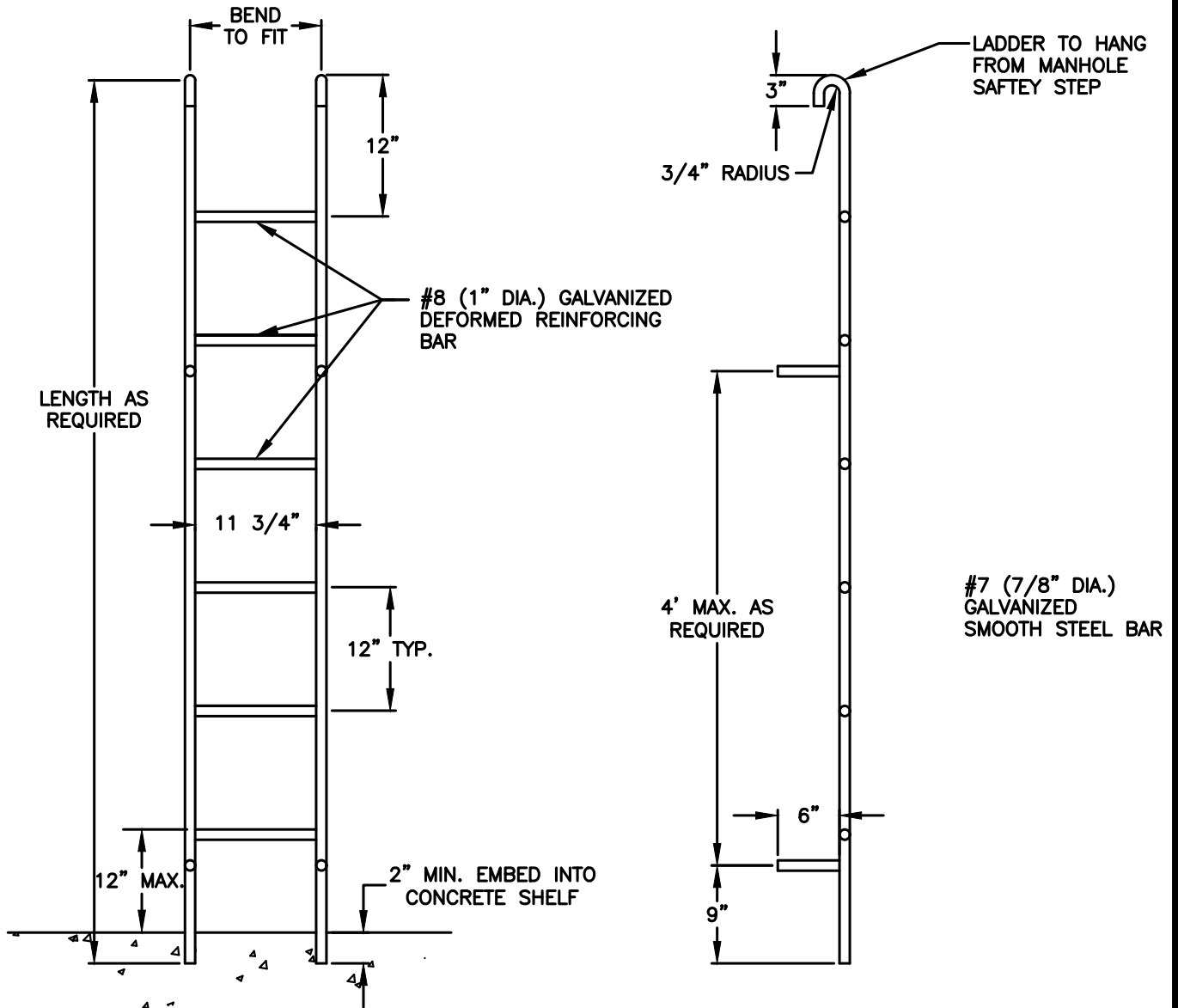
DATE

DWG. NO.

S-12



SAFETY STEP



PREFABRICATED LADDER

NOTE:

1. LADDER RUNGS FOR MANHOLES AND CATCH BASINS SHALL MEET THE REQUIREMENTS OF AASHTO M 199.



CITY OF NORTH BEND

SAFETY STEP AND
PREFABRICATED LADDER

APPROVED:

MARK RIGOS, P.E.

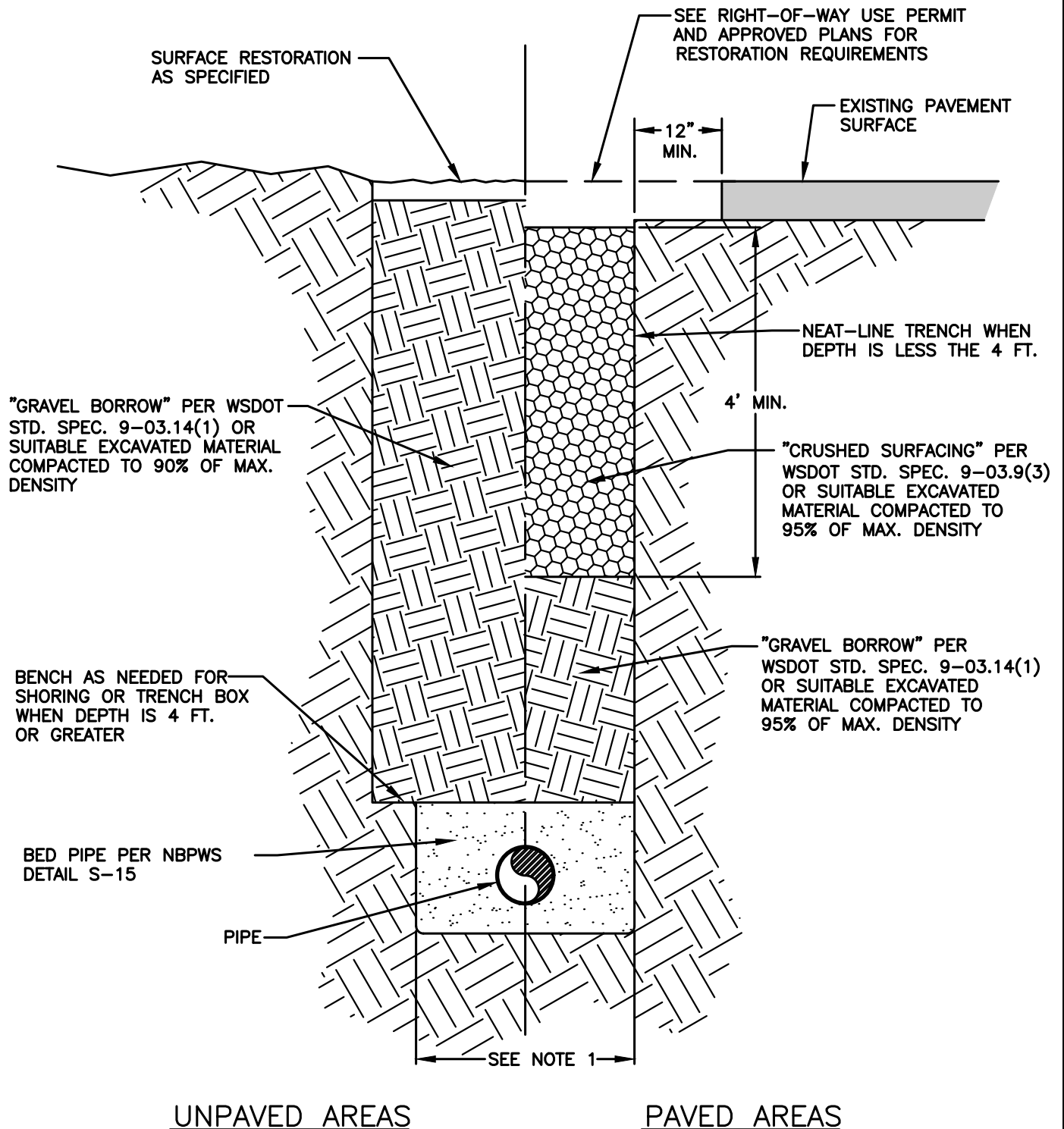
BY CITY

MAY 2018

DATE

DWG. NO.

S-13



NOTES:

1. FOR PIPES 15-INCHES AND UNDER, TRENCH WIDTH=I.D. + 30-INCHES. FOR PIPES 18-INCHES AND OVER, TRENCH WIDTH=(1.5 x I.D.)+18-INCHES. PER SECTION 2-09.4, "MEASUREMENT", OF THE WSDOT STANDARD SPECIFICATIONS.
2. EXCAVATIONS OVER 4' DEEP SHALL COMPLY WITH THE SAFETY STANDARD DISCRIBED IN CHAPTER 296-155 - PART N OF THE WAC.
3. SEE "BEDDING, BACKFILL AND COMPACTION" IN THE STANDARDS FOR ADDITIONAL CONSTRUCTION REQUIREMENTS.



CITY OF NORTH BEND

TYPICAL TRENCH DETAIL

APPROVED:

MARK RIGOS, P.E.

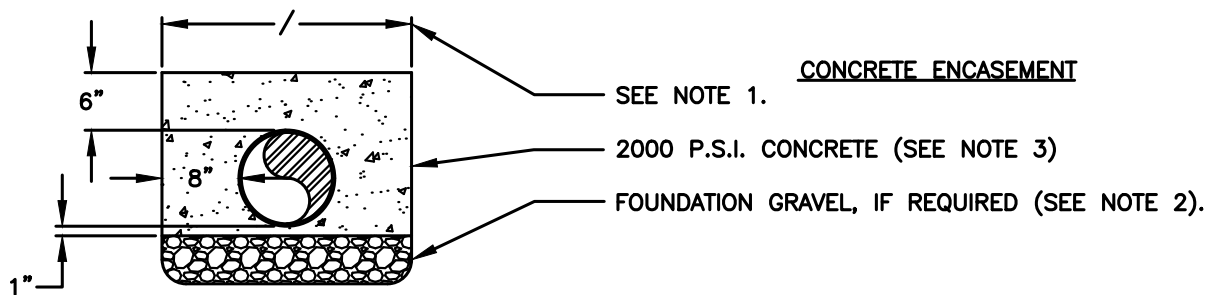
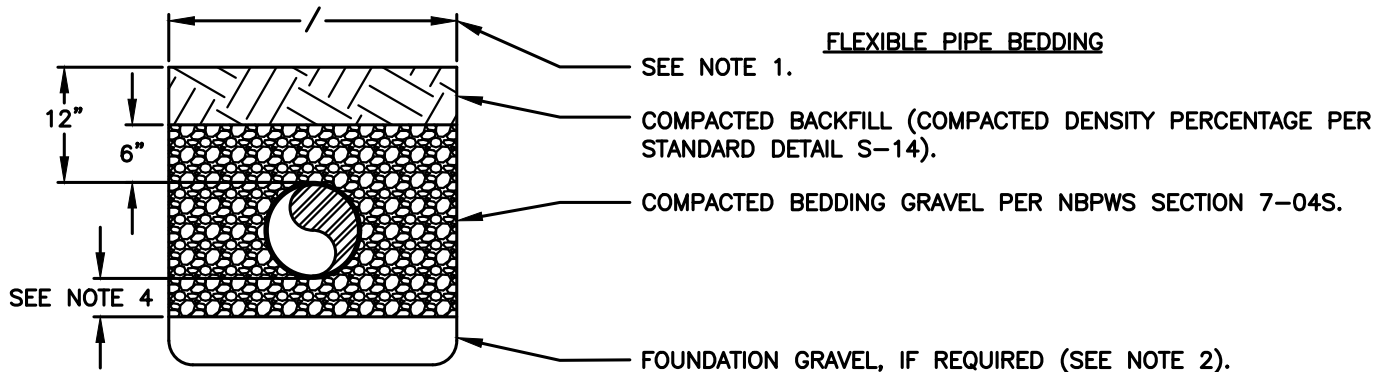
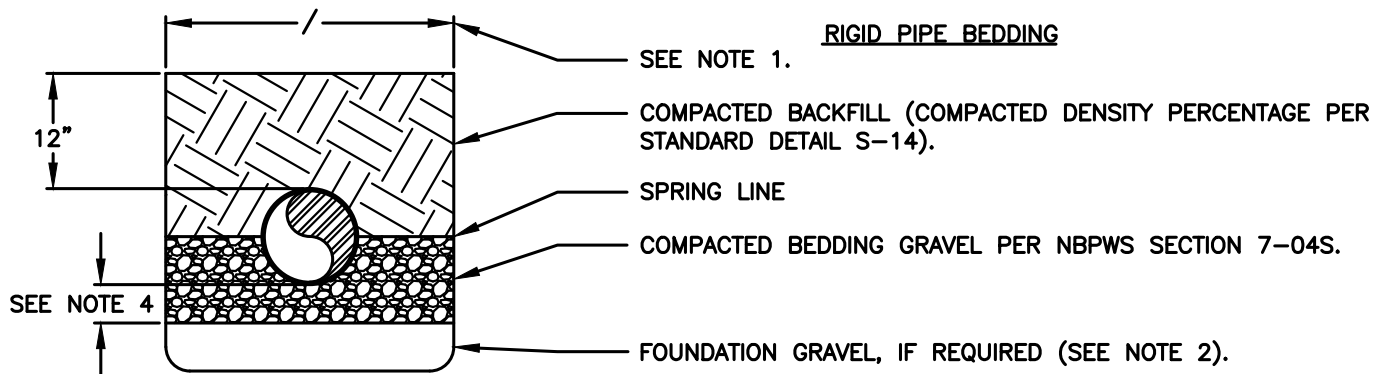
BY CITY

MAY 2018

DATE

DWG. NO.

S-14



NOTES:

1. FOR PIPES 15-INCHES AND UNDER, TRENCH WIDTH=I.D. + 30-INCHES. FOR PIPES 18-INCHES AND OVER, TRENCH WIDTH=(1.5 x I.D.)+18-INCHES. PER SECTION 2-09.4, "MEASUREMENT", OF THE WSDOT STANDARD SPECIFICATIONS.
2. EXCAVATE UNSTABLE MATERIAL DOWN TO FIRM SOIL AND REPLACE WITH FOUNDATION GRAVEL PER SECTION 9-03.9(3), "BALLAST", OF THE WSDOT STANDARD SPECIFICATIONS.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANCHORING PIPE TO PREVENT FLOTATION DURING CONCRETE PLACEMENT.
4. 4-INCHES FOR PIPE 18-INCH DIAMETER AND LESS; 6-INCHES FOR PIPE GREATER THEN 18-INCH DIAMETER.
5. SEE WSDOT SECTION 9-03.9 FOR ADDITIONAL REQUIREMENTS.



CITY OF NORTH BEND

PIPE BEDDING

APPROVED:

MARK RIGOS, P.E.

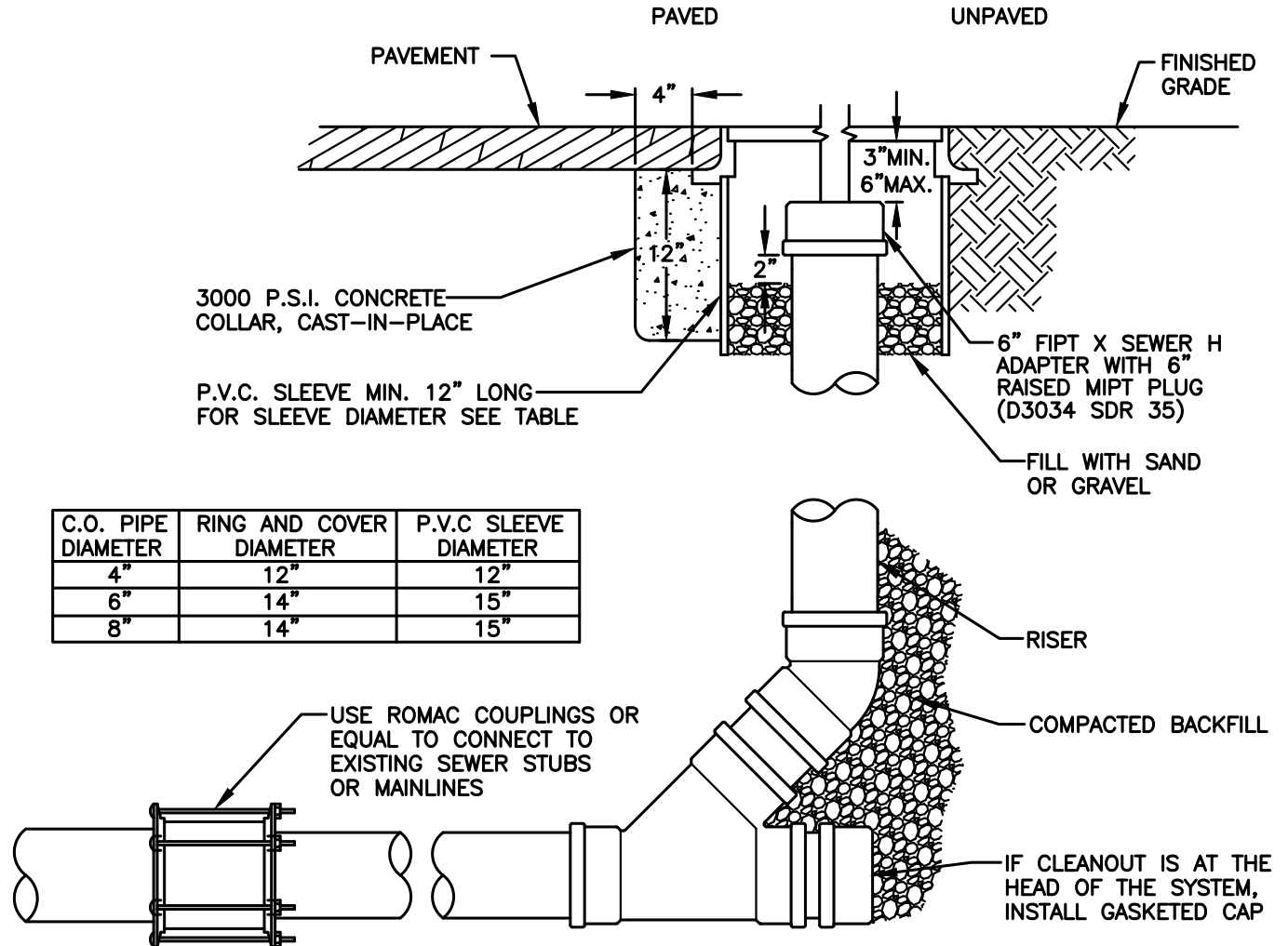
BY CITY

MAY 2018

DATE

DWG. NO.

