



City of Pateros, Washington
TECHNICAL SPECIFICATIONS GUIDEBOOK

JANUARY 2023 - FINAL



City of Pateros, Washington
TECHNICAL SPECIFICATIONS GUIDEBOOK

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1.0 General Requirements

1.1 City Information

Address: City of Pateros
113 Lakeshore Dr.
P.O. Box 8
Pateros, WA 98846
509-923-2571

Business Hours: Monday – Friday - 8:00 AM – 4:30 PM

1.2 Purpose

This document is to guide the developer, utility company, city contractors, residents, and Public Works crews when performing underground work that involves public rights-of-way.

These standards shall apply to all work within existing or proposed public rights-of-way and/or public easements. 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/proponent is however cautioned that higher standards and/or 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 designated critical areas, shorelines, or floodplains.

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

- Washington State Department of Transportation Standard Specifications for Road, Bridge & Municipal Construction, latest edition.
- Washington State Department of Ecology Criteria for Sewage Works Design, latest edition.
- Washington State Department of Health Water System Design Manual, latest edition.
- Manual on Uniform Traffic Control Devices, latest edition.
- Eastern Washington Storm Water Manual, latest edition.

Where improvements are not covered by these details or referenced standards, the City will be the sole judge in establishing appropriate standards.

Plans for improvements within the public right-of-way or public easements shall bear an approval signature from the City.

When required, the designer shall submit calculations or other appropriate materials supporting the design of utilities, pavements, concrete, structures and storm drainage facilities.

Where these “Standards” conflict with any existing City ordinances or discrepancies exist within the body of this text the higher “Standards” shall be utilized as determined by the Public Works Director.

1.3 Definitions

Definitions as used herein are as follows:

1. City: City of Pateros, a legally incorporated municipality represented by the elected city council and/or designated office, official, or representative
2. City’s Engineer: City’s Engineer, whether a staff engineer or consultant. Also referred to as the Engineer.
3. Technical Specifications Guidebook: the component of the City of Pateros Development Standards that describe technical requirements for public and certain private water, sanitary sewage, drainage, and transportation related infrastructure facilities.
4. Contractor: person and/or organization contracted by the Proponent/Developer for the construction of facilities that are subject to City requirements
5. Developer: means an individual, firm, corporation, limited liability company or partnership who proposes to improve real property, commercial and/or multifamily, within the city or its urban growth area (“UGA”). Also, Project Proponent.
6. Developer’s Engineer: person and/or organization responsible for design, preparation of construction plans and specifications, and finished facilities construction certification. Developer’s Engineer shall be licensed to practice engineering in the State of Washington. Also referred to as the Design Engineer.
7. Administrator: the person designated by the Mayor that determines the proper review procedure for all permit applications.
8. Performance Bond: bond furnished by the Proponent/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 approved by the City.
9. Plans: construction drawings, including reproductions thereof, of the work to be done, prepared, and stamped by an Engineer licensed in the State of Washington.
10. PM & CCM: Project Mitigation and Code Compliance Manual.
11. Specifications: directions, provisions, and requirements prepared by an Engineer licensed in the State of Washington for the performance of the work and for the quantity and quality of materials.
12. Standard Details: the component of the Construction Standards that graphically illustrate various common infrastructure facilities. Also Details or Detail Drawings.
13. Maintenance Bond: bond furnished by the Developer, written by a corporate body qualified to write surety in the State of Washington and complying with the requirements herein.
14. City Superintendent: employee, manager, or administrator responsible for public works or person designated by Mayor.
15. Single-family project: means construction of or improvements to one single-family residence as defined by the PMC. Multi-single-family, duplexes, etc are not a Single-family project.

Developer/Utility to be Informed: It is the Developer's responsibility to be fully informed regarding the nature, quality, and the extent of the developer's obligation and work to be done, and, if in doubt, to secure specific written clarification from the City.

Payment for City Services: The Developer/Utility 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 consultants as may be necessitated to adequately review and inspect construction of the project(s). 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 developers appeal to payment demands is to the hearing examiner.

As a condition precedent to the City accepting the completed improvements, the Developer shall construct the proposed water/sanitary/storm and roadway system, or additions thereto, in conformance with this document and its reference documents. An appeal to a rejection of work shall be to the hearing examiner.

1.4 Permits

The construction of any infrastructure items or additions thereto, shall not commence until the following conditions have been fulfilled:

- a. The Developer shall have the preliminary plat approved in accordance with Chapter 16 of the Pateros Municipal Code (PMC).
- b. The Developer shall submit detailed construction plans per Sections 13.04.540 and 13.04.580 of the PMC and these standards of the proposed improvements/utility.
- c. The Developer shall submit the plat drawings conforming to the conditions of preliminary plat approval showing all rights-of-way and easements to be dedicated to the City.
- d. Written approval from all regulatory agencies including SEPA mitigation approval shall be submitted.
- e. All contractors and subcontractors shall have a current Washington State Contractors License and a City Business License on file with the City.
- f. All Insurance and Bonding is in place as required by the City.
- g. Any financial involvement from the City shall be determined and agreed upon.
- h. Critical areas, shorelines, floodplain, or other land use permits have been issued.
- i. The above documents shall require the review and approval by the City and/or its Engineer, and the cost of such review shall be at the Developer's own expense. Should a Developer split any proposed development into more than one phase, the Developer shall submit street and infrastructure plans for all phases of the proposed development to the City in order to receive approval from the City to begin work on the first phase of the development.

The Developer's proposed improvements, or additions thereto, shall not be connected to the City system until authorized by the City, and such connection shall be performed only under the supervision and approval of the City.

For the purpose of applying RCW 4.24.115 to this Contract, the Developer and the City agree that the term "damages" applies only to the finding in a judicial proceeding and is exclusive of third-party claims for damages preliminary thereto.

In requesting a permit to work in public right-of-way, the Developer/utility agrees to indemnify and hold harmless the City from all claims for damages by third parties, including costs and reasonable attorney's fees in the defense of claims for damages, arising from performance of the Developer's express or implied obligations under this Agreement. The Developer waives any right of contribution against the City.

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 or a public easement without the necessary permit(s) first having been obtained from the City. Refer to <http://www.pateros.com/index.php/services/forms/>

Any party requesting such permit shall file written application with the City at least 20 working days before construction is proposed to start. Such application shall include:

- (1) The name and address and phone number of the applicant (name and address of property owner if different than applicant); and applicants' contractor.
- (2) The name and address of the owner of the property abutting the street where the work is proposed.
- (3) The street location of the proposed work, giving the street address or legal description of the property involved.
- (4) 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 to understand the proposed work.
- (5) The plan shall also show the location of buildings, loading platforms, roof overhangs (if significant) or off-street parking facilities in the vicinity of the new construction.
- (6) Any other information requested by the City which is necessary to properly enforce the provisions of this ordinance.
- (7) Schedule of any closing or rerouting of the public around the construction.

No permit shall be issued until the proposed work has been approved by the Public Works Superintendent.

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 this ordinance or any other ordinance of the City of Pateros, nor shall issuance of a permit be construed as a waiver of any ordinance requirements concerning the plan. Any permit issued in error shall be null and void. The fee for right-of-way permits shall be as established by in Chapter 12.08.404 of the PMC.

Permits can be obtained at the Pateros City Hall and online at pateros.com.

1.4.1 Variances

A. General

Design Variances to these standards may be granted by the Public Works Superintendent, in the exercise or reasonable judgement, upon evidence that such design variance is in the public's best interest to include satisfying requirements for safety, function, appearance, maintenance, code compliance in conformance with the intent of these Standards.

To gain approval for a variance from these Design Standards, the Applicant shall submit a "Request for Design Variance" to the Public Works Department. The Design Variance shall state the standard(s) to be varied, including the proposed variance(s) and the reason(s) for the request. Additional supporting

information, plans or design data prepared by a professional engineer, licensed in the State of Washington should be included as needed or requested.

Design variances should be approved prior to construction. To the extent known, the variance should be proposed at the preliminary design stage and include for consideration during plan review and public hearing.

A sample Design Variance Application is included in the Appendix.

Should the Public Works Superintendent prefer to refer variance decision to the City Council, the Council shall sit, in judgment of same, at a public hearing duly called in accordance with the procedures specified below. No application for a variance shall be granted by the Council unless the Council finds:

- (1) That special conditions and circumstances exist which are peculiar to the land such as size, shape, topography or location, not applicable to other lands in the same neighborhood, and that literal interpretation of the provisions of this ordinance would deprive the property owner of rights commonly enjoyed by other properties similarly situated in the same neighborhood.
- (2) That the special conditions and circumstances do not result from the actions of the applicant, or previous landowners, and are not self-imposed hardships.
- (3) That granting the variance requested will not confer a special privilege to the subject property that is denied other lands in the same neighborhood.
- (4) That the granting of the variance will not be materially detrimental to the public welfare or injurious to the property or improvements in the neighborhood in which the subject property is situated; or is in violation of state standards.
- (5) That the granting of the variance requested will be in harmony with the general purpose and intent of these standards, and any applicable Land Use Ordinance(s);
- (6) That the purpose of the variance is not merely to permit the subject property to be utilized more profitably by the owner or to economize on the cost of improving the property.

B. Conditions

In granting any variance the City Council may prescribe appropriate conditions and safeguards that will ensure that the purpose and intent of the specifications shall not be violated. Further, the City Council will require the applicant to post a performance bond guaranteeing compliance with such conditions.

1.5 Use of these Standards

These Standards apply to new, updated and/or replacement public facilities and certain privately owned facilities. These standards apply to certain private improvements, 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 developments, for all improvements intended for ownership, operation, or maintenance by the City and for all other improvements for which the Pateros Municipal Code (PMC) requires approval from the Public Works Superintendent. These standards are intended as guidelines for the Developer's Engineer in preparing their plans, studies and/or reports and for the City in reviewing same. The Standards may not address all facilities, products, and materials required for project design and City approval. Users of these Standards shall utilize and adapt the information and requirements contained herein to the needs and requirements of the specific project for which they are used, subject to City review.

Users are cautioned that higher standards and/or additional measures may be required by the City when proposed construction or development is to be located on, in, near, adjacent, or tributary to designated critical areas, shoreline, or floodplains.

These Standards do not preclude the City from applying other, additional, or revised requirements to specific projects as it deems necessary. Similarly, these Standards do not preclude the application of the requirements of other local, state, or federal agencies or jurisdictions, including but not limited to Washington State Departments of Health, Ecology or Transportation, the local fire authority, or Federal and State environmental authorities.

Where improvements are not covered by City Development Standards, the City will be the sole judge in establishing appropriate requirements. Where these Standards conflict with any existing City ordinances or discrepancies exist within the body of this text, the higher Standards shall be utilized as determined by the Public Works Superintendent, Engineer or City's authorized representative.

1.6 Design Requirements

All non-single family projects shall be designed by an engineer licensed in the State of Washington and who is qualified in the disciplines applicable to the project. The Developer and Developer's Engineer shall be solely responsible for project preliminary engineering, design and preparation of project plans and specifications. They shall also be solely responsible for reviewing, adapting, revising and/or adding to the requirements of City Development Standards and other general or project-specific City requirements as needed for project design and construction.

The decision to use a particular design element be it water, sewer, storm, or streets, at a particular location should be made on the basis of an engineering analysis of the location. Thus, while this document provides minimum requirements for design, it is not a substitute for professional engineering judgment. It is the intent that the provisions of this manual be uniform requirements for facility design but may not be appropriate for all locations and conditions.

This manual cannot provide for all situations. It is intended to assist, but not to substitute for, competent work by design professionals. It is expected that each professional will bring to each project the best of his/her skills and abilities. These uniform requirements are also not intended to unreasonably limit any innovative or creative effort that could result in a more effective and appropriate combination of design, cost savings, or both.

The Developer's Engineer, in consultation with the City, should take into account all available information and use the professional judgment that comes from training and experience to make the final design determination. There should be some record, not necessarily formal or cumbersome, of the matters that were considered during the design process that would justify the decisions that were made regarding the final project design.

The city will judge any proposed designs that depart from the requirements outlined in this manual on the likelihood that such deviation will produce compensating or comparable results, adequate for the uses and the general public. The city will be the final authority in resolving disputes concerning questions of fact in connection with standards for construction not directly covered by this manual.

In some cases, in order to provide capacity for other existing and/or future development the City will determine size or capacity requirements of facilities to be designed by the Developer's Engineer and constructed by the Developer.

The City's review and approval of the submitted materials will not relieve the applicant, Developer and/or designer of liability for design errors or omission.

1.7 Easements and Rights-of-Way

The Developer shall provide recorded easements and/or dedicated rights-of-way with legal description as required by the City to accommodate extensions of City roads, pedestrian/bicycle routes, water, wastewater, and stormwater facilities through and beyond the development.