S-15



NOTES:

1. BOLT-LOCKING CAST IRON RING AND COVER SHALL BE USED IN RIGHT-OF-WAY AND EASEMENTS AND MUST BE RATED HS-20 IF USED IN PAVED AREAS. SEE TABLE FOR SIZES.
2. MID-STATES PLASTIC BOX OR EQUAL MAY BE USED IF C.O. IS OUTSIDE OF RIGHT-OF-WAY OR EASEMENT. SEE TABLE FOR SIZES. THE COVER FOR THE PLASTIC BOX SHALL BE DUCTILE IRON AND READ "SEWER" OR BE BLANK (NO LABEL).
3. CAST IRON COVER SHALL READ "SEWER."
4. 14" BOLT-LOCKING CAST IRON COVER SHALL BE EQUAL TO OLYMPIC FOUNDRY PART NUMBER M1060.
5. SPECIAL "DECORATIVE" CASTING MAY BE USED IF PRE-APPROVED BY CITY.



CITY OF NORTH BEND

CLEANOUT TO GRADE

APPROVED:

MARK RIGOS, P.E.

BY CITY

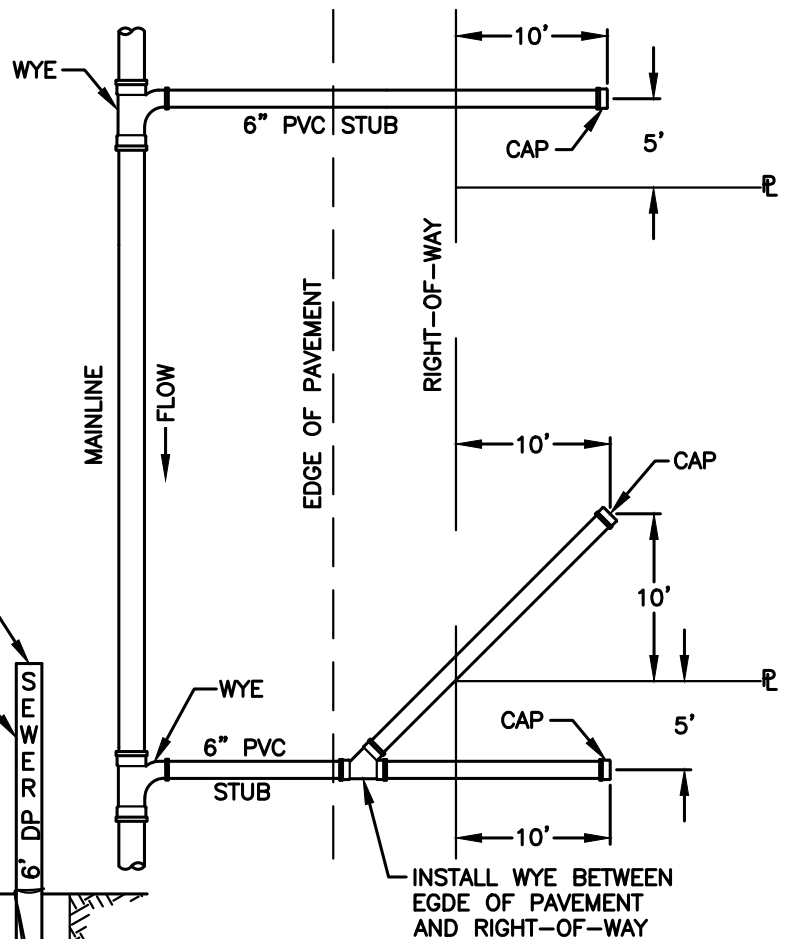
MAY 2018

DATE

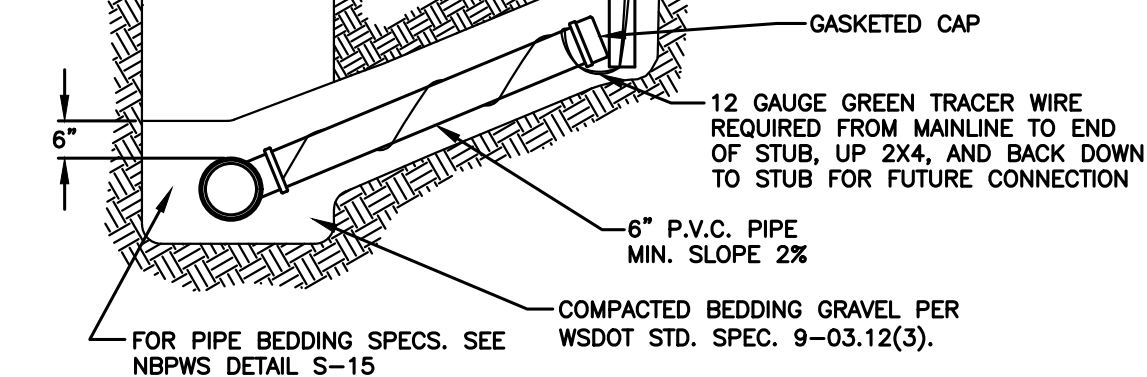
DWG. NO.

S-16

SINGLE SERVICE



JOINT USE SERVICE



NOTES:

1. UNLESS OTHERWISE INDICATED ON PLAN, SIDE SEWER SHALL BE MINIMUM OF 5 FEET DEEP AT PROPERTY LINE, OR 5 FEET LOWER THAN THE LOWEST ELEVATION, WHICHEVER IS LOWER.
2. PIPE CAN BE REDUCED TO 4" DIAMETER ON PRIVATE PROPERTY.
3. CLEANOUT SHALL BE INSTALLED WITHIN 25 FEET OF WYES.



CITY OF NORTH BEND SIDE SEWER STUB (ONLY WHERE PLANS DO NOT REQUIRE CLEANOUTS)

APPROVED:

MARK RIGOS, P.E.

BY CITY

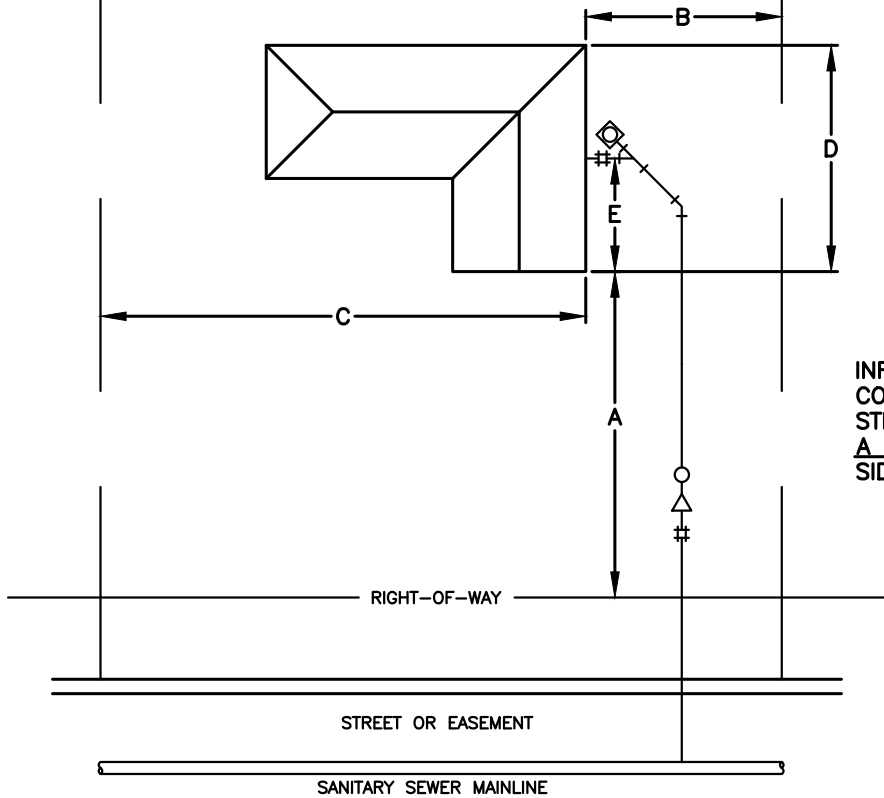
MAY 2018

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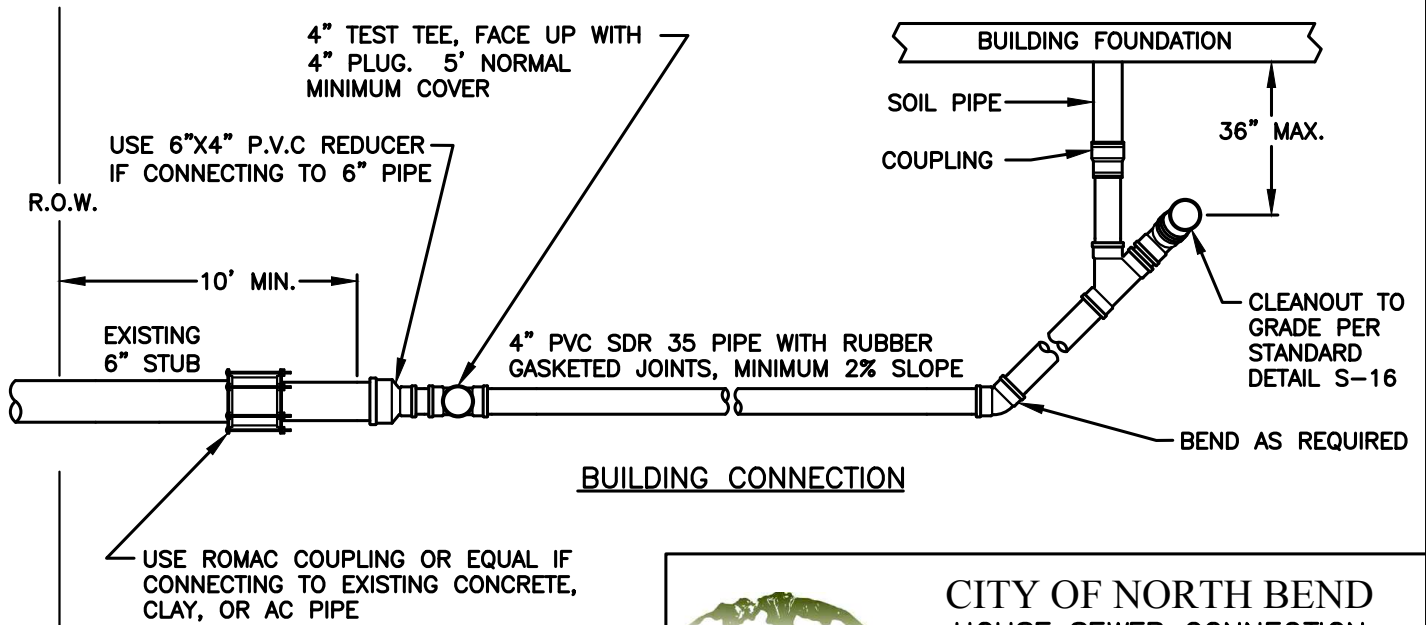
DWG. NO.

S-17

TYPICAL HOUSE SIDE SEWER ON PRIVATE PROPERTY



INFORMATION REQUIRED FOR SEWER
CONNECTION PERMIT: LEGAL DESCRIPTION,
STREET ADDRESS, PLAN WITH DIMENSIONS
A THROUGH E SHOWN, AND COMPLETION OF
SIDE SEWER APPLICATION.



NOTES:

1. REMOVE 2"x4" STAKE AND CAP OR EXIST SIDE SEWER PIPE AND INSTALL NEW 4" P.V.C SIDE SEWER. USE COUPLINGS, REDUCERS, WYES, TEES, AND BENDS, AS REQUIRED TO FIT.



CITY OF NORTH BEND **HOUSE SEWER CONNECTION** **(WHEN CONNECTING TO EXISTING** **STUB ONLY)**

APPROVED:

MARK RIGOS, P.E.

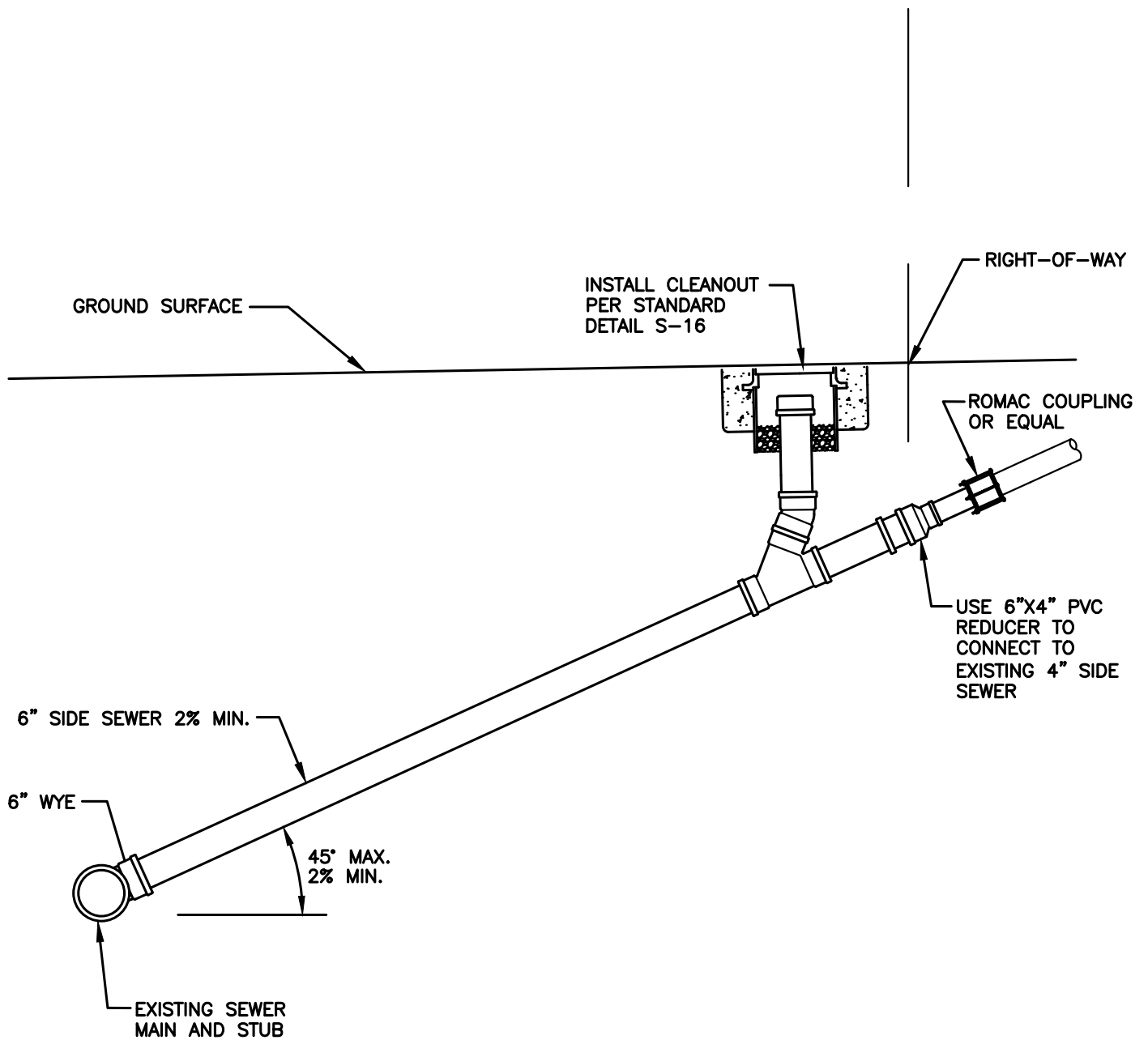
BY CITY

MAY 2018

DATE

DWG. NO.

S-18



NOTE:

1. REPLACE ANY EXISTING 4" SIDE SEWER WITH 6" PVC AND EXTEND THE EDGE OF RIGHT-OF-WAY. REMOVE AND DISPOSE OF ANY EXISTING PIPE THAT IS NOT REUSED.



CITY OF NORTH BEND

SIDE SEWER

APPROVED:

MARK RIGOS, P.E.

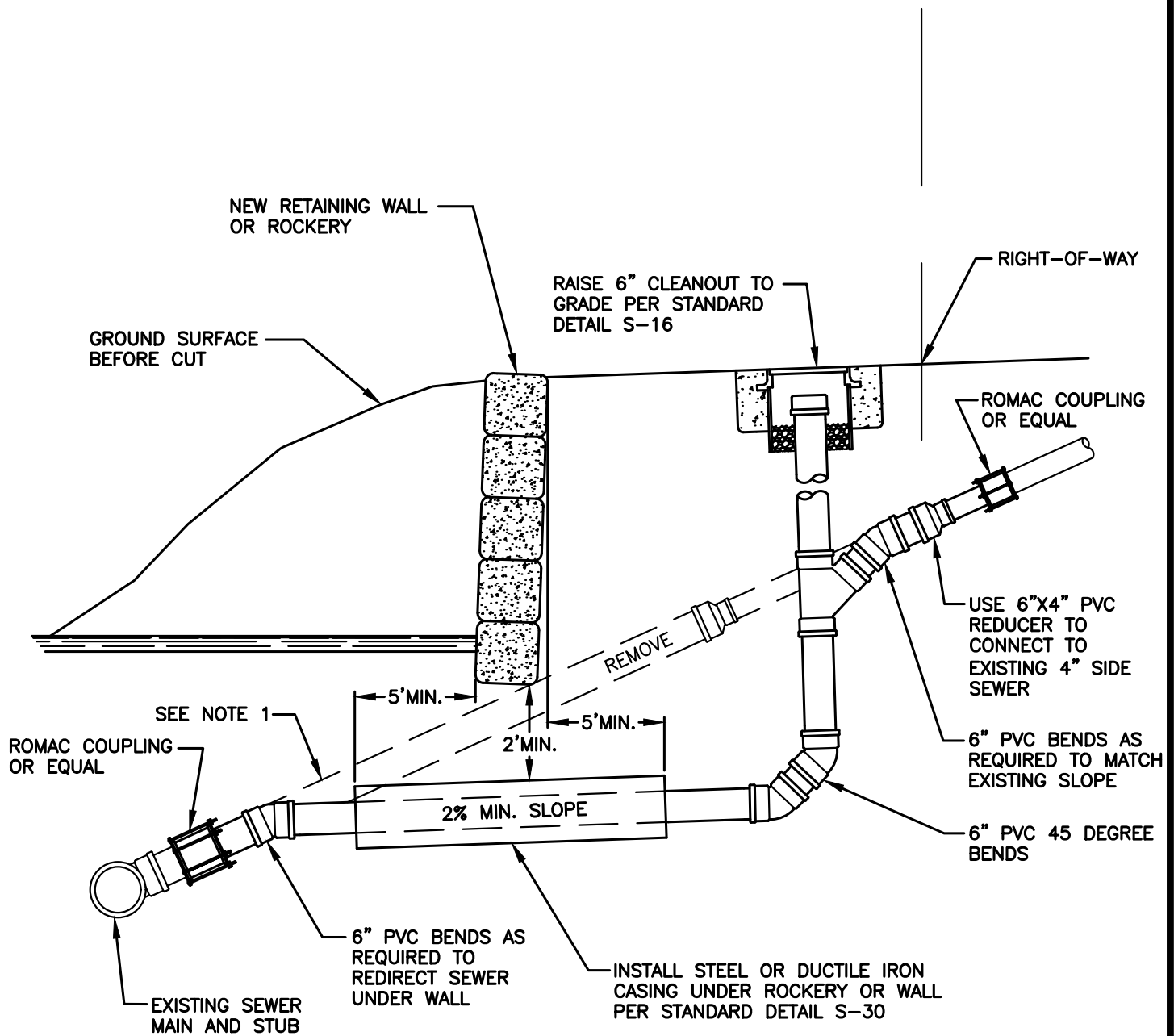
BY CITY

MAY 2018

DATE

DWG. NO.

S-19



NOTES:

1. REPLACE ANY EXISTING 4" SIDE SEWER WITH 6" PVC AND EXTEND TO THE EDGE OF RIGHT-OF-WAY. REMOVE AND DISPOSE OF ANY EXISTING PIPE THAT IS NOT REUSED.
2. RELOCATE SIDE SEWER ONLY WHERE REQUIRED BY ROADWAY CUT.



CITY OF NORTH BEND

SIDE SEWER RELOCATION

APPROVED:

MARK RIGOS, P.E.

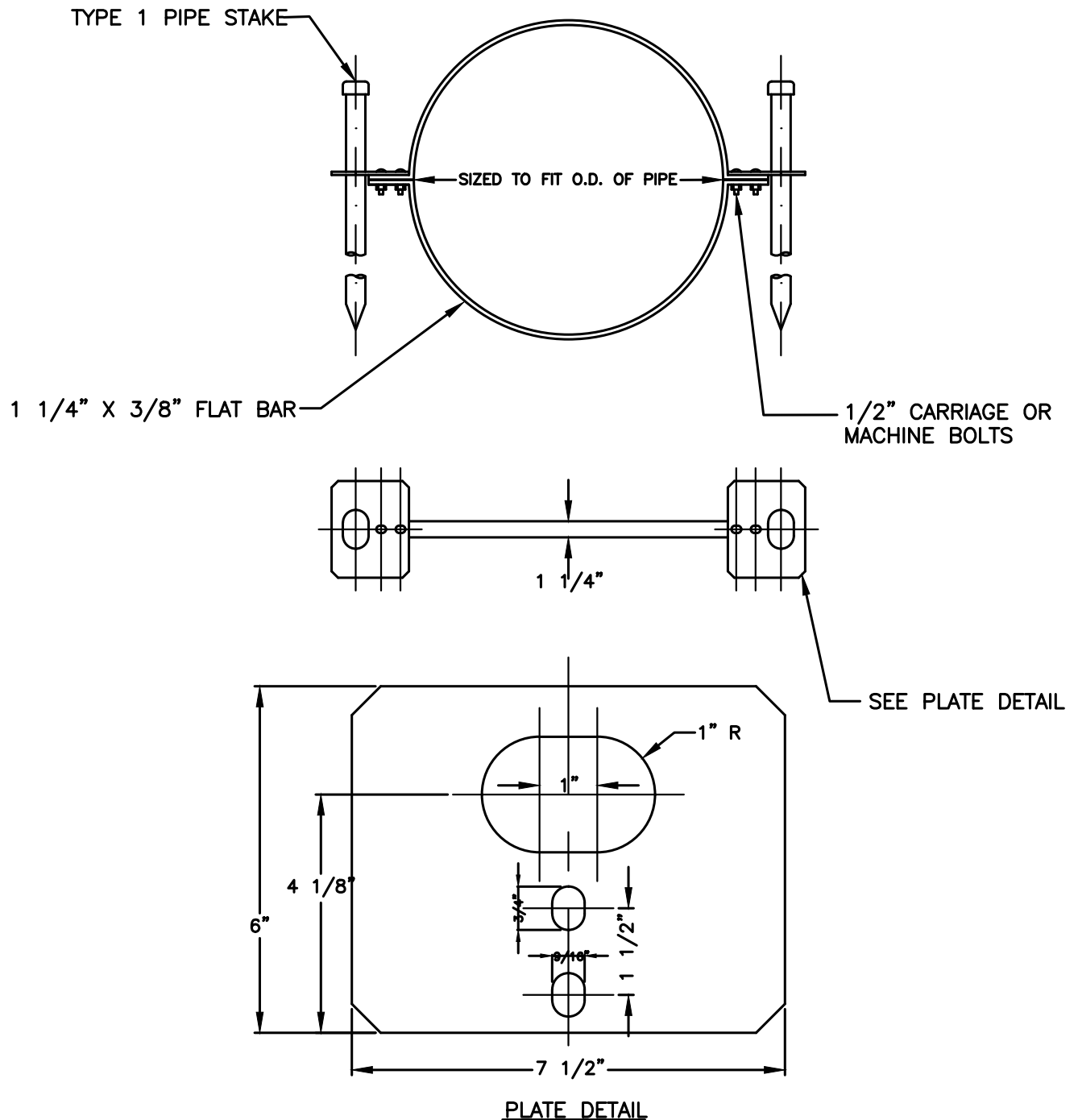
BY CITY

MAY 2018

DATE

DWG. NO.

S-20



NOTES:

1. ALL PIPE STAKES, HARDWARE AND MATERIALS SHALL BE HOT DIPPED GALVANIZED AFTER FABRICATION.
2. TYPE 1 PIPE STAKE: 2" O. D. GALVANIZED PIPE, 6' LONG, WITH A 2" O. D. THREADED PIPE CAP OR WELDED COLLAR. THE OTHER END IS TO BE FLATTENED OR CUT TO TO A POINT.
3. ANCHOR ASSEMBLY IS AN ALTERNATE TO S-19 (BURIED PIPE) OR FOR ABOVE GROUND PIPE WHERE APPROVED BY THE CITY.



CITY OF NORTH BEND

PIPE STAKE ANCHOR ASSEMBLY

APPROVED:

MARK RIGOS, P.E.

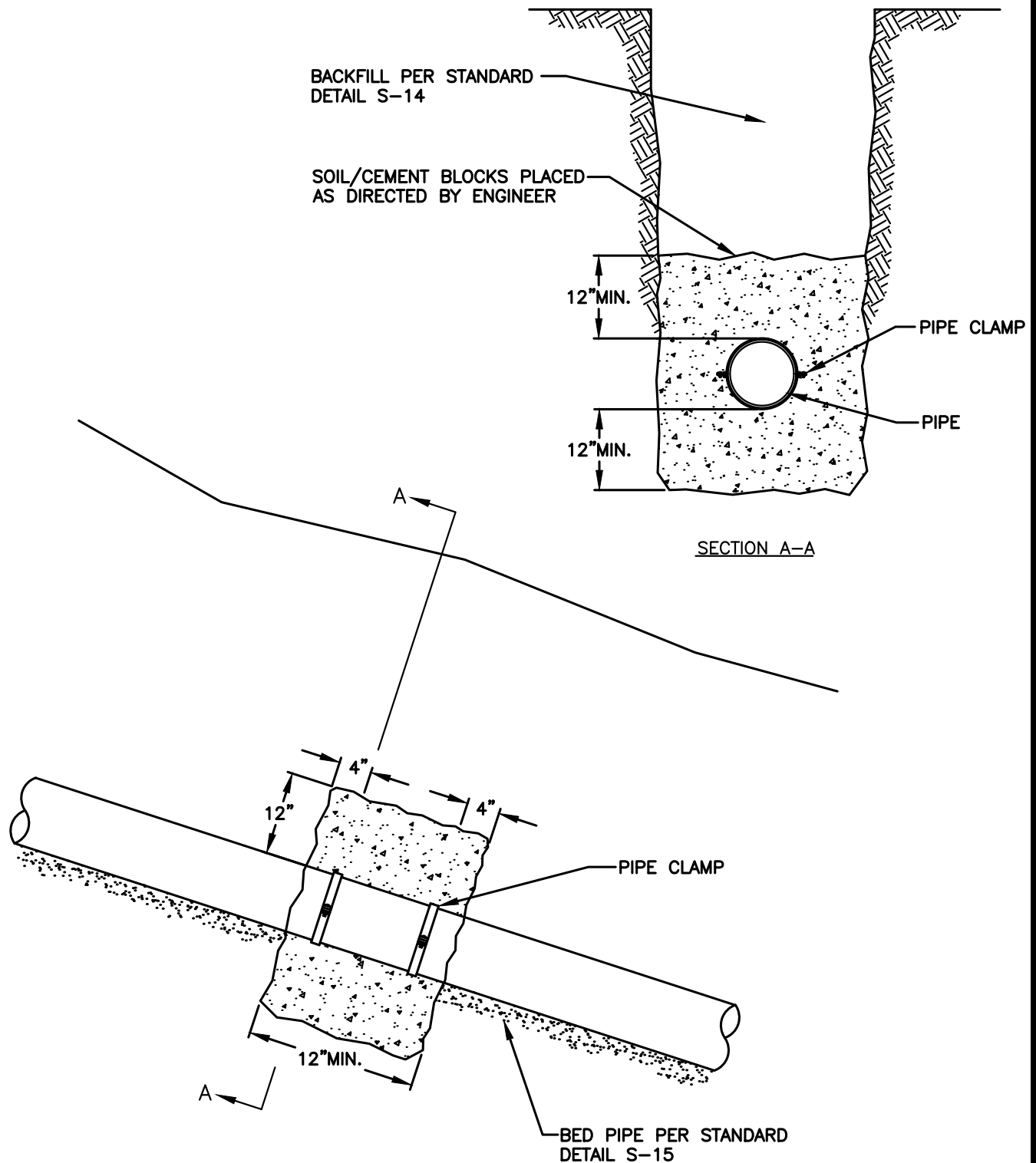
BY CITY

MAY 2018

DATE

DWG. NO.

S-21



NOTES:

1. SOIL CEMENT BLOCKS REQUIRED ON PIPE SLOPES OF 20% OR GREATER.
2. SOIL CEMENT BLOCKS PLACED OVER AND AROUND. TAMPED INTO PLACE BEFORE BACKFILLING. USE 10% CEMENT WITH 90% NATIVE SOIL MIX. ADD ENOUGH WATER TO FORM A DRY MIX THAT WILL HOLD ITS SHAPE WHEN MOLDED INTO A BALL.
3. PLACE TWO PIPE CLAMPS, 4" FROM BLOCK ENDS TO PROVIDE ANCHORAGE TO SOIL/CEMENT MIX.



CITY OF NORTH BEND

SOIL CEMENT PIPE ANCHORS

APPROVED:

MARK RIGOS, P.E.

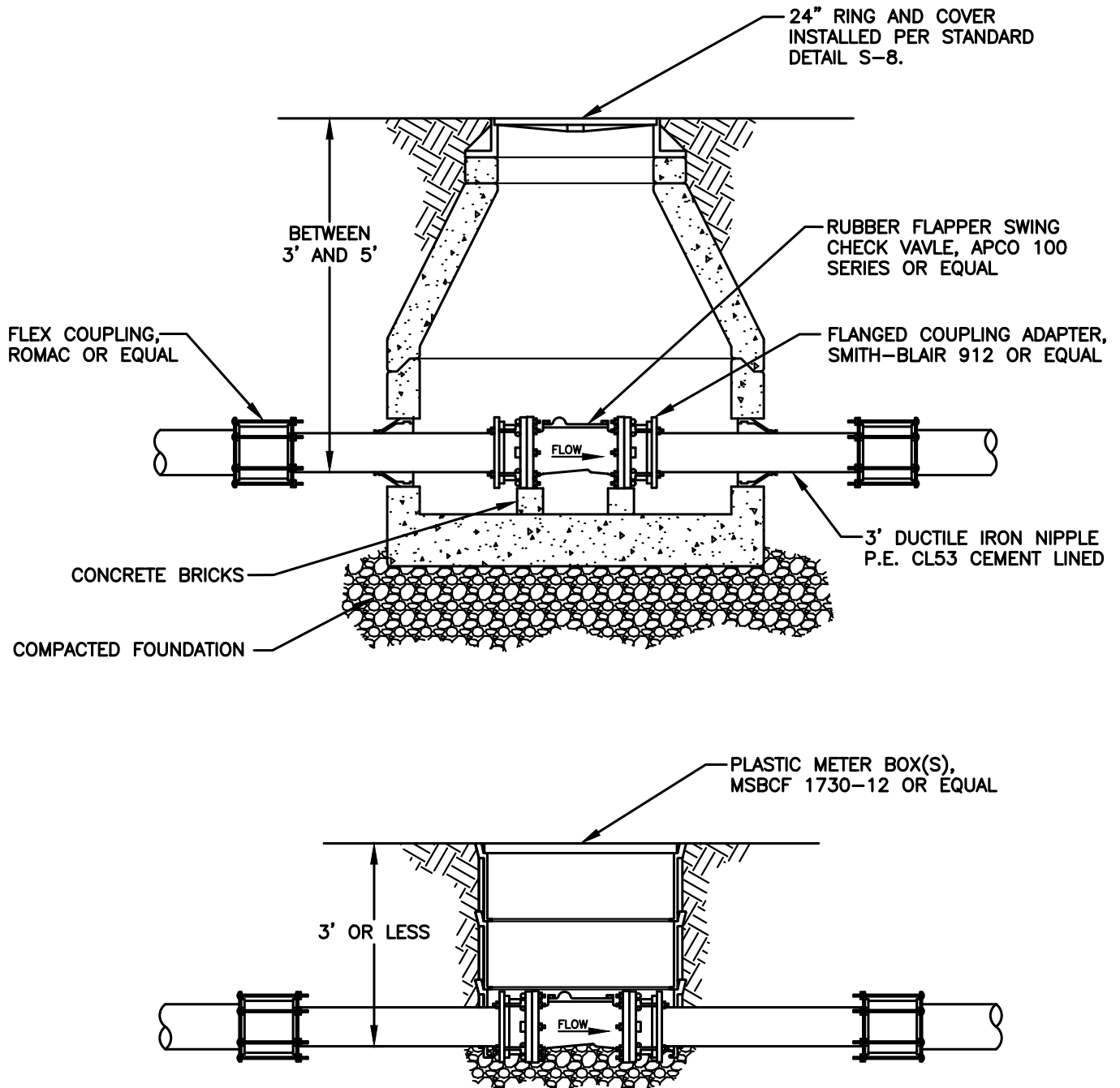
BY CITY

MAY 2018

DATE

DWG. NO.