1.8 Submittal Requirements

All preliminary engineering reports, designs, plans, construction cost estimates and specifications shall be prepared and stamped by the responsible design engineer(s) and shall be submitted to the City for review for conformance to its requirements for the proposed project. As specified elsewhere in these Standards, the Developer or their engineer shall submit calculations or other appropriate materials supporting the proposed design.

Additional specific design and submittal requirements may be specified elsewhere in a Development Agreement. For some projects Washington State Department of Health (DOH) or and/or Washington State Department of Ecology (DOE) will require a Preliminary Engineering Report and DOH/DOE review/approval of the project Plans & Specifications. The City may require a Preliminary Engineering Report (PER) regardless of such a requirement by DOH or DOE.

1.9 Construction Requirements

Nothing in the City's Standards, nor City policies or ordinances, shall be construed as creating a contractual relationship between the City and the Developer's Contractor or creating any City obligation to the Contractor. The Developer shall be responsible for the Contractor's work, actions and for the Contractor's compliance with City requirements for the project.

Literature for all products and materials shall be submitted to the City for review prior to delivery to the project site. Such literature may also be required for City review during City reviews of preliminary engineering reports, designs, and plans/specifications.

All underground work shall be inspected full time by the Design Engineer or his/her qualified representative. The qualifications of the proposed inspector shall be provided to the City a minimum of 14 days prior to construction.

The City reserves the right to observe and/or inspect the work as it may deem appropriate. The City shall be notified 48 hours in advance of start of construction. The City shall be present for all testing. The City shall be notified a minimum 24 hours in advance of all testing. The Developer shall be required to reimburse the City for all onsite inspection costs.

Following completion of construction and prior to City acceptance the Design Engineer shall provide completed all survey files, project record drawings and equipment O&M literature and manuals. Both hard copies and AutoCAD drawings shall be provided. See also 1.6.

Upon completion of project construction, the Developer's Engineer shall provide the City a written and stamped certification that the facilities to be accepted by the City have been designed, constructed, and tested in accordance with these Standards, the project plans and specifications approved by the City, and

all other City requirements; this written certification shall bear the stamp of the same engineer responsible for the design of said facilities.

1.9.1 Coordination Required

- A. City Coordination: The Developer and its Contractor shall coordinate with the City and provide adequate notice regarding all potential impacts to City facilities and the public. The Contractor shall use extreme care when working across, under, or near existing utilities and other public facilities. The Developer shall be responsible for any damage to existing City and other private facilities.
- B. Utilities Coordination: It is the Developer's sole responsibility to coordinate with all utility owners in the project area and to protect such utilities. It is also the sole responsibility of the Project Proponent to locate said utilities and utilize "one call" service as necessary.

1.9.2 Preconstruction Conference

A preconstruction conference to be attended by the Developer's Contractor, Engineer and the City shall be scheduled prior to start of construction. The Developer and Contractor shall submit a list of Contact names and numbers and a proposed detailed schedule for the work before the date of the pre-construction conference. The requirements and timing for submittal of the construction schedule may be further specified elsewhere. The date, time, and location of the pre-construction conference shall be as mutually agreed to by the attending parties. A preconstruction meeting agenda template is included in the Appendix.

1.9.3 Construction Meetings

Weekly (or other periodic) construction meetings involving the Contractor's on-site superintendent, the Developer, Developer's Engineer, representatives of the City and others as necessary, may be held on site on the days and times agreed upon by the parties if required by the City.

1.9.4 Construction Staking

The Developer and Contractor shall provide such staking as required to properly install the facilities in accordance with the approved project plans and specifications. At a minimum, such staking shall include property boundaries and locations of proposed new facilities. The staking shall be completed prior to construction for inspection by the City. Property boundaries shall be staked by a licensed professional land surveyor.

1.9.5 Changes During Inspection

Changes during construction that materially affect the scope of the project and/or the accepted individual lot plans must be submitted for review by the City. Minor changes do not need to be reviewed by the City, but must be documented by the Contractor and included in the Record Drawings.

When changes to the design are necessary, Applicant shall be responsible for coordinating the proposed design changes with the Project Engineer. The Project Engineer shall forward the proposed plan change, together with related calculations, to the City for review and acceptance prior to construction.

1.9.6 Record Drawings

Prior to commencement of construction the Developer's Engineer shall furnish the Contractor at least one set of drawings designated as "RECORD DRAWINGS". The Contractor shall maintain on site this set of plans for the sole and specific purpose of accurately and promptly recording all changes and modifications in the work as it proceeds. The location, depth, and description of all existing utilities, structures and improvements encountered in the work shall also be accurately recorded by the Contractor. All changes recorded by the Contractor shall be entered on the drawings with red ink only. The Developer's Engineer shall review the Contractor's Record Drawings for accuracy and completeness; the Developer's Engineer shall modify the Record Drawings as necessary and forward them to the City with a signed statement that the drawings accurately reflect the new facilities as constructed. Project Record Drawings shall be delivered to the City in both electronic (AutoCAD) format and hard copy (full size 24x36 format or reduced 11 x 17 format prints). City acceptance of the project facilities will not be provided prior to its receipt of the Developer Engineer's completed Record Drawings.

1.9.7 Construction Water

The Developer and Contractor are responsible for obtaining, transporting, and applying such water as is required for proper construction in accordance with the plans and specifications. Water may be supplied by the City at appropriate fire hydrants under the conditions described elsewhere in City policy. All water used for construction purposes will be metered and recorded by the Contractor prior to use of City water. The Contractor will submit a detailed plan for recording water use to the City.

1.9.8 Safety

The activities of the City in conducting reviews and inspections of the Record Drawings, materials, performance, and installed work of the Contractor shall not in any way constitute review or approval of the adequacy of the Contractor's safety supervision, program, or practices in, on, or near the construction site. Safe access shall be provided at all times for local, state, or federal authorities and inspectors, as well as for City representatives.

1.9.9 General Proponent/Developer Responsibility

It is the Developer's responsibility to be fully informed regarding the nature, quality, and the extent of the design issues, construction work and applicable City requirements.

1.9.10 Pavement Cutting and Restoration

No work in public rights-of-way, including cutting or removal of any pavement or surface, shall be allowed until specifically approved by the City. All pavement cutting, removal and restoration shall comply with these Standards.

1.9.11 Protection of Existing Stormwater Structures

The Contractor shall protect existing storm structures and conveyance systems in accordance with the Washington State Department of Ecology's Stormwater Management Manual for Eastern Washington. The Contractor shall construct a Construction Stormwater Pollution Prevention Plan (SWPPP), which will be reviewed by Public Works, and Engineer. The Contractor shall adhere to the SWPPP guidelines under all

circumstances.

1.9.12 Damage Claims

It is agreed and mutually negotiated that in any and all claims against the City or any of its agents or employees by any employee of the Developer, and contractor or subcontractor anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the indemnification obligation hereunder shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Developer or any contractor or subcontractor under Workman's Compensation Acts, disability benefits acts or other employees benefits acts.

1.10 Acceptance Requirements

In addition to other requirements which may be described in the Construction Permit Approval, Development Agreement and/or these Technical Specifications the following are required prior to City acceptance of Developer constructed public facilities and provision of the applicable public service:

1. Receipt by the City of the following:
 - a. Record Drawings (electronic and hard copy)
 - b. Manufacturer's operation and maintenance literature and manuals for all equipment (electronic, and 3 bound copies)
 - c. Developer Engineer's Certification of Completion
 - d. Provision of warranties per Section 1.13.
2. Final inspection by the City and satisfaction of all punch list items
3. Satisfactory start-up and commissioning of equipment, including manufacturer's field training of City staff as applicable
4. Satisfaction of all other provisions required by other components of the Permit Approval, City's Technical Specifications, City ordinances and policies, and the Development Agreement if one.

1.11 Other Requirements

These Standards do not necessarily include all requirements or conditions for City service and/or City acceptance of facilities and are not intended to include or describe all City policies and requirements that may apply to a particular project. Revisions or additions to these Standards may be required by the City as a condition of service and/or acceptance.

1.12 Applicable Codes and Regulations

All design, products, materials, and work related to project facilities to be owned by the City, or placed in City right-of-ways, or for public use shall conform to these Standards and requirements. For any area of work not addressed in these Standards, such as design, products, materials, and work shall also comply with the latest version of the following standards:

1. Washington State Department of Health – Water System Design Manual
2. WAC Chapters 246 through 290 for Group A Public Water Systems

3. Recommended Standards for Water Works (Ten State Standards)
4. Washington State Department of Ecology – Criteria for Sewage Works Design
5. Recommended Standards for Wastewater Facilities (Ten State Standards)
6. Department of Ecology Stormwater Management Manual for Eastern Washington (SMM)
7. City of Pateros Comprehensive Water System Plan (CPWSP)
8. City of Pateros Wastewater Facilities Plan, and General Sewer Plan (WFP, & GSP)
9. City of Pateros Comprehensive Plan (CPCP)
10. Pateros Municipal Code (PMC)
11. WSDOT Local Agency Guidelines (LAG)
12. WSDOT/APWA Standard Specifications and Plans
13. WSDOT Design Manual
14. U.S. DOT Manual on Uniform Traffic Control Devices (MUTCD)
15. Revised Code of Washington (RCW)
16. American Water Works Association (AWWA)
17. American Concrete Institute (ACI)
18. American Public Works Association (APWA)
19. Underwriter’s Laboratory (UL)
20. Local Building Code(s)
21. International Building Code (IBC)
22. International Fire Code (IFC)
23. Uniform Plumbing Code (UPC)
24. American Society for Testing and Materials (ASTM)
25. Concrete Reinforcing Steel Institute (CRSI)
26. International Conference of Building Officials (ICBO)
27. Shoreline Master Program, Flood Damage Prevention Code and Critical Area

In case of conflict between standards, the City Development Standards, and City project specific requirements shall govern, followed by the standards listed above.

1.13 Project Completion

- A. The Developer’s Engineer shall ensure the Contractor has completed all items required for a complete project before requiring the City to perform a final inspection. For a completed project all appurtenances shall be installed; all utilities shall be adjusted; all concrete and HMA shall be placed; all backfilling shall be completed; and the entire project shall be debris free and washed, swept, or vacuumed as necessary to provide a project that is readily inspectable. All mitigation measures including revegetation and site restoration must be completed.
- B. Once the project is prepared for final inspection the Developer’s Engineer shall notify the City, in writing, accompanied the requires for final inspection shall be a colored copy of the As-built Drawings. The City will make a visual inspection of the job site and a written report prepared and a final written report

1.14 Warranty

The Developer shall be required, upon completion of the work and prior to acceptance by the City, to furnish the City with a written guarantee (Maintenance Bond) covering all material and workmanship for a period of two years after the date of final acceptance and the Developer shall make all necessary repairs during that period at his own expense if such repairs are necessitated as the result of furnishing poor materials and/or workmanship. The Developer shall obtain warranties from the contractors, subcontractors and suppliers of material or equipment where such warranties are required and shall deliver copies to the City upon completion of the work.

1.15 Fees

Facility plan review and inspection fees are in addition to the City permit application fees. The fees will be based upon the time necessary to review, comment, and meet with the project proponent. Such time will be dependent upon the plan's completeness, clarity, and conformance to these Standards. See City of Pateros Fee Schedule.

1.16 Bonds and Liability Insurance

The City may require persons constructing public facilities to post with the City surety and cash bonds or certified check in the amount of 150 percent of the estimated construction cost. Whenever the property owner is required to post other bonds on the project or on construction related to the facility, the bonds may, with the permission of the City, be combined into a single bond to the extent allowed by law; provided, that the amount thus bonded shall not at any time be less than the amount that would be required under separate bonds. The single bond shall clearly specify on its face those separate bonds which it is intended to replace.

1. *Performance Bond:* Prior to commencing construction the owner or person constructing the facility shall post a construction and performance bond, or, in lieu of a bond the applicant may establish a cash escrow account with his/her bank or with the City in the amount specified above. The amount of the bond or cash account shall be sufficient to reimburse the City if it should become necessary for the City to enter the property for the purpose of correcting and/or eliminating hazardous conditions relating to soil stability, erosion and/or drainage control during construction. The instructions to the escrow agent shall specifically provide that after prior written notice unto the owner and the owners failure to correct and/or eliminate existing or potentially hazardous conditions in a timely manner, the escrow agent shall be authorized without any further notice to the owner or his consent to disburse the necessary funds to the City for the purpose of correcting and/or eliminating such conditions as specified in the City complaint. The construction and performance bond shall be released three years after determination by the City that all facilities are constructed in compliance with the approved plans.
2. *Maintenance Bond:* Prior to project acceptance, the owner or person constructing the facility shall post a maintenance bond for 100% of the total construction cost. All work shall be guaranteed by the Contractor for a two-year period from the time of final written approval of the construction and the record drawing by the City. Of particular importance is a Maintenance Bond for construction involving work within the road right-of-way. If a contractor's workmanship on a certain project is not satisfactory, either in terms of craftsmanship or materials, the obligees can file a claim against the maintenance bond, during the so-called 'maintenance term'. If the claim is proven, the surety has to financially compensate the obligees for damages and losses due to these issues. A contractor

who has had a claim filed against their bond must indemnify the surety for any compensations it has made to obligees. This, too, is part of the surety bond agreement. It is therefore always best to avoid possibilities of claims. Final approval of questionee work may require an extension of the Maintenance Bond increasing the maintenance bond one year or as deemed necessary.