S-22



NOTES:

1. WHERE DEPTH OF PIPE INVERT IS LESS THAN 3 FEET, USE PLASTIC METER BOX FOR VALVE CHAMBER (MID STATES PLASTIC MODEL MSBCF 1730-12 OR EQUAL). THE COVER FOR THE PLASTIC BOX SHALL BE DUCTILE IRON AND READ "SEWER", OR BE BLANK (NO LABEL).
STACK 2 OR 3 BOXES AS NECESSARY.
2. WHERE DEPTH OF PIPE INVERT IS BETWEEN 3 FEET AND 5 FEET, USE CONCENTRIC CONE CONCRETE MANHOLE PER STANDARD DETAIL S-6.
3. WHERE DEPTH OF PIPE INVERT IS GREATER THAN 5 FEET, USE STANDARD ECCENTRIC CONCRETE MANHOLE PER STANDARD DETAIL S-1.

PROVIDED FOR EXAMPLE ONLY, PROJECT SPECIFIC DETAILS WILL BE REQUIRED TO BE SUBMITTED FOR REVIEW AND ARE TO BE INCLUDED IN THE PROJECT PLANS.



CITY OF NORTH BEND
CHECK VALVE ASSEMBLY FOR
JOINT USE SIDE SEWER
(4" TO 8" DIAMETER)

APPROVED:

MARK RIGOS, P.E.

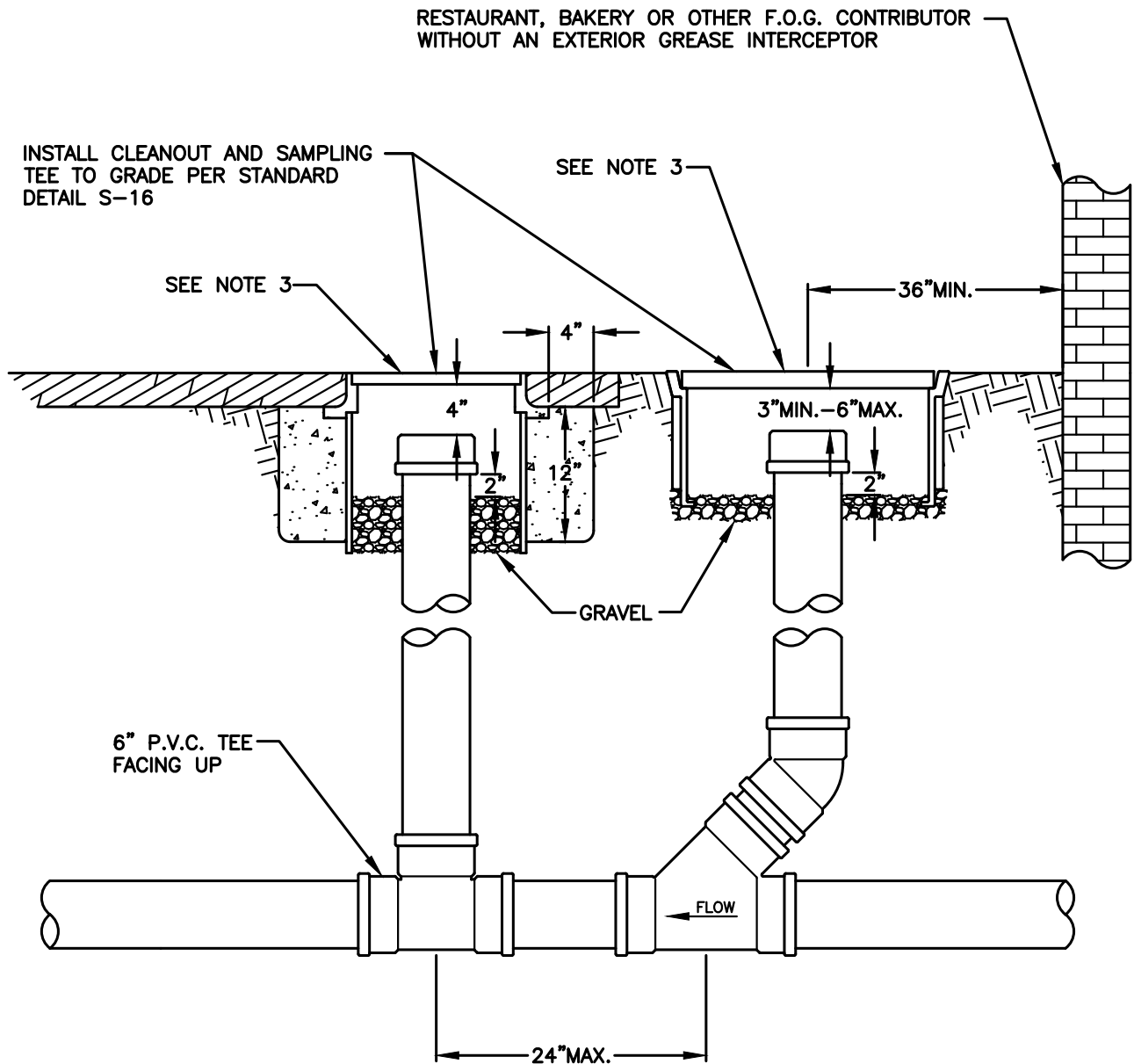
BY CITY

MAY 2018

DATE

DWG. NO.

S-23



NOTES:

1. ONLY FOR USE ON PROPERTIES THAT DO NOT HAVE AN EXTERIOR GREASE INTERCEPTOR.
2. INSTALL SAMPLING TEE ON EXISTING OR NEW SIDE SEWER.
3. FOR PAVED AREAS USE 14" BOLT-LOCKING RING AND COVER EQUAL TO INLAND FOUNDRY NUMBER 209 OR 210. FOR UNPAVED AREAS USE MID-STATES PLASTIC BOX MODEL MSBCF-1118-18XL OR EQUAL. THE COVER FOR THE PLASTIC BOX SHALL BE DUCTILE IRON AND READ "SEWER", OR BE BLANK (NO LABEL).

PROVIDED FOR EXAMPLE ONLY, PROJECT SPECIFIC DETAILS WILL BE REQUIRED TO BE SUBMITTED FOR REVIEW AND ARE TO BE INCLUDED IN THE PROJECT PLANS.



CITY OF NORTH BEND

SAMPLING TEE

APPROVED:

MARK RIGOS, P.E.

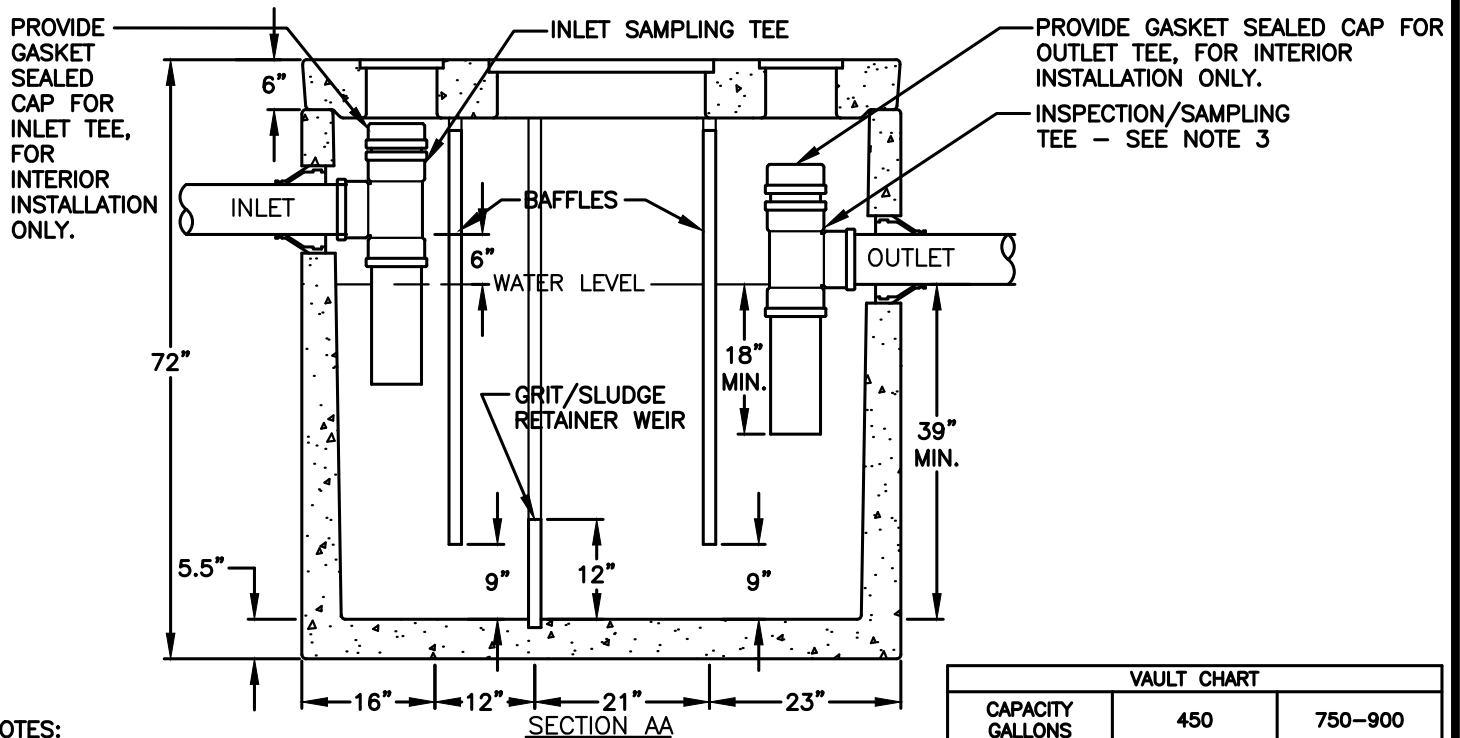
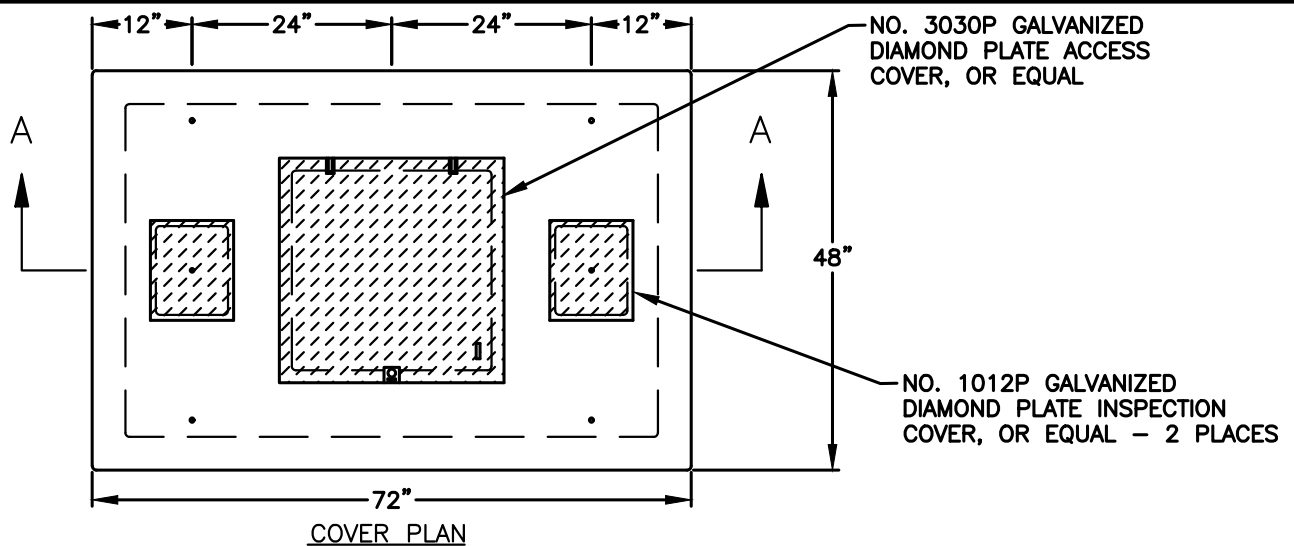
BY CITY

MAY 2018

DATE

DWG. NO.

S-24



NOTES:

1. USE UTILITY VAULT COMPANY INC. MODELS (SEE CHART) OR EQUAL. PRECAST VAULT SHALL HAVE KNOCKOUTS AT ALL PIPE OPENINGS. IF KNOCKOUTS ARE NOT PRESENT, THEN PIPE OPENINGS SHALL BE CORE-DRILLED. PIPE OPENINGS SHALL BE 2" LARGER THAN THE PIPE DIAMETER.
2. P.V.C. INSPECTION AND SAMPLING TEE SHALL BE THE SAME SIZE AS THE OUTLET PIPE FOR 6" OUTLET OR GREATER. USE 6" P.V.C. TEE WHERE OUTLET PIPE SIZE IS LESS THAN 6". INSTALL GASKETED CAP ON TOP OF THE SAMPLING TEE, FOR INTERIOR INSTALLATIONS ONLY.
3. FILL WITH CLEAN WATER PRIOR TO START-UP OF THE SYSTEM.
4. GRAY AND BLACK WATER SHALL BE CARRIED BY SEPARATE SIDE SEWER.
5. PIPE CONNECTION TO VAULT: KOR-N-SEAL OR EQUAL FOR CORE-DRILLED OPENINGS, OR SAND COLLAR FOR KNOCKOUT OPENING. SEAL ALL PIPE CONNECTIONS WITH NONSHRINK GROUT.
6. INTERIOR OIL/WATER SEPARATORS SHALL HAVE VENTING PER 2009 UNIFORM PLUMBING CODE REQUIREMENTS.
7. PRIOR TO STARTUP, OIL/WATER SEPARATOR SHALL PASS 1% PER DAY LEAK TEST WHERE ONLY A MAXIMUM OF 1% OF DEAD STORAGE REDUCTION IS ALLOWED WITHIN A 24 HOUR PERIOD PER THE 2009 UNIFORM PLUMBING CODE 712.2

VAULT CHART		
CAPACITY GALLONS	450	750-900
MODEL #	660-SA	577-SA
LENGTH	6'-0"	7'-0"
WIDTH	4'-0"	4'-8"
HEIGHT	6'-0"	7'-0"
MANUFACTURER	UV	UV

PROVIDED FOR EXAMPLE ONLY, PROJECT SPECIFIC DETAILS WILL BE REQUIRED TO BE SUBMITTED FOR REVIEW AND ARE TO BE INCLUDED IN THE PROJECT PLANS.



CITY OF NORTH BEND

**450-900 GALLON BAFFLE TYPE
OIL/WATER SEPARATOR**

APPROVED:

MARK RIGOS, P.E.

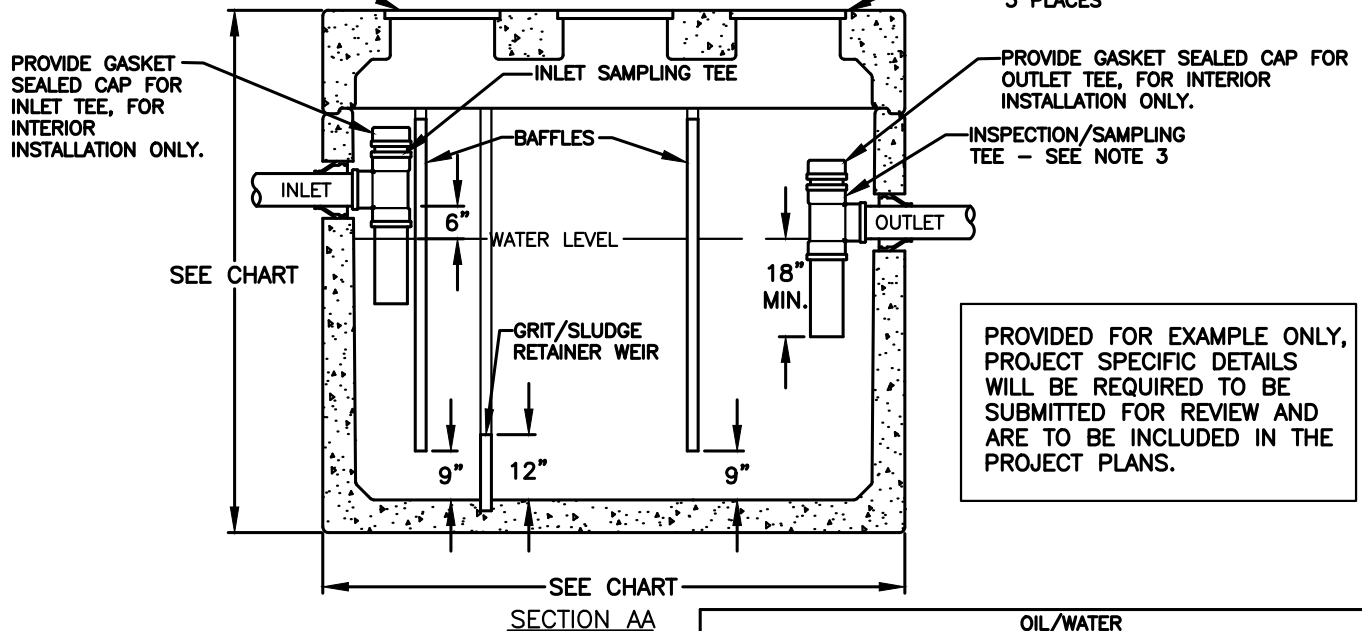
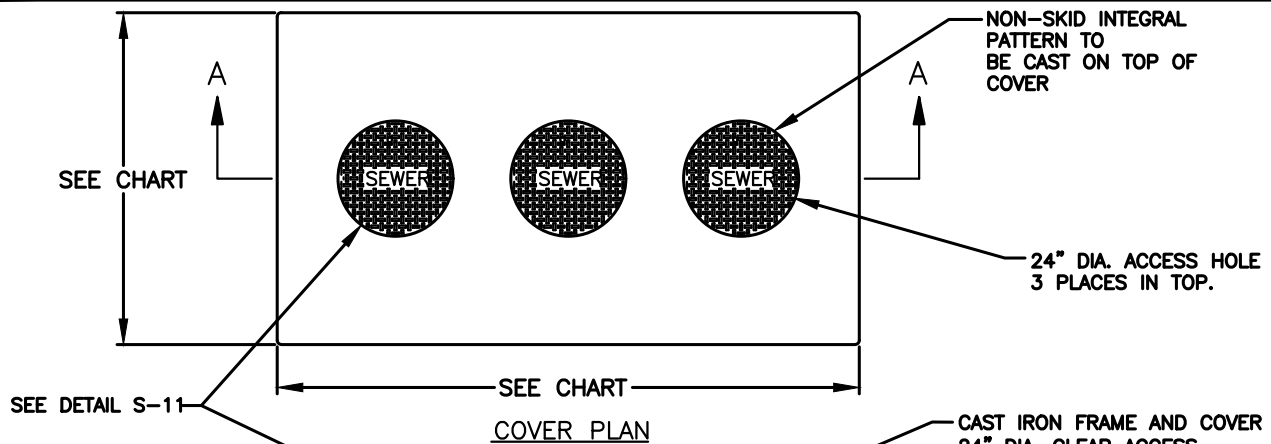
BY CITY

MAY 2018

DATE

DWG. NO.