3. Liability Insurance: The developer and/or Owner shall not commence work until they have furnished evidence of insurance required hereunder, and such insurance has been approved by the City Attorney; not shall the Developer and/or Owner allow any contractor or subcontractor to commence work on his contract or subcontract until the same insurance requirements have been complied with by such contractor or subcontractor. Approval of the insurance by the City Attorney shall not relieve or decrease the liability of the Developer and/or Owner thereby.

Companies writing the insurance under this article shall be licensed to do business in the State of Washington or be permitted to do business under the Law of the State of Washington.

The Developer shall maintain, during the life of the Contract, Comprehensive General and Automobile Liability Insurance, as detailed herein. The insurance shall include, as Additional Named Insured, the City, and their consultants. All insurance policies shall be endorsed to provide that the policy shall not be canceled or reduced in coverage until after 10 days prior written notice, as evidenced by return receipt of registered letter has been given to the City.

Comprehensive General Bodily injury and Property Damage Insurance shall include:

- a. Premises & Operations;
- b. Developer's Protective Liability;
- c. Products Liability, including Completed Operations Coverage
- d. Contractual Liability
- e. Broad Form Property Damage

Comprehensive Automobile Bodily Injury and Property Damage Insurance shall include:

- a. All owned automobiles;
- b. Non-owned automobiles
- c. Hired automobiles

Comprehensive General and Automobile Liability Insurance shall provide coverage for both bodily injury and property damage, as follows:

Comprehensive General and Automobile Bodily Injury Liability Insurance on an occurrence basis of not less than One Million dollars for bodily injury, including death resulting there from, sustained by each person; and for limits of not less than One Million Dollars for each occurrence.

Comprehensive General Property Damage Liability Insurance on an occurrence as is for limits of not less than One Million Dollars (\$1,000,000) for damage to or destruction of property, including loss of use thereof, arising from each occurrence and in an amount of not less than Two Million Dollars in aggregate.

Comprehensive Automobile Property Damage Liability Insurance on an occurrence basis for limits of not less than One Million Dollars (\$1,000,000) for damage to or destruction of property, including loss of use thereof, arising from each occurrence. Comprehensive Liability Insurance shall include the City and the as Additional Named Insured.

Comprehensive General Property Damage Liability shall include liability coverage for damage to or destruction of property of other, including loss of use of property damaged or destroyed, and all other indirect and consequential destruction of property of others, and shall include coverage for:

(“X”) Injury to or destruction of any property arising out of blasting or explosion;

(“C”) Injury to or destruction of any property arising out of the collapse or/or structural injury to any building or structure due:

- (1) To excavation, including borrowing, filling or backfilling in connection therewith, or tunneling, pile driving, coffer-dam work or caisson work, or
- (2) To moving, shoring, underpinning, raising or demolition of any building or structure or removal or rebuilding of any structural support thereof.

(“U”) Injury to or destruction of wires, conduits, pipes, mains, sewers, or other similar property or any apparatus in connection therewith, below the surface of the ground, if such injury or destruction is caused by and occurs during the use of mechanical equipment for the purpose of excavating or drilling, or

Injury to or destruction of property at any time resulting there from.

There shall be included in the liability insurance, contractual coverage sufficiently broad to insure the provisions of “Hold Harmless Clause”.

Nothing contained in these insurance requirements is to be construed as limiting the extent of the Developer’s responsibility for payment of damages resulting from their operations under this Contract.

In the event the Developer is required to make corrections on the premises after the work has been inspected and accepted, they shall obtain, at their expense, and prior to commencement of any corrective work, full insurance coverage, as specified herein. The Developer shall furnish, upon request by the City, certified copies of the insurance policy or policies within two weeks of the City’s request.

4. Workmen’s Compensation Insurance: The Developer and/or Owner shall maintain Workmen’s Compensation Insurance or, as may be applicable, as required by state or federal statute for all their employees to be engaged in work on the Project and, in case any such work is sublet, the Developer shall require the contractor or subcontractor similarly to provide Workmen’s Compensation Insurance for all of the latter’s employees to be engaged in such work. The Developer’s Labor & Industries account number shall be noted in the Proposal in the space provided.

1.17 Public Facility Maintenance

Maintenance of all sanitary sewer, water, stormwater, and street facilities on private property shall be the responsibility of the owner(s), unless otherwise provided. This responsibility and the provision for maintenance shall be clearly stated on subdivision and short plat plans, property conveyance documents, and/or drainage improvement plans.

2.0 Sanitary Sewer Design Standards

The standards established by this section are intended to represent the minimum standards for the design and construction of sanitary sewer facilities. Other requirements may be mandated by the City due to localized conditions and/or project specifics.

In some cases, in order to provide capacity for other existing and/or future development the City will determine size or capacity requirements of facilities to be designed by the Developer's Engineer and constructed by the Developer. Technical Specifications addressing material conformance, execution and testing are included in the Technical Specification section.

2.1 Design Standards

The design of sanitary sewer systems shall be dependent on local site conditions. The design elements of sanitary sewer systems, including pump stations shall conform to the latest edition of the Department of Ecology "Criteria for Sewage Works Design", and the minimum Standards set forth herein.

The Developer's Engineer shall submit all supporting documentation, in report form, including all relevant design information needed for the City to review for adequacy of the proposed design.

2.1.1 Sanitary Sewers

- a. If future extensions of the system are deemed probable by the City, the proposed system shall be designed and sized to service tributary areas and also be extended to farthest property line(s) so as to provide access to future development. Easements shall be provided if necessary to facilitate the same. Sewer mains shall be extended to the farthest boundaries of the property being served providing access for future service of adjacent properties.
- b. If the City approves sewer mains located outside public streets, the right-of-way or easement shall be of sufficient width to allow for future replacement of the facility without damage to permanent adjacent improvements. In general, if the sewer line is located in the center of the right-of-way or easement, such ROW or easement minimum width shall be 20 feet. Special circumstances may require additional width such as for deep sewer lines.
- c. Detailed plans shall be submitted for the City's review, which provide the location, size, type, and direction of flow of the proposed sewers and the connection with existing sewers. All elevation information shall be based on the North American Vertical Datum of 1988 (NAVD 88).
- d. Construction of new sewer systems or extension of existing systems will be allowed only if the existing and downstream receiving systems are capable of supporting the added hydraulic load. Sewer facilities shall be designed and installed to service tributary areas.
- e. Collection and interceptor sewers shall be designed and constructed for the ultimate development of the tributary areas and as may be further established in the City's Sewer Collection System Master Plan. The location and size of oversized sewer lines shall be designated by the Public Works Superintendent. When required by the Public Works Superintendent, the City will conduct a hydraulic analysis to determine the required sewer system improvements. The cost for such analysis shall be reimbursed by the Developer.

- f. Sewer systems shall be designed and constructed to achieve total containment of sanitary wastes and maximum exclusion of infiltration and inflow. Sewers installed below groundwater levels shall require special design and inspection.
- g. Design criteria, site information, computations and other data used for design of sewer system shall be submitted to the City for approval, generally in the form of a Preliminary Engineering Report. In some cases, a geotechnical investigation shall be prepared and submitted, as determined by the Design Engineer, or as required by the City.
- h. The sewage facilities shall be constructed in conformance with these Specification and other applicable standards as allowed by the City.
- i. After all other work is completed and before final acceptance, the entire roadway, including final surfacing, 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 for a new roadway consistent with the original section.

2.1.2 Sanitary Sewer Design Elements

- a. Sewer pipelines shall be installed only in dedicated rights of way, unless otherwise specifically approved by the City.
- b. The sewer pipelines shall be located in the center of right of ways unless otherwise approved by the City. The sewer main shall maintain a minimum of 10-foot horizontal separation from proposed or existing water mains.
- c. The maximum distance between manholes shall be 300 feet unless specifically approved otherwise by the City.
- d. The City reserves the right to require a minimum of eight feet of cover unless topography, existing facilities or other future improvements prohibit this minimum cover for installation, as determined by the Public Works Superintendent.
- e. Sewer lines shall be designed such that the invert elevations of the sewer service stubs at property lines is a minimum of four feet below the lowest expected floor elevation of the structure to be served and a minimum of eight feet below finished grade within the right-of-way. See the Standard Details. The invert elevation of the sewer service stub shall be calculated based on the invert elevation of the lateral sewer at the sewer service connection (including the tee) plus the rise of the sewer service to the property line based on its length and a minimum slope of 0.02 foot/foot plus 1.0 foot. The design elevation of the sewer service stub shall be shown on the Plans. The Public Works Superintendent may deviate depth as deemed necessary.
- f. Minimum slope on all sewer pipe shall comply with Department of Ecology standards with the following exceptions:
 - 4" and 6" sewer service laterals shall be 2.0%
 - 8" gravity mains shall be 0.5%
 - 10" gravity mains shall be 0.4%
 - 12" gravity mains shall be 0.3%

Minimum slope shall be maintained unless specifically waived by the Public Works Superintendent. All mains shall be designed to have a minimum scouring velocity of two feet per second. Increasing gravity main size for the purpose of achieving a shallower slope will not be allowed.

- g. Sanitary sewer service pipe from the main to the building served shall be a minimum 4-inch diameter for single family and duplex residential. Service pipe for triplex and larger multi-family and commercial structures shall be sized by the design engineer based on fixture unit calculations, but in no case shall be less than 6-inch diameter.
- h. Each single-family residence and each multifamily and non-residential structure shall be provided with an individual sanitary sewer service. The number of individual service connections shall be as approved by the Public Works Superintendent.
- i. All sewer services shall be extended horizontally a minimum of five feet past the street right-of-way line (or property line), or back of existing curb or sidewalks, and vertically to six feet below finished grade.
- j. All sewer services running under a concrete curb sections shall include an embossed “S” marking the location of the underlying sewer service.
- k. All private sewer systems connecting to the public system must meet all City Standards and testing requirements.
 - i. All public and private sanitary sewer mains and services shall be installed with detectable continuous marking tape installed 24 inches above the pipe, and not less than 12 inches below finished grade. The marker shall be detectable metallic tape labeled “SEWER” and shall be furnished by the contractor.
 - ii. Testing of all public and private sanitary sewer manholes and piping shall be conducted after backfilling operations have been completed, and prior to any permanent paving. All tests shall be coordinated with the Public Works Superintendent and shall be witnessed by a City representative. In all cases, the Contractor shall furnish all labor, materials, and equipment to make the required tests and shall bear the full cost of the required test. In the event that test results do not conform to the accepted standards, the Contractor, at the Contractor’s expense, shall correct all deficiencies and retest until they conform to the testing requirements. Notify the City 48 hours in advance of the testing.
 - iii. All new sanitary sewer mains, service lines and manholes shall be tested in accordance with the City’s Construction Standards.
 - iv. Deflection testing for PVC pipe may be required at the discretion of the City Engineer.
 - v. Television inspection for 6” pipe may also be required by the Public Works Superintendent.
 - vi. Television inspection for all gravity sewer mains will be required. All television inspections shall be completed prior to any permanent paving and be provided to the Public Works Superintendent for review.
 - vii. The Contractor shall not proceed with permanent paving until the Public Works Superintendent approves in writing, installation and testing.
- l. Minimum size of all gravity sewer main pipe shall be 8-inches. Pipe size shall be based typical residential design flows estimated to be 370 gallons per day per ERU.
- m. All sewer pipe invert elevations at manholes shall be computed to the center of the manhole.
- n. All sewers shall be laid with uniform slope between manholes. Pipe crown shall be matched when upsizing.
- o. Where the slope of the sewer line entering or exiting a manhole is less than 0.05 feet per foot, a drop of 0.1 foot shall be provided between the invert of the entering and exiting sewer pipes.

- p. All sewer manholes shall be located at street centerline or 6-foot left or right of street centerline or as approved by the Public Works Superintendent to avoid placing a manhole cover in a wheel lane.
- q. All sewer mains shall be terminated in a manhole. Should design considerations indicate a future manhole be located beyond the current sewer termination, a temporary clean out may be approved by the City to terminate the sewer provided the distance to the downstream manhole is 150 feet or less.
- r. Where new sanitary sewer mains are to be connected to an existing manhole, the existing manhole shall be core drilled. A sand collar is to be placed on the sewer line and the connection is to be sealed with non-shrink grout inside and outside of the manhole. A representative of the City must be on-site during a connection to an existing sewer. City must be notified 48 hours in advance of the connection.
- s. Sewer services shall be constructed with a prefabricated wye at the main.
- t. Extended sewer services on easements shall be avoided.
- u. Connection of sewer services to manholes shall be avoided. If sewer services must be connected to a terminating manhole such as in a cul-de-sac, no more than two (2) sewer service connections will be allowed and shall enter into the channel with matching pipe crowns.
- v. All manholes shall be completely clean prior to request for final inspection. Cleaning shall include, but not be limited to: debris removal; removal of mortar, dirt, and asphalt from steps; and removal of asphalt from the manhole frame and cover.

2.1.3 Sanitary Pump Stations

- a. Private Sanitary Pump Stations shall not serve more than one property. Private sanitary lift stations are only allowed where gravity sewer exists adjacent to a property but is not deep enough to serve all the property. Private sanitary pump stations require an engineering design report, specifications, and detailed site plans for approval by the City.
- b. Public Sanitary Pump Stations shall be designed to operate on 480-volt 3 phase power supply whenever possible.
- c. Provisions shall be provided to accommodate station inflow in the event of a power outage via the installation of a diesel or propane power generation equipment. Fuel storage is required to supply a minimum of 12 hours of operation at maximum design load. No buried tanks will be allowed.
- d. Sanitary Pump Stations shall be installed only in dedicated rights of way, unless otherwise specifically approved by the City.
- e. Sanitary Pump Station Site shall:
 - f. be selected to serve the entire basin, considering ultimate build-out of the basin.
 - g. include readily accessible by maintenance vehicles, with minimum gate width of 12 feet
 - h. be enclosed by a security fence at least 6 feet in height. All slabs, equipment, and utilities shall be located within the fenced area at least 3 feet from the fence
 - i. Generally, sewage pump stations should only be used when gravity flow is not possible.
 - j. Pump type and manufacturer shall be approved by the Public Works Superintendent.

- k. Installation shall include suitable devices for measuring sewage flow should be provided at all pumping stations
- l. Pump Station controls and logic shall be fully compatible with the current City system and fully integrated prior to use.
- m. All equipment, electrical and controls submittals shall be submitted to the Public Works Superintendent and/or City Engineer, for review and approval prior to installation.
- n. All startup and testing shall be completed in the presence of the design engineer, and City engineer. The Developer shall notify the Public Works Superintendent 48 hours prior to any equipment or controls training.
- o. All equipment and controls training shall be videotaped by the Developer.
- p. Pump Station design shall include a gantry or other means of removing the pumps. The Public Works Superintendent may allow installation of a davit to fit one of the City's exiting hoists.
- q. When the station is expected to operate at a flow rate less than 0.5 times the average design flow for an extended period of time, the design shall address measures taken to prevent septicity due to long holding times in the wet well.
- r. Each Sanitary Pump Station design shall be submitted with a design report and shall demonstrate its conformance with the standards as outlined herein. The report is to be stamped by an engineer as required. At a minimum the following shall be included in the design report:
- s. The pump station design must have a minimum of two pumps
- t. Design flow analysis (break down of phases if applicable) including peak sewage flow calculations,
- u. All relevant elevations, such as; pump(s) off, discharge elevation, pumps(s) on, alarm elevation, max allowable storage elevation, etc.
- v. Maximum static head
- w. Force main size and length
- x. Pump station capacity (gpm) per each pump and multiple pumps
- y. Velocity within force main
- z. System head and pump curves (including compound pump curves when applicable)
- aa. "n" values of force main
- bb. Friction head loss (calculations)
- cc. Velocity head
- dd. Total dynamic head
- ee. Pump time/cycle and number of cycles per day
- ff. Storage available and storage required during a power outage scenario
- gg. Discussion of odor control
- hh. Water hammer calculations.

- ii. The force mains shall be ductile iron or high-density polyethylene (HDPE) with a minimum diameter of 4 inches. Minimum bury for force mains shall be 3.5 feet, installations shall include detectable warning tape and 10-gauge single strand copper locating wire attached to the pipe.

2.2 Construction Drawing Format

The City desires to maintain a consistent format to its construction drawings and, therefore, requires that all construction drawings conform to the following format unless exceptions are approved in advance by the Public Works Superintendent. The City also requires that AutoCAD files be provided for review and record keeping.

The following format and requirements are a minimum for normal type system extensions. Unusual or special facilities or site-specific requirements may dictate additional drawings and/or drawing requirements.

1. Sheet size: full-sized 24" x 36"

2. Plan

The full-sized plan shall be at a scale of 1" = 20' and show all existing or proposed utilities, existing or proposed street surfacing and improvements, street centerline and stationing, street right-of-way margins, street names, legal identifications of properties such as lot number or tax lot number, section subdivision lines, all property lines and all water and sewer easements and rights-of-way.

Show the following:

- a. Locations of streets, right-of-ways, existing utilities, driveways, and sewers.
- b. All associated right-of-way, adjacent property lines, easements and/or proposed property lines.
- c. All utility easements, including County recording numbers.
- d. Site topography at a minimum of two (2') foot intervals, to include a minimum of ten (10') foot within adjacent areas.
- e. Vicinity and site location map.
- f. All known existing structures and utilities, both above and below ground, which might interfere with or be affected by the proposed construction, particularly water mains, gas mains, storm drains, overhead and underground power lines, telephone lines, and television cables.
- g. Station and offset to each manhole. Number each manhole consecutively in the new sewer system preceded by the initials of the development. Begin at the connection to existing system and proceed upstream. Branch lines shall use the sub-number of the manhole from which they branch. A line branching from manhole SR4 would have the first manhole on the line numbered SR4-1. All manholes shall be numbered on the plans and correspondingly numbered on the profile.
- h. Show the size, material, length, slope, capacity (Q_c at full flow) and design flow (Q_d) of each sewer line between manholes.
- i. Show the location of all sewer service stubs and the invert elevation at the end of the stub. Building and basement floor elevations shall be shown in the profile.
- j. Show details as necessary to direct the contractor in making connections to the existing system and to protect existing facilities during construction of the new sewers. Details to be to scale and clearly show special sewer joints, connections, and cross-sections, and sewer appurtenances such

as manholes and related items and all other items as required by the City to clearly identify construction items, materials, and/or methods.

- k. Other items as may be required by the Public Works Superintendent.

3. Profile

The vertical profile of the proposed sewer is required to be shown on each sheet below the plan view. The scale of these drawings shall be 1" = 20' horizontal and 1" = 4' vertical with horizontal grid of 20' and vertical grid of 4'.

Show the following:

- a. For each manhole, show rim elevation, invert elevation of all sewers entering or leaving the manhole, the depth of the manhole, and the manhole number and location (street station and offset).
- b. Show the sewer line in profile and the existing and proposed ground lines. Identify the size, type of pipe, slope and horizontal length of the sewer line on the profile. Include the Q_c (pipe capacity using full pipe, in cfs) and Q_d (design flow in cfs)
- c. Show all crossing utilities and designate special materials or construction procedures that may be required.
- d. Provide a legend to clearly illustrate the composition of the profile.

2.3 General Construction Requirements

Nothing in these general construction requirements or other components of the City's Development Standards, nor City policies or ordinances, shall be construed as creating a contractual relationship between the City and the Developer's Contractor or creating any City obligation to the Contractor. The Developer shall be solely responsible for the Contractor's work, actions and for the Contractor's compliance with City requirements for the project.

1. Work shall be performed only by Washington State licensed and bonded contractors with demonstrated experience in constructing public sewer systems of the type being proposed for construction.
2. All underground work shall be inspected full time by the Design Engineer or his/her qualified representative. The qualifications of the proposed inspector shall be provided to the City a minimum of 14 days prior to construction for City review and concurrence.
3. The City reserves the right to observe and/or inspect the work as it may deem appropriate. The City shall be notified 48 hours in advance of start of construction.
4. The City shall be present for all testing. The City shall be notified a minimum 24 hours in advance of all testing.
5. Literature for all products and materials shall be submitted to the City for review prior to delivery to the project site. Such literature may also be required for City review during City reviews of designs and plans/specifications.
6. Each side sewer lateral shall have an approved water-tight cap at the termination of the stub, it shall be adequately "blocked" to satisfactorily resist the air pressure testing.
7. Front lot corners and side sewer stub locations shall be staked prior to installation of side sewer tee.
8. Each sewer service lateral shall have a treated 2-by-4-inch wood "marker" at the termination of the stub. The "marker" shall extend from the bottom of the trench to 24 inches above finished grade. Above the

ground surface, it shall be painted “white” with “S/S” and the depth, in feet, stenciled in black letters 2 inches high.

9. Sewer service connections if allowed directly into manholes shall be constructed to match the sewer main crown (outlet) and the manhole channeled accordingly.
10. Manholes, where sewer extension may occur, shall be provided with min. 1-foot stubs of same pipe material and diameter, capped watertight, and channeled accordingly.
11. Locking lids shall be provided for all manholes located outside pavement areas and all manhole lids shall have the word “sewer” cast integrally onto its surface.
12. Concrete collars shall be placed around all manhole frames. Manhole rims shall be set 2 inches above the finish grade in areas outside streets or alley ways.
13. Unless directed otherwise by the City, pipe trenches shall not be backfilled until pipe and bedding installation has been inspected and approved by the City’s Inspector.
14. All testing shall be completed and approved prior to asphalt surfacing and after all other underground utilities have been installed, and the lines have been satisfactorily flushed, cleaned, deflection tested, and television inspected.
15. Manhole rim and invert elevations shall be field verified after construction by the Design Engineer and the Record Drawings individually stamped by a Washington State licensed professional engineer which shall attest to the fact that the information is correct. Record Drawings shall be to City datum and must be submitted in a format as set forth herein, and approved by the City prior to project acceptance along with all equipment O&M literature and manuals if applicable.
16. Upon completion of project construction, the Developer’s Engineer shall provide the City a written and stamped certification that the facilities to be accepted by the City have been designed, constructed, and tested in accordance with these Standards, the project plans and specifications approved by the City, and all other City requirements; this written certification shall bear the stamp of the same engineer responsible for the design of said facilities.

3.0 Water System Design Standards

The standards established by this section are intended to supplement the PMC and represent the minimum standards for the design and construction of water system facilities. Other requirements may be mandated by the City due to localized conditions and/or project specifics.

In some cases, in order to provide capacity for other existing and/or future development the City will determine size or capacity requirements of facilities to be designed by the Developer's Engineer and constructed by the Developer.

3.1 Design Standards

The design of water systems shall be dependent on local site conditions. The design elements of water systems shall conform to the minimum Standards set forth herein. Technical Specifications addressing material conformance, execution and testing are included in the Technical Specification section.