S-26



PROVIDED FOR EXAMPLE ONLY,
PROJECT SPECIFIC DETAILS
WILL BE REQUIRED TO BE
SUBMITTED FOR REVIEW AND
ARE TO BE INCLUDED IN THE
PROJECT PLANS.

1100-5000 GALLON BAFFLE TYPE OIL/WATER SEPARATOR

OIL/WATER SEPARATORS					
CAPACITY GALLONS	1100	1500	2200	3000-4000	5000
MODEL #	4484-SA	5106-SA	612-SA	712-SA	814-SA
LENGTH	9'-0"	11'-2"	12'-8"	13'-1'	15'-7"
WIDTH	5'-0"	5'-8"	6'-8"	8'-0"	9'-7"
HEIGHT	7'-2½"	7'-2"	8'-0"	8'-7"	10'-½"
MANUFACTURER	UV	UV	UV	UV	UV

NOTES:

- USE UTILITY VAULT COMPANY INC. MODEL (SEE CHART) OR EQUAL. PRECAST VAULT SHALL HAVE KNOCKOUTS AT ALL PIPE OPENINGS. IF KNOCKOUTS ARE NOT PRESENT, THEN PIPE OPENINGS SHALL BE CORE-DRILLED. PIPE OPENINGS SHALL BE 2" LARGER THAN THE PIPE DIAMETER.
- P.V.C SAMPLING TEE SHALL BE THE SAME SIZE AS THE OUTLET PIPE FOR 6" OUTLET OR GREATER. USE 6" P.V.C. TEE WHERE OUTLET PIPE SIZE IS LESS THAN 6". INSTALL GASKETED CAP ON TOP OF THE SAMPLING TEE, FOR INTERIOR INSTALLATION ONLY.
- FILL WITH CLEAN WATER PRIOR TO START-UP OF THE SYSTEM.
- GRAY AND BLACK WATER SHALL BE CARRIED BY SEPARATE SIDE SEWER.
- PIPE CONNECTION TO VAULT: KOR-N-SEAL OR EQUAL FOR CORE-DRILLED OPENINGS, OR SAND COLLAR FOR KNOCKOUT OPENING. SEAL ALL PIPE CONNECTIONS WITH NONSHRINK GROUT.
- INTERIOR OIL/WATER SEPARATORS SHALL HAVE VENTING PER 2009 UNIFORM PLUMBING CODE REQUIREMENTS.
- PRIOR TO STARTUP, OIL/WATER SEPARATOR SHALL PASS 1% PER DAY LEAK TEST WHERE ONLY A MAXIMUM OF 1% OF DEAD STORAGE REDUCTION IS ALLOWED WITHIN A 24 HOUR PERIOD PER THE 2009 UNIFORM PLUMBING CODE 712.2



CITY OF NORTH BEND

1100-5000 GALLON BAFFLE TYPE OIL/WATER SEPARATOR

APPROVED:

MARK RIGOS, P.E.

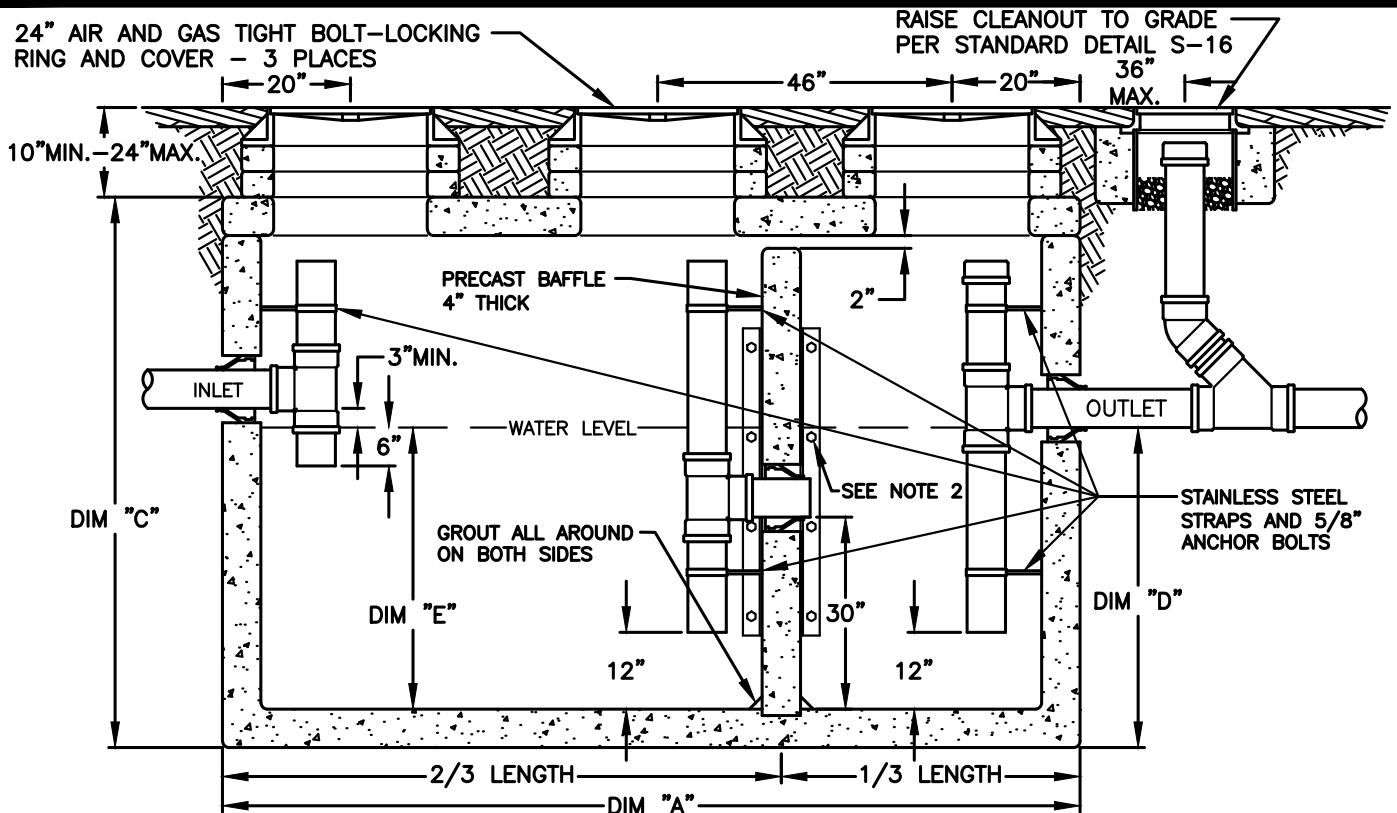
BY CITY

MAY 2018

DATE

DWG. NO.

S-27



GALLON CAPACITY	600	750	1000	1500	2000	2500	3000	4000	5000	6000
UV CO. MODEL No.	577-GA	577-GA	4484-GA	5106-GA	612-GA	612-GA	712-GA	712-GA	818-GA	818-GA
LENGTH DIM "A"	7'-0"	7'-0"	9'-0"	11'-2"	12'-8"	12'-8"	15'-7"	15'-7"	19'-11"	19'-11"
WIDTH DIM "B"	4'-8"	4'-8"	5'-0"	5'-8"	6'-8"	6'-8"	9'-7"	9'-7"	9'-11"	9'-11"
HEIGHT DIM "C"	7'-0"	7'-0"	7'-2"	7'-2"	8'-0"	8'-0"	8'-6 1/2"	8'-6 1/2"	8'-11"	10'-5"
DIM "D"	3'-6"	4'-3"	4'-2"	4'-4"	4'-7"	5'-6"	5'-0"	6'-3"	6'-2"	7'-2"
WATER DEPTH DIM "E"	3'-2"	3'-11"	3'-10"	4'-0"	3'-10"	4'-9"	3'-9"	5'-0"	4'-9"	5'-9"

NOTES:

- USE UTILITY VAULT COMPANY INC. PRECAST CONCRETE VAULT OR EQUAL. SEE CHART ABOVE FOR DIMENSIONS REQUIRED FOR EACH GALLON CAPACITY. PRECAST VAULT SHALL HAVE KNOCKOUTS AT ALL PIPE OPENINGS. IF KNOCKOUTS ARE NOT PRESENT, THEN PIPE OPENINGS SHALL BE CORE-DRILLED. PIPE OPENINGS SHALL BE 2" LARGER THAN THE PIPE DIAMETER.
- IF VAULT IS NOT SLOTTED TO ACCEPT PRECAST CONCRETE BAFFLE THEN BAFFLE SHALL BE HELD IN PLACE BY (2) 3"x3"x3/8" ANGLE 4FT. LONG ON EACH SIDE. ALL 4 PIECES OF ANGLE SHALL BE HELD IN PLACE WITH 4 - 1/2" BOLTS WITH WASHERS SPACED 14" ON CENTER. ANGLE AND FASTENERS SHALL BE STAINLESS STEEL OR GALVANIZED AND ASPHALT COATED.
- P.V.C. INSPECTION AND SAMPLING TEE SHALL BE THE SAME SIZE AS THE OUTLET PIPE FOR 6" OUTLET OR GREATER. USE 6" P.V.C. TEE WHERE OUTLET PIPE SIZE IS LESS THAN 6". INSTALL GASKETED CAP ON TOP OF THE SAMPLING TEE.
- POSITION RISERS BELOW ACCESS OPENINGS TO ALLOW CLEAR ACCESS TO RISER AND VAULT CHAMBER.
- FOR 1000 GALLON INTERCEPTOR, SUBSTITUTE 12" RING AND COVER FOR "CENTER MANHOLE". LOCATE 12" RING AND COVER DIRECTLY ABOVE TEE AND RISER.
- FOR 600 AND 700 GALLON INTERCEPTOR, SUBSTITUTE 30" RING AND COVER FOR THE TWO 24" MANHOLES LOCATED AT THE OUTLET END OF THE VAULT. CENTER OF 30" RING AND COVER SHALL BE LOCATED 2 FT. FROM THE OUTLET FACE OF VAULT.
- FILL WITH CLEAN WATER PRIOR TO START-UP OF THE SYSTEM.
- GRAY WATER ONLY. BLACK WATER SHALL BE CARRIED BY SEPARATE SIDE SEWER.
- PIPE CONNECTION TO VAULT: KOR-N-SEAL OR EQUAL FOR CORE-DRILLED OPENINGS, OR SAND COLLAR FOR KNOCKOUT OPENING. SEAL ALL PIPE CONNECTIONS WITH NONSHRINK GROUT.
- INTERIOR GREASE INTERCEPTORS SHALL HAVE VENTING PER 2009 UNIFORM PLUMBING CODE REQUIREMENTS.
- PRIOR TO STARTUP, GREASE INTERCEPTOR SHALL PASS 1% PER DAY LEAK TEST WHERE ONLY A MAXIMUM OF 1% OF DEAD STORAGE REDUCTION IS ALLOWED WITHIN A 24 HOUR PERIOD PER THE 2009 UNIFORM PLUMBING CODE 712.2

PROVIDED FOR EXAMPLE ONLY,
PROJECT SPECIFIC DETAILS
WILL BE REQUIRED TO BE
SUBMITTED FOR REVIEW AND
ARE TO BE INCLUDED IN THE
PROJECT PLANS.



CITY OF NORTH BEND

GREASE INTERCEPTOR

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

S-28



CITY OF NORTH BEND

RESERVED

APPROVED:

MARK RIGOS, P.E.

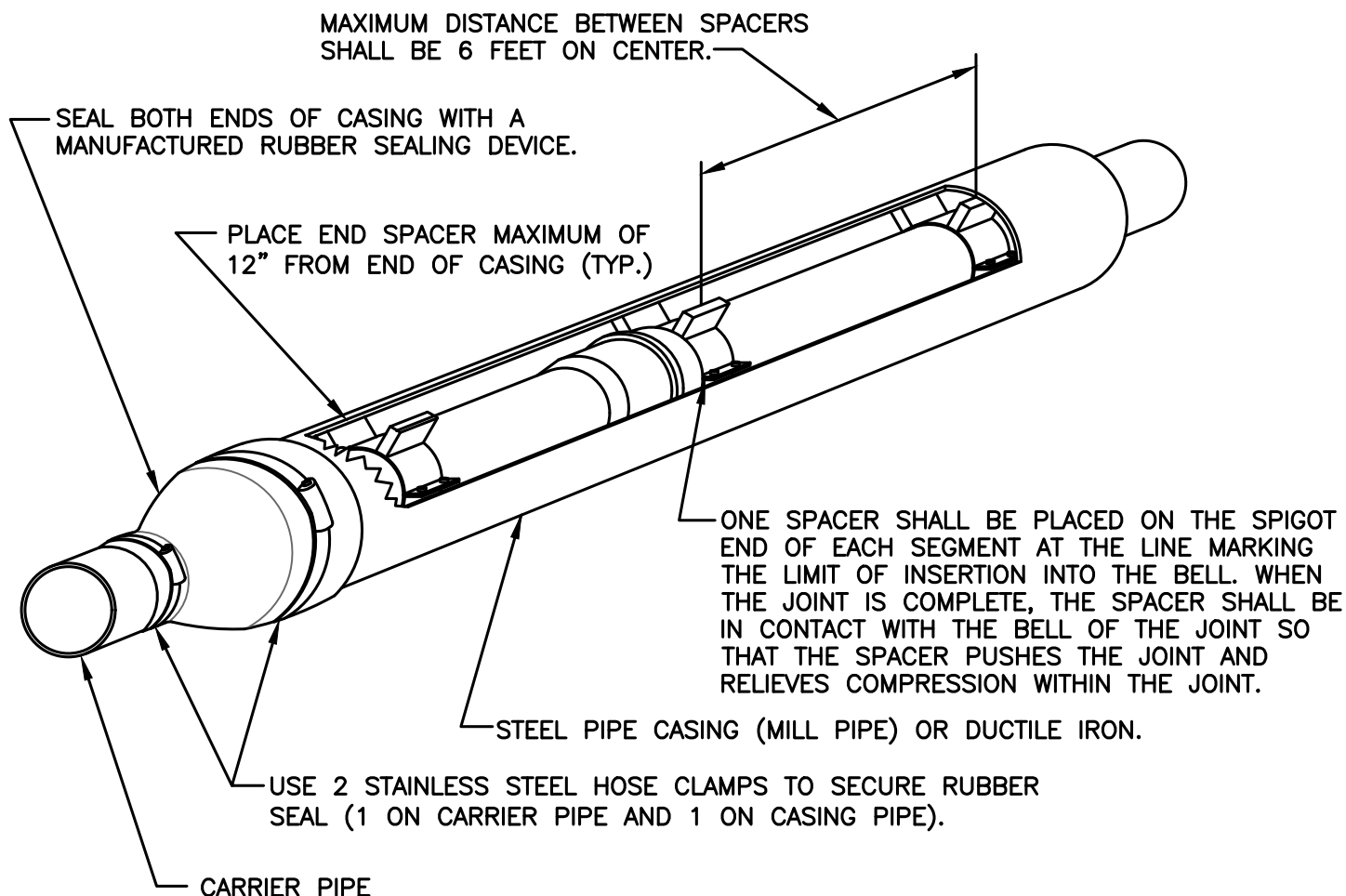
BY CITY

MAY 2018

DATE

DWG. NO.