1. General

- a. If future extensions of the system are deemed probable by the City, the proposed system shall be designed and sized to service future customers and be extended to "far" property line(s) so as to provide access to future development. Easements shall be provided if necessary to facilitate same. Water mains shall be extended to the boundaries of the property being served providing access for future service of adjacent properties.
- b. If the City approves water mains located outside public streets, the right-of-way or easement shall be of sufficient width to allow for future replacement of the facility without damage to permanent adjacent improvements. In general, if the water line is located in the center of the right-of-way or easement, such right of way or easement minimum width shall be 20 feet. Special circumstances may require additional width such as for deep water lines.
- c. Detailed plans shall be submitted for the City's review. These plans shall provide the location, size, type, and direction of flow of the proposed water mains and the connection with existing mains. Horizontal locations and elevation information shall be on the North American Vertical Datum of 1988(NAVD 88).
- d. Construction of new water systems or extension of existing systems will be allowed only if the City system has adequate capacity as determined by the City.
- e. Water mains shall be designed and constructed for the ultimate development of the service areas and as may be further established in the City's Water System Plan. The location and size of oversized water mains shall be designated by the City. When required by the Public Works Superintendent, the City will conduct a hydraulic analysis to determine the required water system improvements. The cost for such analysis shall be reimbursed by the Developer.
- f. Sanitary Lift Station's Water Supply – There shall be no physical connection between any potable water supply and a sewage pumping station which under any condition might cause contamination of the potable water supply. Potable water supply brought to the station shall comply with condition stipulated in the Washington State Department of Health's Criteria for Accepted Cross Connection Control Assemblies. A minimum 1 inch water line with a reduced pressure backflow assemble shall be installed near the pump station for station cleaning purposes. The water service line shall be provided with a frost-free hydrant, hose, rack and nozzle for lift station wash

- g. down. Within the public lift station building a wash sink shall be provided with hot and cold running water.
 - h. All new water services shall comply with the City's Cross Connection Control code and all state and federal standards for protection of potable water systems.
 - i. Water service pipe from the main to the building served shall be a minimum 1-inch diameter for single family and duplex residential. Service pipe for triplex and larger multi-family and commercial structures shall be sized by the design engineer based on fixture unit calculations, but in no case shall be less than 1-inch diameter.
 - j. Each single-family residence and each dwelling unit in a duplex structure shall be provided with an individual water service connection off the water main and meter. The number of individual service.
 - k. Water services, when installed through a concrete curb sections, shall be located on the curb face with the letter "W" embossed in the concrete.
 - l. Connections and meters for other development types shall be approved by the Public Works Superintendent.
 - m. Each single-family residence and each dwelling unit in a duplex structure shall be provided with an individual full $\frac{3}{4}$ -inch meter. Meters for triplex and larger multi-family and commercial structures shall be sized by the design engineer based on fixture unit calculations, but in no case shall be less than $\frac{3}{4}$ -inch diameter. Meters 2 inches and smaller will be furnished by the City and installed by the Contractor. All other meters shall be furnished and installed by the Developer.
 - n. Design criteria, site information, computations and other data used for the design of water system shall be submitted to the City for approval, generally in the form of a Preliminary Engineering Report. In some cases, a geotechnical investigation shall be prepared and submitted, as determined by the Design Engineer or as required by the City.
 - o. The water facilities shall be constructed in conformance with these Standards and other applicable standards as allowed by the City.
 - p. After all other work is completed and before final acceptance, the entire roadway, including final surfacing, 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 for a new roadway consistent with the original section.
2. Design Elements
- a. Water pipelines shall be installed only in dedicated rights of way, unless otherwise approved by the City.
 - a. The water pipelines shall be located in rights of ways. The water main shall be placed such that a minimum of 10-foot horizontal separation from proposed or existing parallel sewer mains and 5-foot horizontal separation from all other parallel underground utilities is maintained at all times.
 - b. A minimum four feet cover shall be provided. When minimum cover cannot be achieved, the Developer shall request approval from the City. The Public Works Superintendent will review and approve on a case-by-case basis. If approved, installation of rigid insulation will be required.
 - c. Fire hydrants are required approximately every 350 feet. Conform to fire code requirements. All fire hydrant locations shall be reviewed by a fire official.

- d. Pipe runs from main line to standard hydrants less than 50 feet in length shall be a minimum of 6 inches. Pipe runs from main line to standard hydrants more than 50 feet in length must be a minimum of 8 inches.
- e. One-inch minimum air and vacuum release valves shall be installed at principal high points in the system. High points shall be avoided, unless approved by the City.
- f. Dead-end lines are not permitted, except in certain cul-de-sac streets, in which case, hydrants shall be provided at the end of the main.
- g. System valves shall be installed on each branch of multiple pipe connections, at end of each block, and along transmission mains at intervals of no more than 600 feet.
- h. The maximum day demands shall be estimated in accordance with the most current edition of the City of Pateros Water System Plan. At maximum day demand, pipe velocities shall not exceed 5 feet per second.
- i. Fire flow water demand shall be calculated by the fire official for a specific development to be used in the design of the water system for the project. The system must be designed to deliver this flow, on top of the maximum day demand, without dropping the pressure below 20 psi, and without exceeding a velocity of 15 feet per second, in any portion of the system, whether new or existing.

3.1.1 *Booster Stations*

1. Design of water booster pump station shall be performed by a professional engineer licensed in the State of Washington. The design of water booster pump station is an engineering matter and is not subject to detailed recommendations or requirements other than as required by these Standards. The applicant's engineer shall submit all supporting documentation, in report form, including all relevant design information needed for the City to review for adequacy of the proposed design. The design report shall be submitted with each water booster pump station and shall demonstrate its conformance with engineering standard as outlined herein.
2. General construction of public and private water booster pump station and appurtenances is required to conform to International Building Code, Uniform Building Code and National Electrical Code.
3. Booster Station design and construction standards shall be determined further during the preliminary applications phase and subject to the City Engineer's review and approval.

3.1.2 *Reservoirs*

1. Reservoirs shall be above ground design unless otherwise approved by the Public Works Superintendent.
2. All reservoirs constructed and added to the City's water system shall incorporate an active or passive water mixing system as approved by the Public Works Superintendent.

3.2 Construction Drawing Format

The City desires to maintain a consistent format to its construction drawings and, therefore, requires that all construction drawings conform to the following format unless exceptions are approved in advance by the City Public Works Department and/or City's Engineer. The City also requires that AutoCAD drawings be provided for review and record keeping.

The following format and requirements are a minimum for normal type system extensions. Unusual or special facilities or construction requirements may dictate additional drawings and drawing requirements.

1. Sheet size: Sheet size: full-sized 24" x 36"

2. Plan

A separate construction full sized plan is required at a scale of 1" = 20', showing all existing or proposed utilities, existing or proposed street surfacing and improvements, street centerline and stationing, street right-of-way margins, street names, legal identifications of properties such as lot number or tax lot number, section subdivision lines, all property lines and all water and sewer easements and rights-of-way.

Show the following:

- a. Locations of streets, right-of-ways, existing utilities, driveways, and water mains.
- b. All associated right-of-way, adjacent property lines, easements and/or proposed property lines. All utility easements, including County recording numbers.
- c. Site topography at a minimum of two (2') foot intervals, to include a minimum of ten (10') foot within adjacent areas.
- d. Vicinity and site location map.
- e. All known existing structures, both above and below ground, which might interfere with the proposed construction, particularly sewer lines, gas mains, storm drains, overhead and underground power lines, telephone lines, and television cables.
- f. Show all valves, fire hydrants, fittings, and other appurtenances. Each shall be called out and located by stationing along the centerline of the street or baseline of the easement.
- g. Show the size, material, and length of each water main and service.
- h. Show details as necessary to direct the contractor in making connections to the existing system and to protect existing facilities during construction of the new water line. Details shall be to scale and clearly show special water pipeline joints, connections, cross-sections, water appurtenances, and all other items as required by the City to clearly identify construction items, materials, and/or methods.
- i. Other items as may be required by the Public Works Superintendent.

3. Profile

The vertical profile of the proposed water is required to be shown below the plan view. The scale of these drawings shall be 1" = 20' horizontal and 1" = 4' vertical with horizontal grid of 20' and vertical grid of 4'.

Show the following:

- a. Show the water main in profile and the existing and proposed ground lines. Identify the size, slope and horizontal length of the water line on the profile.

- b. Show all crossing utilities and designate special materials or construction procedures that may be required.
- c. Provide a legend to clearly illustrate the composition of the profile.

3.3 General Construction Requirements

Nothing in these general construction requirements or other components of the City's Development Standards, nor City policies or ordinances, shall be construed as creating a contractual relationship between the City and the Developer's Contractor or creating any City obligation to the Contractor. The Developer shall be solely responsible for the Contractor's work, actions and for the Contractor's compliance with City requirements for the project.

1. Work shall be performed only by Washington State licensed and bonded contractors with demonstrated experience in constructing public water systems of the type being proposed for construction.
2. All underground work shall be inspected full time by the Design Engineer or his/her qualified representative. The qualifications of the proposed inspector shall be provided to the City a minimum of 14 days prior to construction for City review and concurrence.
3. The City reserves the right to observe and/or inspect the work as it may deem appropriate. The City shall be notified 48 hours in advance of start of construction.
4. The City shall be present for all testing. The City shall be notified a minimum 24 hours in advance of all testing.
5. Literature for all products and materials shall be submitted to the City for review prior to delivery to the project site. Such literature may also be required for City review during City reviews of designs and plans/specifications.
6. Pipe trenches shall not be backfilled until pipe and bedding installation has been inspected and approved by the City's Inspector.
7. All testing shall be completed and approved prior to asphalt treated base or finished paving is accomplished and after all other underground utilities have been installed.
8. Record Drawings shall be individually stamped by a Washington State licensed professional engineer who shall attest to the fact that the information is correct. Record Drawings shall be to City datum, and must be submitted in a format as set forth herein, and approved by the City prior to project acceptance along with all equipment O&M literature and manuals, if applicable.

3.4 Cross Connection Control

The City bases its Cross Connection Control (CCC) program requirements on WAC 246-290-490. All consumers using water purveyed by the City for irrigation and/or heating and cooling shall be required to install a City approved backflow prevention device commensurate with the degree of hazard posed by the connection. A City Public Works employee certified as a Cross Connection Control Specialist (CCS) shall be responsible for implementing the CCC program and inspecting backflow prevention devices. The City reserves the right to shut off water supply to any consumers found to be in violation of the City's CCC program. Once the consumer has satisfied the CCC program requirements, that may be reconnected to the City water system and shall be responsible for paying all fees associated with reconnection to the water system.

4.0 Stormwater Design Standards

The standards established by this section are intended to represent the minimum standards for the design and general construction requirements of sanitary sewer facilities. Technical Specifications addressing material conformance, execution and testing are included in the Technical Specification section. Other requirements may be mandated by the City due to localized conditions and/or project specifics. In some cases, in order to provide capacity for other existing and/or future development the City will determine size or capacity requirements of facilities to be designed by the Developer's Engineer and constructed by the Developer.

4.1 Introduction/Purpose

These design standards are intended to reduce or prevent adverse storm drainage impacts due to development. They represent the minimum standards for storm drainage systems and facilities within the City of Pateros and its UGA. Compliance with these standards does not relieve the designer, owner, or developer of the responsibility to apply conservative and sound professional judgment to protect the health, safety and welfare of the general public and provide a satisfactory system. Site conditions and environmental constraints and considerations may require a greater level of protection than would normally be required under these standards.

4.2 Stormwater Guideline Adoption

The City of Pateros hereby adopts the Department of Ecology Stormwater Management Manual for Eastern Washington (SMM) as the City's stormwater guidelines. Design and construction of stormwater facilities shall comply with the latest edition of the SMM and as well as the additional requirements included herein. Where a conflict exists between the SMM and these standards, the more stringent regulation applies.

4.3 Conceptual Drainage Report

A Conceptual Drainage Report is required for all projects for which a Drainage Plan is required as specified in **Section 4.4**. The City may simplify or eliminate Conceptual Drainage Report requirements for projects which are not required to provide a Drainage plan. Conceptual Drainage Reports shall be submitted and reviewed by the City prior to submittal of Drainage Plan. The purpose of the Conceptual Drainage Report is to demonstrate how the stormwater design for the proposed development will meet these standards and the requirements of good engineering practice. The report is intended to provide the City with information to determine if the proposed development can adequately address stormwater issues without affecting adjacent or down gradient properties and to determine the overall effect of the development on the area's existing stormwater and groundwater situation.

If the Conceptual Drainage Report does not meet both these standards and approval of the City Public Works Department and Community Development Director, the City of Pateros will not approve the report. A Drainage Plan shall not be submitted without approval of the Conceptual Drainage Report or waiving of the report requirement by the City of Pateros.

The Conceptual Drainage Report shall include the following:

- a. Description of the proposed development and stormwater collection and disposal method(s).
- b. A schematic of the proposed development and stormwater system showing the approximate size and location of all the major components that are anticipated to be constructed.
- c. Supporting technical data and drainage calculations with a written discussion describing how the proposed concept plan will meet these Standards.
- d. The Conceptual Drainage Report shall be prepared and stamped by a registered Civil Engineer currently licensed by the State of Washington and qualified by experience and education.

A detailed design is not being sought at this stage, but adequate work must be done to demonstrate that sufficient infrastructure can be provided and that the proposed development will meet these Standards, and that there will be no adverse effects to adjacent or down gradient properties.

4.4 When a Drainage Plan is Required

A drainage plan shall be required for the following:

1. All plats and short plats.
2. All developments, including remodeling, reconstruction, redevelopment, and new construction adding five (5,000) thousand square feet or more of new impervious surfaces, including gravel parking areas.
3. Developments entailing construction which would change the point of discharge of surface waters, discharge surface waters at a higher velocity and/or quantity than that of the pre-development discharge rate, or, tend to add to pollution of surface waters.
4. Developments requiring construction adjacent to any pond, lake, seasonal stream, or in the general vicinity of wetlands, wetland buffers or areas of known high groundwater and/or seasonal flooding.
5. Developments requiring construction within 200 feet of any stream or river.
6. As determined necessary by the City.

4.5 General Requirements

Drainage Plans shall conform to the following requirements:

1. Drainage Plans shall be prepared by a registered Civil Engineer currently licensed by the State of Washington and qualified by experience and education. Storm drainage plans or revisions to any approved plan shall be reviewed and approved by the City prior to any construction. Approval by the City shall be in the form of a signature block with signatures from all departments with jurisdiction.
2. When required by the Public Works Superintendent, the City will conduct such analysis as it deems necessary to evaluate stormwater, groundwater and/or wetland issues related to or caused by the development, or as needed to review information and analysis provided by the Developer. The cost for such analysis shall be reimbursed by the Developer.
3. On-site storm drainage improvements must be sufficient to mitigate impacts due to flooding, erosion, sedimentation, or pollution. The project shall also comply with Critical Area requirements.

4. All drainage system elements must provide for adequate maintenance and accessibility at all times. Storm drainage facilities shall be designed to eliminate interference from underground utilities and from condition which exceed design loads for any pipe or other structural element.
5. Drainage plans shall address system reliability in terms of layout, specifications of materials, methods of installation and maintenance access and feasibility.
6. The impact of a system failure shall be analyzed both in terms of on-site and off-site effects.
7. No drainage originating inside of a building or structure shall be connected to storm drainage or surface water systems.
8. Developer shall meet all other applicable laws for water quality prior to discharge to any wetland, stream, or river.
9. All proposed development drainage conveyance systems must be analyzed, designed, and constructed to handle drainage flows from existing off-site tributaries, the abutting street sections, and on-site storm drainage.
10. Developments involving clearing and grading and/or that propose new, or modifications of existing drainage facilities shall include an erosion/sedimentation control plan which includes suitable measures to prevent sediment-laden runoff from leaving the site during construction. Erosion/sedimentation control may be achieved by structural control measures (sediment trap or pond), covers (mulch, sodding, plastic covering) and/or construction practices (straw bale barriers, filter fabric, quarry rock driveway pads).
11. Maintenance and operation of all private drainage facilities is the responsibility of the property owner or a properly formed homeowners association and shall be performed in compliance with City of Pateros maintenance standards. The City reserves the right to maintain a private drainage facility when the facility is out of compliance with maintenance standards as determined by the City. Any and all costs associated with this City maintenance will be paid by the property owner or homeowners association.

4.6 Plan Submittal Contents and Standards

The City desires to maintain a consistent format to its plan submittals and, therefore, requires that all plan submittals conform to the following format unless exceptions are approved in advance by the City.

The following format and requirements are a minimum for normal type system extensions. Unusual or special facilities or construction requirements may dictate additional drawings and drawing requirements. The City also requires that AutoCAD files be provided for review and record keeping.

1. Sheet size: 24" x 36"

2. Plan

A full sized plan and profile of appropriate scale, typically between 1" = 20' and 1" = 50', showing the existing and proposed drainage area and conveyance systems showing all hydraulic and physical data such as all existing or proposed utilities, existing or proposed streets, surfacing and improvements, street centerline and stationing, right-of-way margins, street names, legal identifications of properties such as lot number or tax lot number, section subdivision lines, all property lines and all water and sewer easements and rights-of-way.

Show the following:

- a. Locations of streets, right-of-ways, existing utilities, driveways, and water mains.
- b. All associated right-of-way, adjacent property lines, easements and/or proposed property lines. All utility easements, including County recording numbers.

- c. Existing and proposed site topography at a minimum of one (1') foot intervals on the subject property including the drainage area, and all adjacent properties sufficient to determine all potential topographic impacts of the construction, including natural or manmade drainage courses or pipes to the extent necessary to determine all hydraulic or hydrologic impacts of the proposed projects.
- d. Vicinity and site location map.
- e. All known existing structures, both above and below ground, which might interfere with the proposed construction, particularly sewer lines, gas mains, storm drains, overhead and underground power lines, telephone lines, and television cables.
- f. Show the size, material, and length of each storm sewer main, connection and/or channel cross section.
- g. Invert elevations at all inlets, structures, outfalls, and other points of interest.
- h. Bottom elevations of all ditches, channels, ponds, swales, and streams.
- i. Grades on all pipes or channel bottoms calculated to the number of decimal places necessary to guarantee 0.01-foot accuracy for pipes or paved channels and 0.1-foot accuracy for earth bottom channels.
- j. Design water surface elevations and flow rates for all conveyance pipes or channels.
- k. All above ground pond details, if used, shall include design volume, contours of the finished surface, inlet locations, outlet details including inverts or grate elevations, and secondary overflow paths.
- l. Top or grate elevations of all structures, inlets, catch basins, or manholes.
- m. Retention pipe, trench, or drywell details including dimensions, elevations of inverts, and maximum water surface elevations.
- n. Details of all structures including underground retention/infiltration structures, if used.
- o. Phasing limits for phased construction projects and any interim drainage control measures required due to the phasing.
- p. Control points and benchmarks used for vertical and horizontal control of construction, set to the City datum.
- q. Erosion and sedimentation control plans.
- r. Other items as may be required by the Public Works Superintendent.

3. Profile

The vertical profile of the proposed storm sewer pipes, ditches, etc. is required. The scale of these drawings shall be 1" = 20' horizontal and 1" = 4' vertical with horizontal grid of 20' and vertical grid of 4'.

Show the following:

- a. storm sewer mains and/or ditches in profile and the existing and Show the proposed ground lines. Identify the size, slope, and horizontal length of the storm sewer mains and/or ditches on the profile.
- b. Show all crossing utilities and designate special materials or construction procedures that may be required.
- c. Provide a legend to clearly illustrate the composition of the profile.

4. Engineering calculations shall include at a minimum:

- a. Signature and stamp of the responsible Civil Engineer.
- b. A narrative describing how the drainage plan meets these Standards including the Stormwater Management Manual for Eastern Washington (see Section 4.2).
- c. Infiltration/Retention volume calculations.
- d. Analysis of all offsite flows upstream of the proposed drainage system in sufficient detail to determine the hydraulic and hydrologic impacts.
- e. Hydraulic and habitat analysis of the downstream drainage environment in sufficient detail to determine the impacts of the proposed drainage system.
- f. A narrative describing the upstream and downstream analysis and detailing the intent and function of the on-site system.
- g. All additional pertinent backup information, survey data, or calculations.

4.7 Plan Review and Approval

The drainage plan and supporting calculations will be reviewed by the Public Works Superintendent and/or City Engineer in coordination with all other City land development and/or permit review procedures. The City's review and approval of the submitted materials will not relieve the applicant, owner and/or designer of liability for errors or omissions in the design of storm drainage facilities.

Any applicant or property owner proposing an action that may require a Conceptual Drainage Report or Drainage Plan may request a preliminary review of the proposal by the City and a determination of the need for Conceptual Drainage Report and/or Drainage Plan. The preliminary review may be included as part of the pre-application process.

4.8 General Construction Requirements

Nothing in these general construction requirements or other components of the City's Standards, nor City policies or ordinances, shall be construed as creating a contractual relationship between the City and the Developer's Contractor or creating any City obligation to the Contractor. The Developer shall be solely responsible for the Contractor's work, actions and for the Contractor's compliance with City requirements for the project.

1. Work shall be performed only by Washington State licensed and bonded contractors with demonstrated experience in constructing public water systems of the type being proposed for construction.
2. All underground work shall be inspected full time by the Design Engineer or his/her qualified representative. The qualifications of the proposed inspector shall be provided to the City a minimum of 14 days prior to construction for City review and concurrence.
3. The City reserves the right to observe and/or inspect the work as it may deem appropriate. The City shall be notified 48 hours in advance of start of construction.
4. The City shall be present for all testing. The City shall be notified a minimum 24 hours in advance of all testing.
5. Literature for all products and materials shall be submitted to the City for review prior to delivery to the project site. Such literature may also be required for City review during City reviews of designs and plans/specifications.

6. Pipe trenches shall not be backfilled until pipe and bedding installation has been inspected and approved by the City's Inspector.
7. All testing shall be completed and approved prior to asphalt treated base or finished paving is accomplished and after all other underground utilities have been installed.
8. Record Drawings shall be individually stamped by a Washington State licensed professional engineer who shall attest to the fact that the information is correct. Record Drawings shall be to City datum, and must be submitted in a format as set forth herein, and approved by the City prior to project acceptance along with all equipment O&M literature and manuals, if applicable.

5.0 Street Design Standards

The standard established by this section in conjunction with Pateros Municipal Code (PMC) is intended to represent the minimum standards for the design and construction of streets, alleys, bike lanes, pathways, and sidewalks.

5.1 Design Standards

To the extent practical, the City of Pateros shall plan, design, construct and operate and maintain appropriate facilities for safe accommodation of pedestrians, bicyclists, transit users, motorists, emergency responders, freight and users of all ages and abilities in all new construction, retrofit or reconstruction projects. Pateros will support and incorporate complete street principles as required by city code and state requirements. Vehicular, bicycle and pedestrian travel ways shall be designed to provide efficient and economical travel ways, and create a safe and pleasant environment for the citizens of Pateros. An effective design shall consider the location of facilities in relation to land use, pedestrian and bicycle safety, adequate right of way width, traffic standards and safety, landscaping, drainage facilities, ease of maintenance, and the ability to provide effective and efficient public services.

Design detail, workmanship and material shall be in accordance with the current edition of the Washington State Department of Transportation's "Standard Plans for Road, Bridge, and Municipal Construction," the "APWA Amendments to Division One, and the Standard Plans for Road, Bridge and Municipal Construction," except where PMC or these standards provide otherwise.

1. Developments consisting of single-family housing where the number of dwelling units exceeds 25 shall provide two separate and approved access roads.
2. All new commercial or residential subdivisions, short plats, binding site plans shall provide streetlights in accordance with the standards for such improvements of the City and they shall be owned and operated by the City.
3. All public and private roadways in the City shall be paved.
4. Commercial concrete curb and gutter per the details in the Standard Details section shall be used for all street edges unless otherwise approved by the City Engineer. Form and subgrade inspection by the City are required before curb and gutter are poured.

The face or top of all new curbs shall be embossed to denote the location of water and sewer services crossings. Water services shall be neatly marked ¼-inch into concrete with a "W" and side sewers shall be marked with an "S".

5. Trails and pathways should be developed in accordance with the City's Comprehensive Plan.
6. Bicycle facilities should be developed in accordance with the City's Comprehensive Plan. The design of bikeways shall depend upon their type and usage. Bike lanes and shared roadways shall be surfaced the same as the adjacent motor vehicle roadway.

In general, all bikeway facilities shall be designed per the MUTCD or as specified herein.

5.2 Construction Drawing Format

The City desires to maintain a consistent format to its plan submittals and, therefore, requires that all plan submittals conform to the following format unless exceptions are approved in advance by the City.

The following format and requirements are a minimum for normal type system extensions. Unusual or special facilities or construction requirements may dictate additional drawings and drawing requirements. The City also requires that AutoCAD files be provided for record keeping and review.

Sheet size: 24" x 36"

1. Plan

A full sized plan and profile of appropriate scale, typically between 1" = 20' and 1" = 50', showing the existing and proposed drainage area and conveyance systems showing all hydraulic and physical data such as all existing or proposed utilities, existing or proposed streets, surfacing and improvements, street centerline and stationing, right-of-way margins, street names, legal identifications of properties such as lot number or tax lot number, section subdivision lines, all property lines and all water and sewer easements and rights-of-way.

Show the following:

- a. Locations of streets, right-of-ways, existing utilities, driveways, and water mains.
- b. All associated right-of-way, adjacent property lines, easements and/or proposed property lines. All utility easements, including County recording numbers.
- c. Existing and proposed site topography at a minimum of one (1') foot intervals on the subject property including the drainage area, and all adjacent properties sufficient to determine all potential topographic impacts of the construction, including natural or manmade drainage courses or pipes to the extent necessary to determine all hydraulic or hydrologic impacts of the proposed projects.
- d. Vicinity and site location map.
- e. All known existing structures, both above and below ground, which might interfere with the proposed construction, particularly sewer lines, gas mains, storm drains, overhead and underground power lines, telephone lines, and television cables.
- f. Show the size, material, and length of each storm sewer main, connection and/or channel cross section.
- g. Street alignment in stations of one-hundred-foot intervals.
- h. Bearing on street centerline.
- i. Curve data on all horizontal curves, 50; stations minimum.
- j. Typical roadway section of proposed street.
- k. Street profile with original ground line, stationing in intervals of one hundred feet, and grade line showing grade percents and vertical curves.
- l. Bottom elevations of all ditches, channels, ponds, swales, and streams.
- m. Erosion and sedimentation control plans.
- n. An address number will be assigned to all new parcels at the time of final plat, or site plan review.
- o. Other items as may be required by the Public Works Superintendent.

2. Traffic Impact Analysis:

A Traffic Impact Analysis (TIA) is a specialized study of the impacts that development will have on the surrounding transportation system. The TIA is an integral part of the development impact review process.

It is specifically concerned with the generation, distribution, and assignment of traffic from the “new development.” New development is defined as a site action that triggers SEPA requirements.