S-29



CARRIER PIPE DIAMETER	4"	6"	8"	10"	12"
CASING DIAMETER	10"	12"	14"	16"	20"
STEEL CASING THICKNESS	0.25"	0.25"	0.25"	0.25"	0.25"
SPACER BAND WIDTH	8"	8"	8"	8"	8"

NOTES:

1. RUNNER HEIGHT SHALL BE SIZED TO PROVIDE:
 - A. MIN. 0.75" BETWEEN CARRIER PIPE BELL AND CASING PIPE WALL AT ALL TIMES.
 - B. MIN. 1.00" CLEARANCE BETWEEN RUNNERS AND TOP OF CASING WALL TO PREVENT JAMMING DURING INSTALLATION.
2. MINIMUM RUNNER WIDTH SHALL BE 2 INCHES.
3. STEEL CASING DIAMETERS ARE "OUTSIDE DIAMETER" FOR 16" AND LARGER. .
4. SPACER BAND WIDTH SHALL BE 12" FOR CARRIER PIPES THAT ARE 36" DIAMETER OR GREATER.
5. FOR STEEL CASING, PROVIDE SHOP-APPLIED ANTI-CORROSIVE COATING ON CASING EXTERIOR CONFORMING TO AWWA 210. MINIMUM COATING 16 MILS DFT (DO NOT EXCEED MANUFACTURER'S MAXIMUM THICKNESS). PRODUCT SHALL BE EQUAL TO TNEVEC HI-BUILD TNEC-TAR SERIES 46H-413.



CITY OF NORTH BEND

CASING INSTALLATION

APPROVED:

MARK RIGOS, P.E.

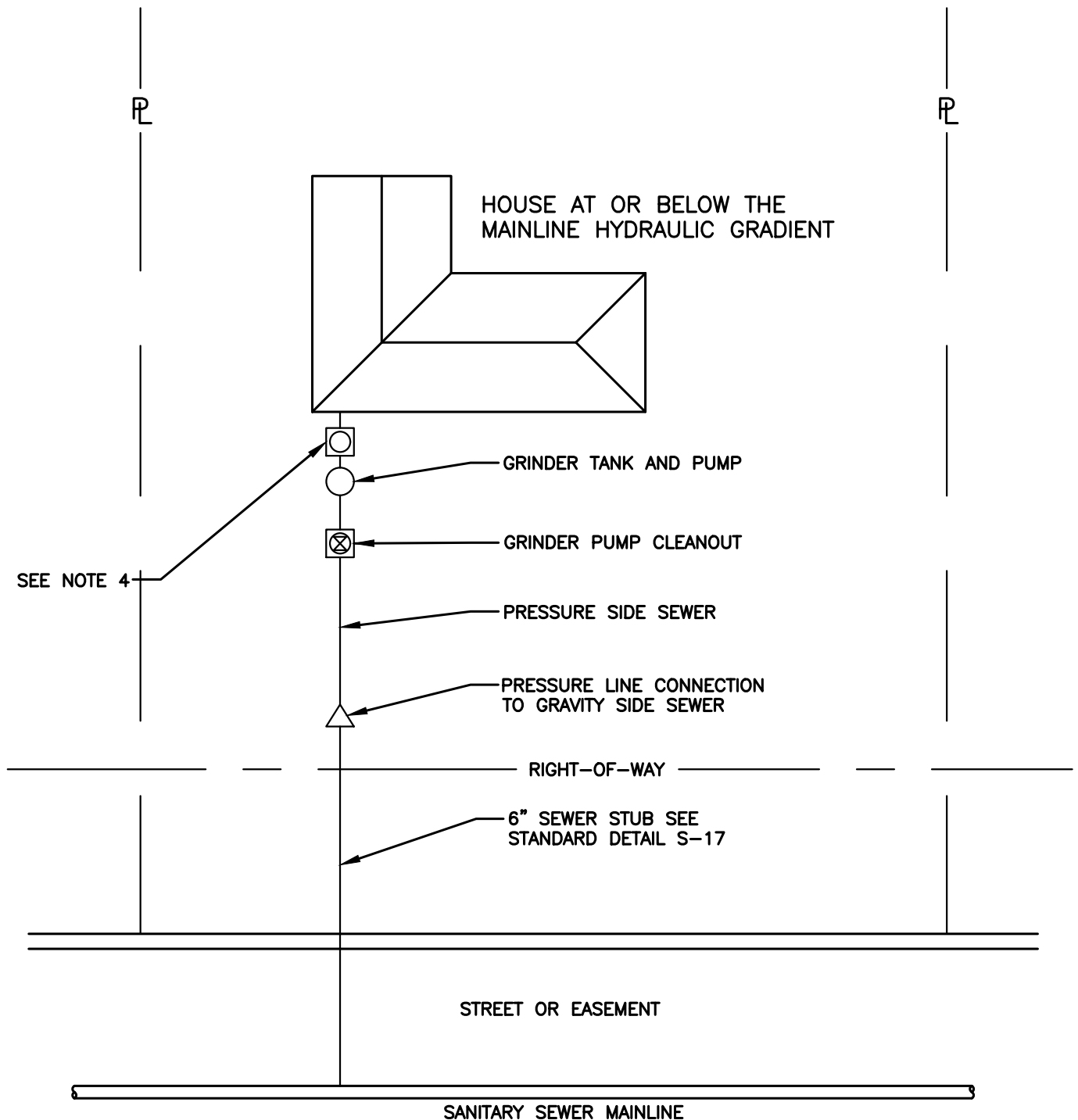
BY CITY

MAY 2018

DATE

DWG. NO.

S-30



NOTES:

1. PUMP SHALL NOT BE CONNECTED TO A SEPTIC TANK OF ANY SIZE.
2. CHECK VALVES AND PUMP ASSEMBLIES ARE PRIVATE AND SHALL BE THE PROPERTY OWNERS RESPONSIBILITY TO MAINTAIN.
3. PUMP BASIN SYSTEM SHALL BE DESIGNED BY THE PUMP MANUFACTURER.
4. ALL CLEANOUTS SHALL BE INSTALLED TO GRADE PER STANDARD DETAIL S-16
5. PRESSURE SIDE SEWER TO 6" GRAVITY STUB CONNECT MUST BE MADE WITH PVC REDUCER, NOT FLEXIBLE COUPLING.
6. PRESSURE SIDE SEWER TESTING SHALL BE IN ACCORDANCE WITH SECTION 7-05N OF THE STANDARDS.

PROVIDED FOR EXAMPLE ONLY, PROJECT SPECIFIC DETAILS WILL BE REQUIRED TO BE SUBMITTED FOR REVIEW AND ARE TO BE INCLUDED IN THE PROJECT PLANS.



CITY OF NORTH BEND

SINGLE HOME SEWER PUMP SYSTEM

APPROVED:

MARK RIGOS, P.E.

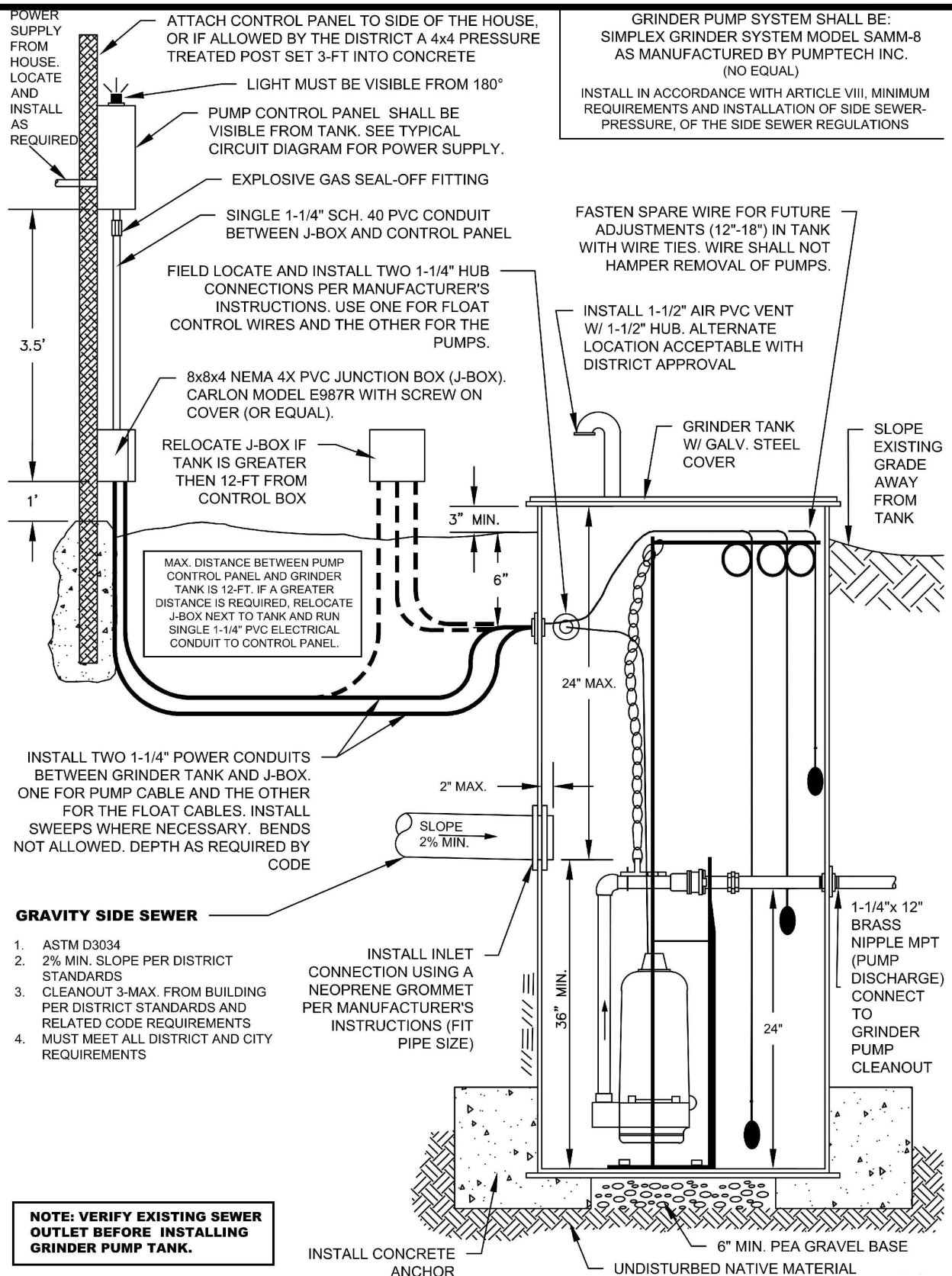
BY CITY

MAY 2018

DATE

DWG. NO.

S-31



GRAVITY SIDE SEWER

1. ASTM D3034
2. 2% MIN. SLOPE PER DISTRICT STANDARDS
3. CLEANOUT 3-MAX. FROM BUILDING PER DISTRICT STANDARDS AND RELATED CODE REQUIREMENTS
4. MUST MEET ALL DISTRICT AND CITY REQUIREMENTS

PROVIDED FOR EXAMPLE ONLY, PROJECT SPECIFIC DETAILS WILL BE REQUIRED TO BE SUBMITTED FOR REVIEW AND ARE TO BE INCLUDED IN THE PROJECT PLANS.

GRINDER PUMP SYSTEM SHALL BE: SIMPLEX GRINDER SYSTEM MODEL SAMM-8 AS MANUFACTURED BY PUMPTech INC. (NO EQUAL)

INSTALL IN ACCORDANCE WITH ARTICLE VIII, MINIMUM REQUIREMENTS AND INSTALLATION OF SIDE SEWER-PRESSURE, OF THE SIDE SEWER REGULATIONS



CITY OF NORTH BEND

GRINDER PUMP INSTALLATION
DETAIL

APPROVED:

MARK RIGOS, P.E.

BY CITY

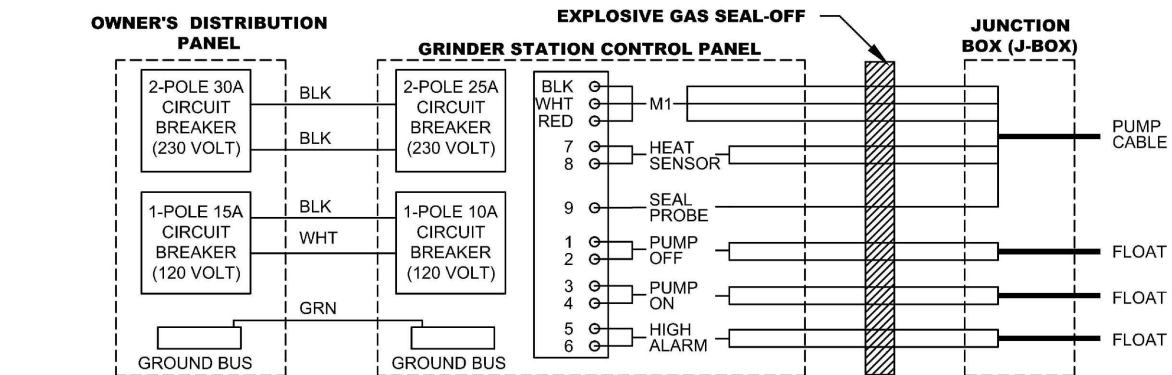
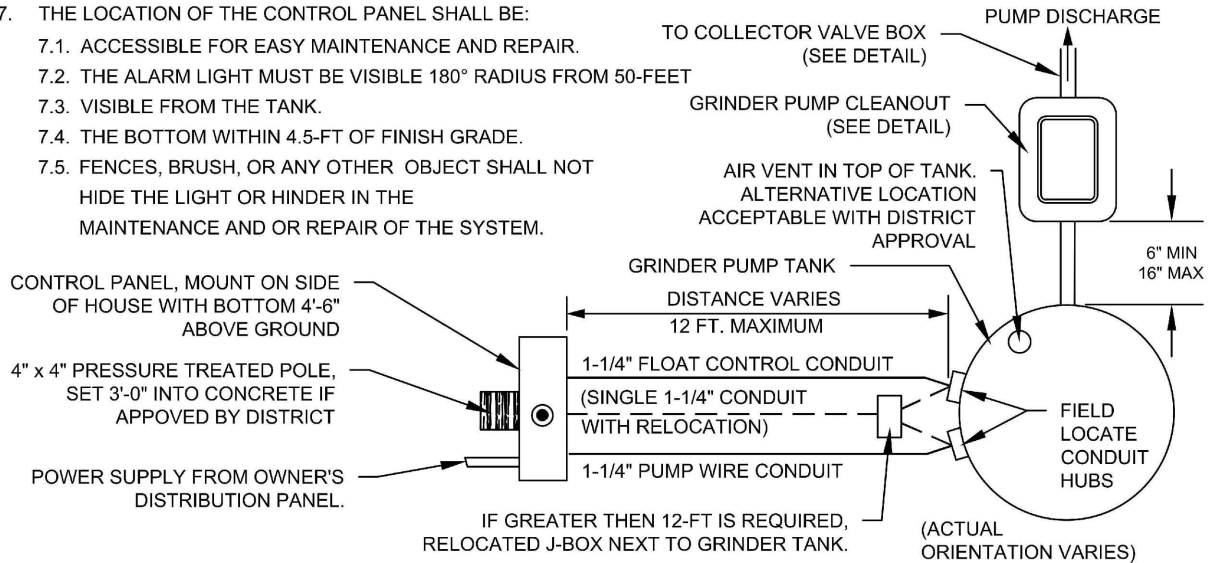
MAY 2018

DATE

DWG. NO.

S-32A

1. THE GRINDER TANK SHALL BE INSTALLED WITHIN 12-FEET OF THE PUMP CONTROL PANEL. WHERE THIS DISTANCE MUST BE EXCEEDED, THE INSTALLER SHALL OBTAIN DISTRICT APPROVAL AND THEN RELOCATE THE ELECTRICAL JUNCTION BOX (J-BOX) WITHIN 1-FT OF THE GRINDER TANK AND 6-INCHES ABOVE FINISH GRADE.
2. THE TANK LOCATION SHALL BE ACCESSIBLE FOR MAINTENANCE AND REPAIR BY DISTRICT PERSONNEL.
3. TANK COVER SHALL BE APPROX. 3" ABOVE FINISHED GRADE. FINISH GRADE SHALL BE FREE DRAINING AROUND AND AWAY FROM THE TANK SO THAT SURFACE WATER CANNOT POND AROUND THE STATION.
4. AIR VENT MAY BE INSTALLED IN ALTERNATIVE LOCATION WITH DISTRICT APPROVAL.
5. POSITION GRINDER PUMP TANK TO MINIMIZE NUMBER OF BENDS IN DISCHARGE PRESSURE PIPING. BENDS SHALL BE INSTALLED IN THE GRAVITY SIDE SEWER IF NEEDED.
6. NO PLANTS ARE TO BE LOCATED WITHIN 5-FT OF THE TANK. THE PROPERTY OWNER SHALL MAINTAIN A 5-FT CLEAR ZONE AROUND THE TANK.
7. THE LOCATION OF THE CONTROL PANEL SHALL BE:
 - 7.1. ACCESSIBLE FOR EASY MAINTENANCE AND REPAIR.
 - 7.2. THE ALARM LIGHT MUST BE VISIBLE 180° RADIUS FROM 50-FEET
 - 7.3. VISIBLE FROM THE TANK.
 - 7.4. THE BOTTOM WITHIN 4.5-FT OF FINISH GRADE.
 - 7.5. FENCES, BRUSH, OR ANY OTHER OBJECT SHALL NOT HIDE THE LIGHT OR HINDER IN THE MAINTENANCE AND OR REPAIR OF THE SYSTEM.