A full or partial TIA may be required if:

1. The new development generates 20 or more new PM peak hour trips.
2. The project requires a SEPA review.
3. The new development will generate more than 50 peak hour trips at a time other than the PM peak hour.

The scope of a TIA will be determined by the City on a case-by-case basis.

5.3 General Construction Requirements

Nothing in these general construction requirements or other components of the City’s Development Standards, nor City policies or ordinances, shall be construed as creating a contractual relationship between the City and the Developer’s Contractor or creating any City obligation to the Contractor. The Developer shall be solely responsible for the Contractor’s work, actions and for the Contractor’s compliance with City requirements for the project.

1. Work shall be performed only by Washington State licensed and bonded contractors with demonstrated experience in constructing public water systems of the type being proposed for construction.
2. All underground work shall be inspected full time by the Design Engineer or his/her qualified representative. The qualifications of the proposed inspector shall be provided to the City a minimum of 14 days prior to construction for City review and concurrence.
3. The City reserves the right to observe and/or inspect the work as it may deem appropriate. The City shall be notified 48 hours in advance of start of construction.
4. The City shall be present for all testing. The City shall be notified a minimum 24 hours in advance of all testing.
5. Literature for all products and materials shall be submitted to the City for review prior to delivery to the project site. Such literature may also be required for City review during City reviews of designs and plans/specifications.
6. Pipe trenches shall not be backfilled until pipe and bedding installation has been inspected and approved by the City’s Inspector.
7. All testing shall be completed and approved prior to asphalt treated base or finished paving is accomplished and after all other underground utilities have been installed.
8. Record Drawings shall be individually stamped by a Washington State licensed professional engineer who shall attest to the fact that the information is correct. Record Drawings shall be to City datum, and must be submitted in a format as set forth herein, and approved by the City prior to project acceptance along with all equipment O&M literature and manuals, if applicable. All as-builts and associated survey data shall be submitted to the City prior to final acceptance.

5.1 Right of Way

- A. Public right of way widths shall be in accordance with PMC, these standards or as directed by the Public Works Director. Minimum right of way widths are shown in this code and are determined by the street type.

- B. Narrower right of way widths may be allowed under unique circumstances at the discretion of the Public Work Director via the Design Variance process. Variance requests will be evaluated based on topography, traffic condition, emergency vehicle access, zoning, existing development and on-street parking requirements.

5.4 Roadways and Alleys

A. Street Geometry

- a. Public street widths shall be in accordance with PMC and these standards. Private roads within the City limits shall be in accordance with local access road standards. Minimum widths and roadway design criteria are shown in detail drawings and Table 5.2.1 below.
- b. Turnarounds are required when dead end streets are longer than 150' to allow emergency and service vehicles to turn around. The following types of turnarounds are acceptable for public and private streets. Other turn around designs will be considered by the Director on a case-by-case basis, but must meet the most current version of the International Fire Code (IFC).
 - i. Standard Cul-de-sac: The standard cul-de-sac is preferred for construction on local access dead end streets. The radius point of the bulb is on the street centerline.
 - ii. Offset Cul-de-sac: An offset cul-de-sac has a radius point offset from the centerline, with one curb being tangent to the bulb curb. Like the standard cul-de sac, it is intended for use on local access dead end streets.
 - iii. Hammerhead: The hammerhead termination may be used on local access dead ends. Construction of a hammerhead termination on local access streets is allowed only on approval of the Director.
 - iv. The following specific design criteria shall apply to the design of cul-de-sacs:
 - 1. a. Cul-de-sac islands shall not be allowed.
 - 2. Minimum curb radius for the bulb shall be 50 feet.
 - 3. Minimum right of way radius for the bulb section shall be 56 feet. If the sidewalk is to be located on an easement, the minimum right of way radius is 51 feet.
 - 4. Unless otherwise approved by the Engineer, cul-de-sacs shall be designed to "drain out" to the adjacent street to avoid flooding if the storm drainage system fails.
 - 5. Cul-de-sac profiles shall be established to provide minimum one percent grades at all places along the gutter lines.
- c. Entrance Gates
 - i. Proposed entrance gates shall not interfere with emergency vehicle access. An adequate fire lane must be provided. If a center island is used, a minimum 14- foot wide lane between the curb faces shall be provided. The center island shall not extend past the end of the gate when it is fully opened. In a case where there is no center island, the minimum road width is 20 feet. No parking on either side of the street will be allowed within 48 feet of the gate on both sides of the gate. The no

parking zone shall be clearly signed on both sides of the gate. When fully opened, the gate shall not block access to structures or fire hydrants.

- ii. Gated streets require a queuing area to allow vehicles to exit the connecting street prior to the gate. The queuing area must be at least 48 feet long to accommodate fire vehicles.
- d. Intersections
- i. Arterial intersection designs are driven by the demands of the anticipated traffic flow. The minimum centerline distance between intersections shall be 150 feet.
 - ii. Generally, intersections should be at right angles. The minimum acute intersecting angle for streets shall be 70 degrees. For stop sign-controlled streets the 70° (tangent) portion shall extend along the controlled street a minimum of 30 feet from the end of the curb radius. For all cases, the effects of sight distance shall be considered.
- e. Alleys
- i. All alleys shall be a minimum of twenty feet wide.
- f. Profile Grades
- i. The maximum profile grade for all public streets is 8 percent. For private streets, the maximum profile grade shall be 10 percent. A variance may be granted by the Director considering topography, safety, maintainability, function, and emergency vehicle access. The minimum profile grade for all streets is 0.8 percent.
- g. Horizontal Curves
- i. Horizontal curves are to be determined in accordance with normal civil engineering procedures, considering design speeds, sight distances, roadway crown, building proximity, and vertical grades. A 100-foot radius shall be considered the minimum unless otherwise authorized by the Engineer.
 - ii. The maximum superelevation on horizontal curves shall be four (4) percent. The minimum horizontal curve radii shall be determined per AASHTO Design for Low Speed Urban Streets, based on design speed, which shall be 5 mph over the speed limit, and considering the roadway crown.
 - iii. Pavement widening on horizontal curves to accommodate large vehicles shall be considered per AASHTO Chapter III - Elements of Design, Table III-23.
- h. Pavement Markings
- i. Design plans for pavement markings shall be submitted to the Public Works Department for review and acceptance prior to construction. Plans shall include all existing and proposed striping, show the full width of the street, and show existing conditions beyond the proposed development. Any existing markings that are to be removed shall be clearly designated.
 - ii. All crosswalks, stop bars and parking tees shall be thermoplastic. Centerline and shoulder striping may be painted.
 - iii. All pavement markings shall conform to the MUTCD specifications.

i. Monuments

- i. Prior to any construction within City rights-of-way, the Developer shall employ a Washington State Licensed Surveyor to conduct through search for all survey monuments. Any found monuments shall be referenced in accordance with current applicable state laws. A copy of the references shall be submitted to Public Works.
- ii. If placing new or replacing existing monuments is required the developer shall do so in accordance with current applicable state laws.
- iii. At a minimum, monumentation shall be provided and constructed at the following locations in accordance with PMC and:
 1. At center of each cul-de-sac
 2. At point of intersection of all streets
 3. At point of curvature on all horizontal curves
 4. At point of tangency on all horizontal curves
 5. On the roadway centerline at the end of every plat
 6. When the above locations are obstructed and a monument is unable to be set, reference points shall be set in a manner where the actual monument location can be re-established.
 7. The location of the monuments shall be clearly marked on the construction plans and final plat.

j. Street Signs

- i. All existing and proposed street signs required as part of street design shall be shown on the plans submitted to Public Works and shall be subject to review and approval by the Director. The plans shall include all existing and proposed signs, show the full width of the street, include any signs on the opposite side of the street, and show existing conditions beyond the proposed development. 2. All traffic control devices (TCD), including, but not limited to regulatory signs, warning signs, and guide signs shall adhere to the manual on Traffic Control Devices (MUTCD) standards
- ii. Sign Posts: Signs to be mounted on steel sign support ST-1in accordance with WSDOT Standard Plan G-24.50-04.

k. Street Lighting

- i. Design of street lighting shall be submitted to Public Works and shall be subject to review and approval by the Director. Street lighting plans shall be provided on arterials and all specified pedestrian and bike routes. Lighting shall be by ANP Lighting: Series W527-M0337LD-D-W-40K-XXX-UNV-PM20-100GLFRGUP with 14' tall, 4" diameter fluted black powder coated pole with post cup mount with flush grade pole base.

l. Bikeways and Off-Road Pathways

- i. Bicycle facilities shall be constructed where designated in Table 5.2.1 below, and shall be designed in accordance with City Standards. Where shared pedestrian/ bicycle pathways are constructed, the minimum width shall be 10 feet.

- ii. Off-Road Multi-Use Pathways
 - 1. All off-road pathways shall be constructed as multi-use pathways and designed to accommodate, at a minimum, pedestrians and bicyclists. To promote multi-use compatibility and public safety, all public and private off-road multi-use pathways shall be constructed in accordance with state design standards below. Design drawings demonstrating compliance with said standards shall be submitted to the Public Works for review and approval prior to construction. Deviations to these design standards may only be permitted with the approval of the Public Works Director.
 - a. Width: The minimum width of all off-road pathways shall be 10 feet.
 - b. Construction: The pathway pavement may be constructed of either asphalt or concrete.
 - c. Section: Asphalt shall be a minimum of two inches thick over four inches of crushed gravel, on a compacted subgrade. Concrete shall be four inches thick over two inches of crushed gravel, on a compacted subgrade.
 - d. Shoulders: The pathway shall include a minimum of one-foot level shoulders on each side.
 - e. Clearing: Trees and brush shall be cleared a minimum of fourteen feet (two feet each side of the pathway to a height of ten feet).
 - f. Alignment: The pathway alignment shall follow the natural terrain of the land so as to minimize grading.
 - g. Drainage: A discernable drainage ditch shall be constructed on the uphill side of a pathway. Culverts shall route stormwater runoff to the lower side of the trail to natural drainage ways.
 - h. Grade: The maximum sustained grade shall be 12%. 15% grades may be allowed for short sections.
 - i. Side Slopes: Pathways with downhill side slopes greater than 2:1 may require protective measures such as fencing.
 - j. Pullouts Pullouts ten feet wide and 16 feet long should be constructed at significant lookout areas to allow for rest and aesthetic opportunities.

Table 5.2.1 Planned Multi-Modal Street Sections.

	Minimum Street Width	6 ft Sidewalk	5 ft Bike Lane	8 ft. Onsite Parking	Lane Width	Comment
Riverside Drive	38	S	Both	N	10	Penninsula Park to Warren Ave
Eveline Street	38	SW	Both	NE	10	From Warren to Riverside
Chris Street	25	SW	SW	None	10	
North Street	25	SW	NE	None	10	from Beach to Warren

Beach Street*	23	NW	N	SE	10	from North St to Chris St.
Warren Avenue	32	N	Both	varies	11	
Commercial Avenue	37	SE	N	SE**	12	
Lakeshore Drive	37	Both Sides	S	Both***	12	
S. Dawson Street	37	S	N	Both	12	Commercial to Lakeshore

*Beach St is one way

**gravel parking on the north side

***intermittent angle parking

Table 5.3.1 Pateros Roadway Inventory

Street	Functional Classification	FCID ⁽⁴⁾	Federal Functional Class Code	FHWA Roadway Owner Code	WSDOT Urban Rural Code
US 97	Rural Other Principle Arterial ⁽¹⁾	N/A	3	N/A	N/A
Warren Avenue	Rural Minor Collector ⁽²⁾	24PR	6	4	98
Lakeshore Drive	Rural Minor Collector	24PR	6	4	98
Riverside Drive	Rural Minor Collector	24PR	6	4	98
Watson Draw Rd.	Rural Minor Collector	24AE	6	4	98
Other Streets	Local Access ⁽³⁾	N/A	N/A	N/A	N/A

⁽¹⁾ Rural Other Principal Arterials provide mobility through rural areas.

⁽²⁾ Rural Minor Collectors gather traffic from local roads and distribute them to arterials.

⁽³⁾ Local access roads provide access to adjacent property.

⁽⁴⁾ Functional Class Route Identifier.

6.0 Technical Specifications

6.1 Products

The City retains the right to reject products or materials that do not meet the following requirements.

Description

1. Materials and equipment furnished and installed shall be manufactured, fabricated, or constructed to meet all applicable safety requirements.
2. All material and equipment shall be of new manufacture and, when required by the City, a certificate shall be supplied attesting to this fact.
3. All products and materials shall comply with these Standards, as well as all applicable codes and regulations.
4. Materials and equipment furnished shall be delivered, handled, and stored in accordance with manufacturer's recommendations and the provisions of this section.