ELECTRICAL NOTES:

1. PUMP AND FLOAT CABLES TO BE EXTENDED INTO AND END AT THE J-BOX USING TWO SEPARATE CONDUITS; ONE FOR THE PUMP AND ONE FOR THE FLOATS. A SINGLE CONDUIT WITH INDIVIDUAL WIRES SHALL THEN EXTENDED FROM THE J-BOX TO PUMP CONTROL PANEL.
2. RUN FROM THE J-BOX TO THE PUMP CONTROL PANEL FOUR #10 AWG THHN WIRE FOR THE PUMP (WHITE, BLACK, RED, GROUND), TWO #14 AWG THHN WIRE WITH INDIVIDUAL COLORS FOR THE PUMP SENSOR AND PROBE, AND THREE SETS OF INDIVIDUAL COLORED #14 WIRE FOR THE FLOATS.
3. AN EXPLOSIVE GAS SEAL-OFF SHALL BE INSTALLED IN THE ELECTRICAL CONDUIT JUST PRIOR TO THE PUMP CONTROL PANEL.
4. INSTALLATION MUST CONFORM TO ALL REQUIREMENTS AND REGULATIONS OF THE NATIONAL ELECTRICAL CODE. AN ELECTRICAL PERMIT AND INSPECTION IS REQUIRED WHETHER THE WORK IS PERFORMED BY THE OWNER OR A CONTRACTOR.
5. THE OWNER'S DISTRIBUTION PANEL SHALL SUPPLY ONE SEPARATE 230-V SINGLE PHASE, 30-AMP CIRCUIT FOR THE PUMP, AND ANOTHER SEPARATE 120-VOLT, 15-AMP CIRCUIT FOR THE ALARM SYSTEM.
6. THE CONTRACTOR SHALL REFER TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR THE GRINDER PUMP CONTROL PANEL. THE TYPICAL CIRCUIT DIAGRAM SHOWN ABOVE IS ONLY AN EXAMPLE.

PROVIDED FOR EXAMPLE ONLY,
PROJECT SPECIFIC DETAILS
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ARE TO BE INCLUDED IN THE
PROJECT PLANS.



CITY OF NORTH BEND

TYPICAL CIRCUIT DIAGRAM

APPROVED:

MARK RIGOS, P.E.

BY CITY

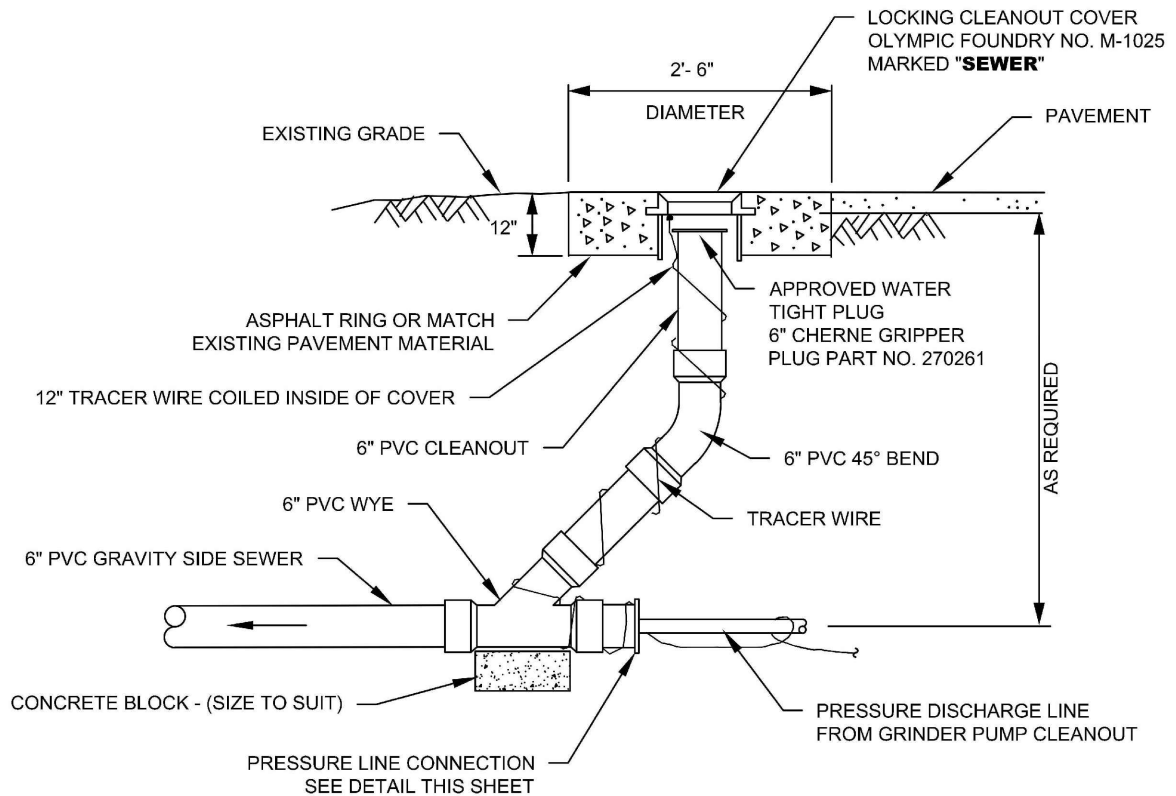
MAY 2018

DATE

DWG. NO.

S-32B

S-32C

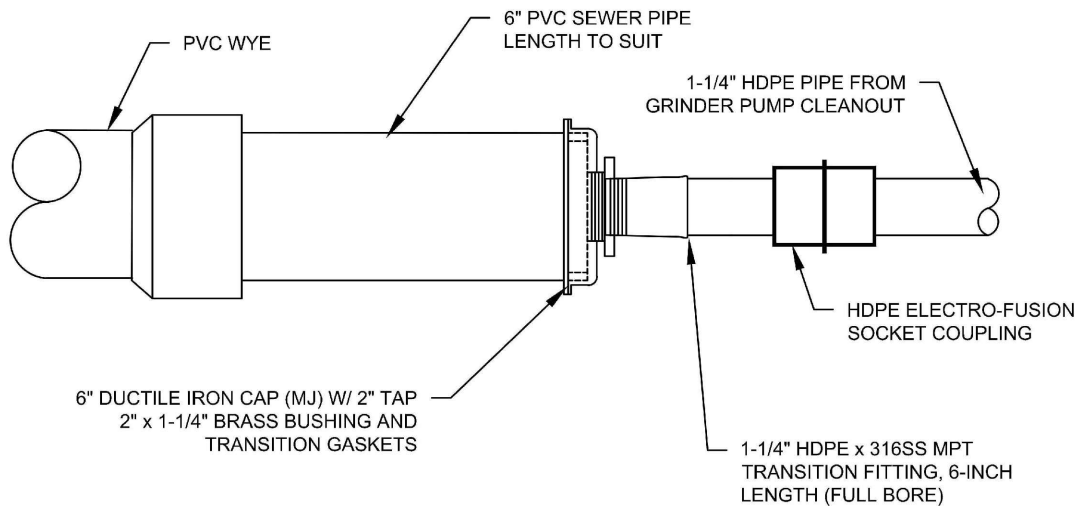


NOTES:

1. ALL PVC FITTINGS SHALL BE GASKETED
2. NO COLLECTION VALVE BOX REQUIRED WHEN CONNECTING TO A GRAVITY SIDE SEWER

REV. 2/20/10

PRESSURE LINE CONNECTION TO GRAVITY SANITARY SEWER DETAIL



REV. 2/20/10

PRESSURE LINE CONNECTION DETAIL

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CITY OF NORTH BEND

GRINDER PUMP INSTALLATION
DETAIL

APPROVED:

MARK RIGOS, P.E.

BY CITY

MAY 2018

DATE

DWG. NO.

S-32D

REFERENCE DOCUMENTS

**PERFORMANCE AND MAINTENANCE
BOND AGREEMENT**



City of North Bend Performance and Maintenance Bond Agreement

RE: North Bend Permit No.: _____

Applicant: _____

Project Address: _____

Estimated Cost of Completed Project: _____

This Performance and Maintenance Security Agreement (the “Agreement”) is made and entered on the last date set forth below, between the City of North Bend (“City”) and the above named Applicant (“Developer”).

RECITALS

A. Project. The undersigned Developer has applied to the City for a Performance and Maintenance Security Agreement for the project known as _____ (the “Project”), which is the subject of the permit identified above (the “Permit”) located at the address identified above and legally described in the attached **Exhibit A** (the “Property”).

B. Performance. Subject to the Permit approval granted by the City for the Project, the provisions of the North Bend Municipal Code (“NBMC”) and state law, the Developer will construct or install certain improvements and mitigation in connection with the Project, in accord with the improvements and mitigation identified on the Permit and as shown on the following approved plans: _____ approved on _____, 20__ (the “Improvements”).

C. Maintenance. Subject to the approval granted by the City for the Project, the provisions of the NBMC and state law, the Developer will maintain the Improvements in accord with the obligation identified in the Permit and as shown on the following approved plans: _____ approved on _____, 20__ (the “Maintenance”).

D. Code Provisions for Security. Performance and Maintenance of the Improvements are subject to the security requirements in the NBMC identified below:

Performance

- ☐ NBMC 12.24.15 Right of Way
- ☐ NBMC 14.05.045 Critical Areas
- ☐ NBMC 14.20.510 Shoreline Permit
- ☐ NBMC 17.08.130 Land Segregation
- ☐ NBMC 18.18.160 Landscaping
- ☐ NBMC 19.10.140 Drainage, Grading and Clearing

Maintenance

- ☐ NBMC 14.05.045 Critical Areas
- ☐ NBMC 18.18.150 Landscaping
- ☐ NBMC 19.10.110 Drainage, Grading and Clearing

E. Type of Security. Developer has elected, consistent with NBMC, to provide the City with the following type of security for this Agreement:

- ☐ Performance Bond
- ☐ Maintenance Bond

Developer hereby agrees and binds itself and its legal representatives, successors, and assigns as follows:

TERMS OF AGREEMENT

1. The Recitals set forth above are incorporated into the Agreement between the City, Developer and any third party who also signs this Agreement.
2. Developer and any third party shall signify their agreement to specific terms by signing under the terms section below that corresponds to the security chosen in recital E. above.

3. Terms - Performance Bond.

- a. Developer, as Principal, and _____ as Surety, hereinafter called Surety, are held and firmly bound unto the City, as Obligee, in the penal sum of XXXX (\$XX.XX) for payment where of Principal and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally as described in 3. b. – f. below.
- b. In accord with Recital D. above, Developer is required to provide the City with performance security for the Improvements to assure that all work or action identified in Recital B. are satisfactorily completed.

- c. After written notice from the City that Developer has failed to (a) complete all work or action on the Improvements satisfactorily, (b) pay all sums owing to contractors, subcontractors, materialmen, suppliers or others as a result of such work for which a lien against any City property, or property where the improvements are located, has arisen or may arise; or (c) obtain acceptance by the City for the Project; all on or before the time frame as set forth in the Permit, or any extension of time granted by the City in writing, Principal shall complete to the City's reasonable satisfaction (a) through (c) identified in the written notice by the deadline specified in the written notice, and repair any damage to other work resulting from the Principal's identified failure.
- d. If Principal does not complete the Improvements to the City's reasonable satisfaction as described in c. above, then within five (5) days after the City's written demand to Surety, Surety shall pay to the City all amounts necessary to complete the Improvements up to and including the full penal sum of this bond.
- e. This Agreement for bond shall remain in effect until the City determines in writing at its sole discretion that the Improvements have been completed, or _____ years from full execution of this Agreement, whichever occurs first.
- f. The City, Developer and Surety also agree to be bound by the General Terms in section 5. below.

IN WITNESS THEREOF, the parties hereto have executed this Agreement.

Principal: _____
 By: _____
 Title: _____
 Date: _____

Surety: _____
 By: _____
 Title: _____
 Date: _____

4. Terms - Maintenance Bond.

- a. Developer, as Principal, and _____ as Surety, hereinafter called Surety, are held and firmly bound unto the City, as Obligee, in the penal sum of XXXX (\$XX.XX) for payment where of Principal and Surety bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally as described in 4. b. – 4.f. below.
- b. Principal has constructed the Improvements for the Project under the Permit in accord with the requirements in Recital B.
- c. After written notice from the City of defects due to faulty materials or workmanship related to the constructed Improvements, Principal shall remedy such defects by the deadline specified in the City's written notice and to the City's reasonable satisfaction, and pay for any damage to other work resulting therefrom.

- d. If Principal does not so remedy such defects to the City's reasonable satisfaction, then within five (5) business days after the City's written demand to Surety, Surety shall pay to the City all amounts necessary to remedy such defects up to and including the full penal sum of this bond.
- e. This Agreement for bond shall remain in effect for _____ years from full execution of this Agreement.
- f. The City, Developer and Surety also agree to be bound by the General Terms in section 5. below.

IN WITNESS THEREOF, the parties hereto have executed this Agreement.

Principal: _____
By: _____
Title: _____
Date: _____

Surety: _____
By: _____
Title: _____
Date: _____

5. General Terms.

a. The Developer shall indemnify and hold the City and its agents, employees, and/or officers harmless from, or shall process and defend at its own expense, all claims, damages, suits at law or equity, actions, penalties, losses, or costs of whatsoever kind or nature, brought against the City arising out of, in connection with, or incident to the execution of this Agreement and/or the Developer's performance or failure to perform any aspect of the Agreement. With respect to any such claim or suit brought against the City, Developer also waives its immunity under Title 51 RCW, the Industrial Insurance Act. This waiver is specifically negotiated between the parties.

b. This Agreement shall be governed by and construed in accordance with the laws of the State of Washington. In the event any suit, arbitration, or other proceeding is instituted to enforce any term of this Agreement, the parties specifically understand and agree that venue shall be exclusively in King County, Washington. The prevailing party in any such action shall be entitled to its attorneys' fees, expert witness fees, and costs of suit. This Agreement contains the entire agreement between the parties hereto, and no other agreements, oral or otherwise, regarding the subject matter of this Agreement shall be deemed to exist or bind any of the parties hereto. The provisions of this Agreement shall not be construed against either party. If any of the provisions of this Agreement are held to be invalid or unenforceable, the remaining provisions will nevertheless continue to be valid and enforceable.

c. Any failure by the Developer to comply with the terms of this Agreement in a timely manner shall constitute default. Any action or inaction by the City following any default in any term or condition of this Agreement shall not be deemed to waive any rights of the City pursuant to this Agreement.

d. The Developer shall pay all additional costs of the City incurred in the administration of the Agreement, including monitoring by the City as required. Said costs will be paid from the Project permitting deposit. Should there not be sufficient funds in the Project permitting deposit to cover such additional costs, then said costs shall be paid by Developer after receipt of invoice from the City. The Director of Planning and/or the Director of Public Works and/or their designees shall periodically inspect the work required hereunder and inspect completed improvements. Notwithstanding the foregoing, if Developer fails to pay for said inspections, the City may use funds from section 3.d. or 4.d. as applicable to cover said costs. This provision shall not be construed as creating any obligation on the City, its employees, agents and representatives to perform such work.

e. In the event the Developer fails to satisfactorily complete the obligations as described in the City's written notice, the City's employees and agents are hereby authorized to enter onto the Property and perform such work. This provision shall not be construed as creating any obligation on the City, its employees, agents and representatives to perform such work.

f. Funds obtained by the City pursuant to 3.d. and 4.d. above may be used by the City to remedy said defects and pay any and all sums owing to contractors, suppliers, laborers, materialmen, subcontractors or others as a result of such work for which a lien against any City property or property where the Improvements are located, has arisen or may arise. Further, said funds may be used to cover the cost of correcting any damage which may occur off-site due to defects, including damage, if any, to public property. This provision shall not be construed as creating any obligation on the City, its employees, agents and representatives to perform such work.

g. Written notice to all parties shall be by prepaid first class mail to the address specified below or as subsequently amended in writing. Notice shall be considered delivered three (3) days after having been deposited in the mail:

City

Developer

Surety

IN WITNESS THEREOF, the parties hereto have executed this Agreement.

CITY OF NORTH BEND

By: _____

Its _____

Institution Notary

STATE OF WASHINGTON

County of _____

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that (he/she) is authorized to act on behalf of _____, the Financial Institution which signed this instrument and acknowledged it to be the Institution's free and voluntary act for uses and purposes mentioned in the instrument.

Dated: _____, 20____

Signature: _____

Name Printed: _____

Title: _____

My appointment expires: _____

Developer Notary

STATE OF WASHINGTON)

) ss.

COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that he/she signed this instrument, on oath stated that he/she was authorized to execute the instrument on behalf of _____ for the uses and purposes mentioned in this instrument.

DATED: _____.

(Signature of Notary Public)

(Printed Name of Notary Public)

Commission Expires: _____

City Notary

STATE OF WASHINGTON)

) ss.

COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that he/she signed this instrument, on oath stated that he/she was authorized to execute the instrument on behalf of _____ for the uses and purposes mentioned in this instrument.

DATED: _____.

(Signature of Notary Public)

(Printed Name of Notary Public)

Commission Expires: _____

**PERFORMANCE AND MAINTENANCE
ASSIGNMENT OF FUNDS AGREEMENT**



City of North Bend Performance and Maintenance Assignment of Funds Agreement

RE: North Bend Permit No.: _____
Applicant: _____
Project Address: _____
Estimated Cost of Completed Project: _____

This Performance and Maintenance Assignment of Funds Agreement (the “Agreement”) is made and entered on the last date set forth below, between the City of North Bend (“City”) and the above named Applicant (“Developer”).

RECITALS

A. Project. The undersigned Developer has applied to the City for an Assignment of Funds Agreement for the project known as _____ (the “Project”), which is the subject of the permit identified above (the “Permit”) located at the address identified above and legally described in the attached **Exhibit A** (the “Property”).

B. Performance. Subject to the Permit approval granted by the City for the Project, the provisions of the North Bend Municipal Code (“NBMC”) and state law, the Developer will construct or install certain improvements and mitigation in connection with the Project, in accord with the improvements and mitigation identified on the Permit and as shown on the following approved plans: _____ approved on _____, 20__ (the “Improvements”).

C. Maintenance. Subject to the approval granted by the City for the Project, the provisions of the NBMC and state law, the Developer will maintain the Improvements in accord with the obligation identified in the Permit and as shown on the following approved plans: _____ approved on _____, 20__ (the “Maintenance”).

D. Code Provisions for Security. Performance and Maintenance of the Improvements are subject to the security requirements in the NBMC identified below:

Performance

- ☐ NBMC 12.24.15 Right of Way
- ☐ NBMC 14.05.045 Critical Areas
- ☐ NBMC 14.20.510 Shoreline Permit
- ☐ NBMC 17.08.130 Land Segregation
- ☐ NBMC 18.18.160 Landscaping
- ☐ NBMC 19.10.140 Drainage, Grading and Clearing

Maintenance

- ☐ NBMC 14.05.045 Critical Areas
- ☐ NBMC 18.18.150 Landscaping
- ☐ NBMC 19.10.110 Drainage, Grading and Clearing

E. Type of Security. Developer has elected, consistent with NBMC, to provide the City with the following type of security for this Agreement:

- ☐ Assignment of Funds to Secure Performance
- ☐ Assignment of Funds to Secure Maintenance

Developer hereby agrees and binds itself and its legal representatives, successors, and assigns as follows:

TERMS OF AGREEMENT

1. The Recitals set forth above are incorporated into the Agreement between the City, Developer and any third party who also signs this Agreement.

2. Developer and any third party shall signify their agreement to specific terms by signing under the terms section below that corresponds to the security chosen in Recital E, above.

3. Terms - Assignment of Funds/Letter of Credit in Lieu of Bond Securing Performance.

a. _____ (“Financial Institution”) is a financial institution qualified to hold escrow accounts and to do business in the State of Washington.

b. Developer has establish an escrow account in the form of an assignment of savings account or irrevocable letter of credit with the Financial Institution in the amount of \$ _____, in Account No. _____ (the “Account”). The escrow account agreement is attached as **Exhibit B** to this Agreement. Developer and Financial Institution bind themselves, their heirs, executors,

administrators, successors, and assigns, jointly and severally as described in Subsections 3(c) – (g) below.

c. At no time shall any portion of the sums in the Account be released without written authorization from the City. The Account shall represent the costs of the Improvements as identified in Recital B of this Agreement. If, after final review of Developer's cost estimate by the City Engineer, the cost estimates are deemed low, then the Developer shall add funds to the Account to make up the deficiency in an amount as determined by the City Engineer. Said final review by the City Engineer shall take place within thirty (30) days from the date of execution of this Agreement. In addition, in the event bids received for Improvements and accepted by the Developer are in excess of previous estimates, the amount in escrow shall be increased by the excess amount.

d. After written notice from the City that Developer has failed to (a) complete all work or action on the Improvements satisfactorily; (b) pay all sums owing to contractors, subcontractors, materialmen, suppliers or others as a result of such work for which a lien against any City property, or property where the improvements are located, has arisen or may arise; or (c) obtain acceptance by the City for the Project; all on or before the time frame as set forth in the Permit, or any extension of time granted by the City in writing, Developer shall complete to the City's reasonable satisfaction all items identified in the written notice by the deadline specified in the written notice, and repair any damage to other work resulting from the Developer's failures identified in the written notice.

e. In the event the Developer has not completed all items identified in the written notice pursuant to Subsection 3(d) of this Agreement, the Financial Institution shall remit to the City within five (5) working days of the City's written demand, the amount of funds in the Account, or such lesser amount as may be specified in the demand. The Financial Institution agrees that it shall have no duty or right to evaluate the correctness or appropriateness of any such notice or determination by the City, and shall not interplead, or in any manner, delay payment of said funds to the City.

f. The Account and this Agreement shall remain in effect until the City determines in writing at in its sole discretion that the Improvements have been completed, or _____ years from full execution of this Agreement, whichever occurs first.

g. The City, Developer and Financial Institution agreed to also be bound by the General Terms in Section 5 of this Agreement.

4. Terms - Assignment of Funds/Letter of Credit in Lieu of Bond Securing Maintenance.

a. _____ ("Financial Institution") is a financial institution qualified to hold escrow accounts and to do business in the State of Washington.

b. Developer has establish an escrow account in the form of an assignment of savings account or irrevocable letter of credit with the Financial Institution in the amount of \$ _____, in Account No. _____ (the "Account"). The escrow account agreement is attached as Exhibit B to this Agreement. Developer and Financial Institution bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally as described in Subsections 4(c) - (g) of this Agreement.

c. At no time shall any portion of the sums in the Account be released without written authorization from the City. Such Account shall represent the costs of the Maintenance as identified in Recital C of this Agreement.

d. After written notice from the City of defects due to faulty materials or workmanship related to the constructed Improvements, Developer shall, by the deadline identified in the written notice, remedy such defects to the City's reasonable satisfaction and pay for any damage to other work resulting therefrom.

e. If Developer does not so remedy such defects to the City's reasonable satisfaction, then within five (5) business days after City's written demand to Financial Institution, Financial Institution shall pay to the City from the Account all amounts necessary to remedy such defects up to and including the full penal sum in the Account. The Financial Institution agrees that it shall have no duty or right to evaluate the correctness or appropriateness of any such notice or determination by the City, and shall not interplead, or in any manner, delay payment of said funds to the City.

f. The Account and this Agreement shall remain in effect for a period of ____ (__) years from the written acceptance of the Improvements by the City.

g. The City, Developer and Financial Institution agree to also be bound by the General Terms in Section 5 of this Agreement.

5. General Terms.

a. The Developer shall indemnify and hold the City and its agents, employees, and/or officers harmless from, or shall process and defend at its own expense, all claims, damages, suits at law or equity, actions, penalties, losses, or costs of whatsoever kind or nature, brought against the City arising out of, in connection with, or incident to the execution of this Agreement and/or the Developer's performance or failure to perform any aspect of the Agreement. With respect to any such claim or suit brought against the City, Developer also waives its immunity under Title 51 RCW, the Industrial Insurance Act. This waiver is specifically negotiated between the parties.

b. This Agreement shall be governed by and construed in accordance with the laws of the State of Washington. In the event any suit, arbitration, or other proceeding is instituted to enforce any term of this Agreement, the parties specifically understand and agree that venue shall be exclusively in King County, Washington. The prevailing party

in any such action shall be entitled to its attorneys' fees, expert witness fees, and costs of suit. This Agreement contains the entire agreement between the parties hereto, and no other agreements, oral or otherwise, regarding the subject matter of this Agreement shall be deemed to exist or bind any of the parties hereto. The provisions of this Agreement shall not be construed against either party. If any of the provisions of this Agreement are held to be invalid or unenforceable, the remaining provisions will nevertheless continue to be valid and enforceable.

c. Any failure by the Developer to comply with the terms of this Agreement in a timely manner shall constitute default. Any action or inaction by the City following any default in any term or condition of this Agreement shall not be deemed to waive any rights of the City pursuant to this Agreement.

d. The Developer shall pay all additional costs of the City incurred in the administration of the Agreement, including monitoring by the City as required. Said costs will be paid from the Project permitting deposit. Should there not be sufficient funds in the Project permitting deposit to cover such additional costs, then said costs shall be paid by Developer after receipt of invoice from the City. The Director of Planning and/or the Director of Public Works and/or their designees shall periodically inspect the work required hereunder and inspect completed improvements. Notwithstanding the foregoing, if Developer fails to pay for said inspections, the City may use funds from those deposited pursuant to Sections 3(b) or 4(b) of this Agreement, as applicable, to cover said costs. This provision shall not be construed as creating any obligation on the City, its employees, agents and representatives to perform such work.

e. In the event the Developer fails to satisfactorily complete the obligations as described in the City's written notice, the City's employees and agents are hereby authorized to enter onto the Property and perform such work. This provision shall not be construed as creating any obligation on the City, its employees, agents and representatives to perform such work.

f. Funds obtained by the City pursuant to Sections 3(b) or 4(b) of this Agreement may be used by the City to remedy said defects and pay any and all sums owing to contractors, suppliers, laborers, materialmen, subcontractors or others as a result of such work for which a lien against any City property or property where the Improvements are located, has arisen or may arise. Further, said funds may be used to cover the cost of correcting any damage which may occur off-site due to defects, including damage, if any, to public property. This provision shall not be construed as creating any obligation on the City, its employees, agents and representatives to perform such work.

g. Written notice to all parties shall be by prepaid first class mail to the address specified below or as subsequently amended in writing. Notice shall be considered delivered three (3) days after having been deposited in the mail:

City of North Bend:

Developer:

Financial Institution:

IN WITNESS THEREOF, the parties hereto have executed this Agreement.

CITY OF NORTH BEND

By: _____

Its: _____

STATE OF WASHINGTON)

) ss.

COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that (he/she) signed this instrument, on oath stated that (he/she) was authorized to execute the instrument and acknowledged it as the _____ of _____ to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: _____

Print Name: _____

NOTARY PUBLIC in and for the State of
Washington, residing at _____

My commission expires: _____

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DEVELOPER

By: _____
Its: _____

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that (he/she) signed this instrument, on oath stated that (he/she) was authorized to execute the instrument and acknowledged it as the _____ of _____ to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: _____

Print Name: _____
 NOTARY PUBLIC in and for the State of
 Washington, residing at _____
 My commission expires: _____

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FINANCIAL INSTITUTION

By: _____
Its: _____

STATE OF WASHINGTON)
) ss.
COUNTY OF KING)

I certify that I know or have satisfactory evidence that _____ is the person who appeared before me, and said person acknowledged that (he/she) signed this instrument, on oath stated that (he/she) was authorized to execute the instrument and acknowledged it as the _____ of _____ to be the free and voluntary act of such party for the uses and purposes mentioned in the instrument.

DATED: _____

Print Name: _____
 NOTARY PUBLIC in and for the State of
 Washington, residing at _____
 My commission expires: _____

UTILITY EASEMENT

EASEMENT TRANSMITTAL

Easement No.: _____

Date: _____

City: NORTH BEND

Title Policy No.: _____

Project: _____

Drawing No.: _____

Base Map: _____

Names and Addresses of Parties Involved:

Permanent Easement: _____ Square Feet _____

Temporary Permit: _____ Square Feet _____

Access Easement: _____ Square Feet _____

Comments:

Three copies of the aforementioned easement are attached for signatures and recording.

Recorded on Design Drawing By: _____

Date: _____

Recorded in Easement Book By: _____

Date: _____

Transmittal: NORTH BEND PUBLIC WORKS

By: _____

Filed for Record at
the request of:
CITY OF NORTH BEND
PUBLIC WORKS
P.O. Box 896
1155 E. North Bend Way
North Bend, WA 98045

Easement No.:

Project:

Tax Parcel ID#:

Abbrev. Legal:

Grantor(s): [name]
 [address]

Grantee: CITY OF NORTH BEND

AGREEMENT FOR EASEMENT

THIS AGREEMENT, made this _____ day of _____,
20____, by and between CITY OF NORTH BEND, a municipal corporation of King
County, Washington, hereinafter termed the "City", and [property owner names],
hereinafter termed "Grantor",

WHEREAS, Grantor(s) is/are the owner(s) of land at approximately [street
address or location general description], legally described as follows:

[property legal description]

Easement No. _____

WHEREAS, the City requires an easement for (check those that apply)

- ☐ Sanitary sewer line and appurtenances
- ☐ Water main and appurtenances
- ☐ Storm drainage main and appurtenances

across Grantor's property at a location more specifically described herein below; and

WHEREAS, Grantor has title to said real property and is authorized to grant and convey this easement to the City.

NOW, THEREFORE, in consideration of the sum of One Dollar (\$1.00), and other good and valuable consideration in hand paid, receipt of which is hereby acknowledged, and in consideration of the performance by the City of the covenants, terms and conditions hereinafter set forth, Grantor hereby grants, conveys and quitclaims to the City the following easement:

That portion of the above-described real property further described as follows:

[easement legal description]

1. CITY'S USE OF PROPERTY. Said easement is for the purpose of installing, constructing, operating, inspecting, maintaining, removing, repairing, replacing and using gravity and pressure sanitary sewer mains, manholes, water lines, storm drainage pipes, catch basins, swales, ponds, vaults and appurtenances thereto including all valves and fire hydrants (the "facilities"), together with the nonexclusive right of ingress to and egress from said portion of Grantor's property for the foregoing purposes.

2. USE OF PROPERTY BY GRANTOR. Grantor shall retain the right to use the surface of the easement if such use does not interfere with installation or maintenance of the facilities. Grantor shall not erect buildings or structures of a permanent nature; shall not install any other improvements including trees, large shrubbery, or fences; and shall not change surface grades, except as approved in advance by the City, in any manner which would unreasonably interfere with ingress, egress and access by the City for installation and/or normal maintenance of the facilities. Such buildings, structures or improvements will be deemed an encroachment upon the City's rights, and Grantor shall be obligated to remove such encroachments at Grantor's expense. Further, the provisions of Paragraph 4 hereof as to restoration shall not apply to any such encroachments in the easement area.

Provided, however, that fences may be constructed which provide gate or other access approved in advance by the City.

3. RESTORATION AFTER ORIGINAL CONSTRUCTION. For original construction, Grantor's property will be restored to a condition as good as or better than it was prior to the entry by the City. Where possible, photographs will be taken prior to construction to assure the completeness of restoration. Final restoration shall include, as appropriate, sod replacement in existing lawns, hydro-seeding in unimproved areas, and replanting or replacement of existing shrubs and bushes, where such will not unreasonably interfere with the City's use of the easement. Fences, rockeries, and concrete, asphalt and/or gravel driveways which do not unreasonably interfere with the City's use of the easement will be repaired or replaced. Large trees that exist within the easement area may be permanently removed during original construction unless otherwise noted in this easement document.

4. RESTORATION AFTER MAINTENANCE. If Grantor's property is disturbed by the maintenance, removal, repair, or replacement of the facilities, the City shall restore the easement area to a condition as good as or better than it was prior to entry for such purpose by the City.

5. ATTORNEY'S FEES. In case suit or action is commenced by either party, or their successors and/or assigns, to enforce any rights under this easement, or regarding an encroachment on the easement, in addition to costs provided by statute, the substantially prevailing party shall be entitled to an award of attorney's fees in such sum as the Court may adjudge just and reasonable.

6. EASEMENT TO BIND SUCCESSORS. This easement is permanent and shall terminate only upon agreement of the parties hereto, their successors and/or assigns. This easement, during its existence, shall be a covenant running with the land and shall be binding on the successors, heirs and assigns of the parties hereto.

7. EXEMPTION FROM EXCISE TAX. The City is a municipal corporation with powers of eminent domain. This easement is granted for a public purpose. The City shall hold Grantor harmless from the imposition or payment of any excise tax based upon the conveyance of this easement.

Easement No. _____

IN WITNESS WHEREOF, I/we have set my/our hand(s) and seal(s) this _____ day of _____, 20____.

Grantor

Grantor

STATE OF WASHINGTON)

COUNTY OF KING) ss.

On this _____ day of _____, 20____, before me personally appeared _____ (and) _____, to me known to be the individual(s) described in and who executed the within and foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said Grantors, for the uses and purposes therein mentioned.

WITNESS my hand and official seal hereto affixed the day and year above written.

NOTARY PUBLIC in and for the State of Washington

Residing at: _____

My commission expires: _____

Easement No. _____

IN WITNESS WHEREOF, I/we have set my/our hand(s) and seal(s) this _____ day of _____, 20____.

(Corporation Name) _____

President

Secretary

STATE OF WASHINGTON)

COUNTY OF KING) ss.

On this _____ day of _____, 20____, before me personally appeared _____ (and) _____, to me known to be the President and Secretary, respectively, of _____ the corporation that executed the foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said corporation, for the uses and purposes therein mentioned.

WITNESS my hand and official seal hereto affixed the day and year above written.

NOTARY PUBLIC in and for the State of Washington

Residing at: _____

My commission expires: _____

Easement No. _____

IN WITNESS WHEREOF, I/we have set my/our hand(s) and seal(s) this _____ day of _____, 20____.

Corporation Name (LLC)

Member

Member

STATE OF WASHINGTON)

COUNTY OF KING) ss.

On this ____ day of _____, 20____, before me personally appeared (and) _____, to me known to be the Manager and/or Member(s), respectively, of _____, LLC, A Washington Limited Liability Company, the Company that executed the foregoing instrument, and acknowledged said instrument to be the free and voluntary act and deed of said Company, for the uses and purposes therein mentioned, and on oath stated that they were authorized to execute said instrument.

WITNESS my hand and official seal hereto affixed the day and year above written.

NOTARY PUBLIC in and for the State of Washington

Residing at: _____

My commission expires: _____

PRE-APPLICATION CHECKLIST

PLAN REVIEW CHECKLIST

FINAL INSPECTION CHECKLIST

SUBMITTAL STANDARDS

SMALL SITE TESC PLAN

SMALL SITE STORM DRAINAGE HANDOUT

SITE DEVELOPMENT CHECKLIST