Quality

The Developer shall, whenever required during the progress of the work and after completion of construction, furnish proof acceptable to the City that all items installed equal or exceed all requirements specified in these Standards.

Delivery

1. Deliver, store, and handle products in accordance with the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.
2. Deliver products to the site in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Labels to include:
 - a. Name of product.
 - b. Name of manufacturer.
 - c. Date of manufacture, where applicable.
 - d. Shelf life, where applicable.
 - e. Quality of grade, where applicable.
 - f. Lot number, where applicable.
 - g. Fire performance characteristics, where applicable.

Handling

1. All means possible shall be used to protect materials and equipment before, during and after installation.
2. The City shall not accept damaged materials or equipment. Damaged materials or equipment shall be replaced to the approval of the City prior to final acceptance.

Storage

1. All equipment and materials shall be stored in a safe, dry place as to prevent any deterioration of the product's quality.

2. Store products at the site in a manner that will facilitate inspection prior to installation. Store products subject to damage by the elements above ground, under cover in a weather tight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

6.2 Technical Specifications

These Technical Specifications are organized generally in the Construction Specification Institute (CSI) format. Standard Detail drawings are located in the appendix. No attempt has been made in these Construction Standards or Details to segregate work covered by any trade or subcontractor under one specification.

APPENDICES

APPENDIX A

Section 31 23 00 Trench Excavation, Backfill and Compaction
Section 33 14 00 Water Pipe, Services and Appurtenances
Section 33 19 00 Water Meters and Appurtenances
Section 03 40 00 Manholes, Wet Wells and Dry Wells
Section 34 42 00 Storm Drains
Section 33 31 00 Wastewater Pipelines
Section 32 10 00 Surface Improvements and Restoration
Section 32 90 00 Landscape Restoration
Request for Design Variance Form
Preconstruction Meeting Agenda
Standard Construction Detail Drawings

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TRENCH EXCAVATION, BACKFILL AND COMPACTION

Section 31 23 00 - Page 1

1.00 GENERAL

1.01 DESCRIPTION:

- A. The work specified in this Section includes trench excavation for pipe and appurtenances, bedding, trench backfill, compaction, finish grading and clean-up. Unless specified elsewhere, the work of this Section also includes clearing, grubbing, removal of all materials of whatever nature in the excavation limits, disposal of all waste materials, repairs and restorations, and maintenance of temporary surfaces as required.
- B. Special provisions, requirements and/or revisions to this Specification and/or Bid Item(s) may be included in Section 01 01 00 (green pages) and/or on the Drawings or Details.
- C. See also Section 32 10 00, Surface Improvements and Restoration for A.C. pavement, concrete, and other surface removal and placement items.

1.02 QUALITY ASSURANCE:

A. Soils and Backfill

Moisture density standard ASTM D1557 method unless otherwise specifically approved.

B. In-Place Density Determination

Sandcone method ASTM D1556 or nuclear method ASTM D6938.

C. Classification of Soils

ASTM D2487

1.03 SUBMITTALS:

- A. Submittals shall conform to Section 01 33 00 of the Specifications.
- B. All materials shall be approved by the Engineer prior to the start of work. The Contractor shall notify the Engineer in advance of his intention to import material and of the borrow area selected. If feasible, the Engineer will inspect the material and source for approval, or he shall require the Contractor to submit a representative sample of proposed material for review. If the Contractor chooses to manufacture and/or process, in any way, materials to be used, whether the material is to be imported, borrowed on-site, or obtained directly from the excavation, such material and process shall be approved by the Engineer prior to its use. All materials, whether native or imported, shall be subject to continued review by the Engineer for approval or rejection as the work progresses.
- C. Unless specified otherwise elsewhere, prior to beginning of any excavation work, the Contractor shall provide the Engineer with an opportunity to obtain representative samples of all backfill materials, including representative native materials, to be used for determination of Proctor moisture-density curves. Unless specified otherwise, the cost of such determinations shall be the responsibility of the Owner. It is the Contractor's responsibility to provide such samples, or the opportunity for the Engineer to obtain such samples adequately, in advance of the work.

2.00 PRODUCTS

2.01 FOUNDATION STABILIZATION MATERIAL:

Unless other or additional requirements are specified in Section 01 01 00 and/or on the Drawings or Details, foundation stabilization material, where required to replace soft or unsuitable trench bottoms, shall be well-graded, 2-1/2 inch minus granular material essentially free of dirt, silt, clay, and organic or deleterious matter. The material shall have no more than 10% by weight passing the No. 200 sieve size.

2.02 PIPE BEDDING MATERIAL:

A. Ductile Iron & Steel Pipe (All Sizes), Thermoplastic Pipe 4" Diameter and Larger

Unless other or additional bedding material requirements are required by the Drawings, pipe bedding material to be installed and compacted under, around and above all pipe as specified in this Section shall be clean, well-graded sand or sand/gravel mixture with a maximum particle size of 3/4 inch, entirely free of clay, silt, organic or deleterious matter and frozen material. Minimum material weight shall be 110 pounds per cubic foot at 95% relative compaction. Bedding shall conform to the following gradation requirements:

<u>Sieve Size</u>	<u>Percent Passing</u>
1" square	100
1/4" square	25-80
U.S. No. 200	0-7

B. Copper Water Service Pipe, Thermoplastic Pipe Less Than 4" Diameter

All requirements of 2.02 A. herein apply, except that bedding material shall be clean sand, free of gravel, with no more than 5% passing the No. 200 Sieve (by weight).

2.03 TRENCH BACKFILL MATERIAL:

Unless other or additional trench backfill material requirements are indicated on the Drawings, trench backfill material shall be well graded, sand, gravel, crushed rock, or native soil material free of humus, organic, frozen or deleterious material and debris. It shall contain no rocks larger than 12" in largest dimension, with no more than 25% of the material being such rock. The material shall contain no more than 5 percent by weight passing the No. 200 sieve. It shall also be free of any consolidated, saturated or deleterious matter that may damage the pipe or structures or present a compaction problem. There shall be no rocks larger than 4 inches in largest dimension within 2 ft. of the pipe. There shall be no material larger than 3 inches in largest dimension in the upper 7 inches of the trench surface or subgrade zone. If the Engineer determines that the native excavated material is unsuitable for trench backfill, the Contractor shall backfill with approved native material from another work area or, if not available, with imported material.

3.00 EXECUTION

3.01 PREPARATION OF EXCAVATION AREA:

- A. Where clearing or partial clearing of the pipeline alignment and/or work area is required, such clearing shall be completed prior to starting trench excavation. Unless other or additional clearing, grubbing, and/or existing surfaces removal requirements are specified elsewhere in the Specifications or on the Drawings, pavements, trees, roots, brush, grass and other materials in the pipeline alignment that are unsuitable for trench backfill shall be stripped and disposed of off site, in conformance with all applicable ordinances and regulations. In no case shall trench excavation material cover brush or trees.
- B. All bituminous and concrete pavements in the trench excavation area shall be neatly cut in an approved manner prior to trench excavation. Such pavements, including roads, walks, parking areas, curbs, and other paved surfaces, shall be cut on each side at least 12" wider than the width of the top of the trench. In no case shall existing pavements be removed in such a manner as to damage the remaining pavement or lift it off its base material. Pavement materials so cut and removed shall be disposed of off site, in conformance with all applicable ordinances and regulations. Additional or other pavement removal requirements may be indicated on the Drawings or elsewhere in the Specifications.
- C. Unless a separate payment item or items are provided in the Specifications or on the Drawings, all costs of such stripping and disposal of waste material shall be considered incidental to trench excavation and no additional payment will be made therefore.

3.02 OBSTRUCTIONS:

- A. Objects encountered during trench excavation operations, such as tree roots, stumps, abandoned structures or portions of structures, abandoned piping, logs, debris, paving, railroad ties, or any and all other obstructions shall be removed and disposed of off site, in conformance with all applicable ordinances and regulations. The Engineer, if requested, may make changes in the pipeline alignment to minimize interference caused by such obstructions when encountered.
- B. Unless a separate payment item or items are provided in the Drawings or Specifications, the cost of removal and disposal of such obstructions, as well as the cost of delays that may be caused by same, shall be considered incidental to trench excavation and no additional payment will be made.

3.03 CLASSIFICATION OF TRENCH EXCAVATION:

A. General

1. Trench excavation may be classified or unclassified. If a trench rock excavation or drilling and blasting bid item is included, then the following definition of trench rock excavation shall apply to that bid item. If no trench rock excavation bid item is provided, and if no other excavation classifications and bid items are provided, then all trench excavation of any nature, including excavation and disposal of rock as defined below, shall be considered included in trench excavation and no additional payment will be made.
2. All trenches shall be sloped and/or braced and sheeted and trench excavation material stored and retained in accordance with the most stringent of the applicable laws and regulations, in accordance with good safety practice, and as necessary to protect persons, adjacent or affected

property, and the work. The Contractor shall be solely responsible for determining and utilizing the necessary sloping, bracing and/or sheeting.

B. Trench Excavation

Trench excavation shall be such excavation where the excavated material is piled essentially beside the trench as it is removed and backfilled from this position. Also included in this definition is any and all material of whatever nature that must be transported to another site for disposal or for temporary stockpiling prior to backfill, hauled without stockpiling due to confined work area, or transported to another trench backfill location for any reason. Unless specifically provided for in other bid item(s), all costs of such handling, transport, stockpiling and/or disposal shall be considered incidental to trench excavation and no additional payment will be made.

C. Rock Excavation

1. Rock excavation shall be excavation of boulders (exceeding 1.0 cubic yard in volume), ledge rock, or other solid rock material requiring pneumatic equipment ("hoe ramming") or systematic drilling and blasting for its removal. Boulders, or other rock larger than 1.0 c.y. not requiring the use of pneumatic equipment ("hoe-ramming") or drilling and blasting, shall not be considered rock excavation under this bid item. Hard pan, hard clay and glacial till or sandstone, siltstone, shale or other rock which is soft or weathered, or other extensively fissured rock will not be considered rock excavation and is not defined as rock requiring drilling and blasting or hoe ramming. No drilling and blasting or hoe ramming of rock shall be done without prior approval by the Engineer that such operations are required.
2. All boulders, ledge rock, and other solid rock shall be removed to provide at least 6" clearance below the pipe. Excess excavated rock material and rock excavation that is not suitable for backfill shall be removed and disposed of off-site by the Contractor. Unless a specific bid item is provided, such removal and disposal of excess or unsuitable rock excavation material shall be considered incidental and no additional payment shall be made. Materials removed shall be replaced with materials from adjacent excavations or with imported material as designated by the Engineer.
3. If rock excavation is to be accomplished through drilling and blasting, the blasting shall be done in such a manner as to prevent damage to structures, utilities and other improvements, but in no case shall ground vibration exceed 2 inches/second peak particle velocity for 40 hertz and greater frequency of vibration. The Contractor shall submit a blasting program 7 days prior to any drilling. Drilling and blasting shall not commence until the Engineer has reviewed the submitted blasting program. Review of the blast plan by the Engineer shall in no way relieve the Contractor of the sole responsibility for the accuracy, adequacy, or safety of the plan when implemented in the field, nor for any damage to structures, utilities, or improvements that may result. The Contractor shall be solely responsible for the planning and execution of any and all drilling and blasting and for its adequacy, safety, and compliance with all applicable laws, ordinances, and regulations. All drilling and blasting shall be done in strict conformance to federal, state, and local requirements pertaining to this work and with materials and methods that assure the protection of persons and property. Any damage or injury to persons or property, including existing buried utilities or structures, resulting from rock excavation operations shall be the sole responsibility of the Contractor.

4. Whenever blasting is required, the Contractor shall conduct a pre-blast structure survey on all structures above and below ground within the affected area of his work that may be subject to blasting damage. The survey shall be conducted prior to the start of any blasting operation and shall include an area of at least 250 feet ahead, behind, and to the sides of any area to be blasted. The Contractor shall complete the pre-blast survey of all structures that could be affected by a particular blast a minimum of two (2) days prior to said discharge, and deliver a copy of the survey to the Engineer not later than one (1) day prior to the blasting operation. The Contractor also shall make every effort to keep the owners of structures that could be affected by a blast informed as to the timing of the discharges. However, it is the Contractor's responsibility to conduct the survey in a manner to ensure all structures having reasonable possibility of sustaining blast damage are included in the survey, irrespective of their proximity to blast site. The pre-blast structure survey shall be recorded on appropriate forms and may be supplemented by photographs, video tapes, tape recordings or other suitable methods of documentation. One copy of the form shall also be delivered to the Engineer no later than one (1) week after the survey is completed, unless required sooner as provided for above.
5. All blasts shall be recorded with one or more seismographs capable of recording the three components of motion. The Engineer shall be notified a minimum of two (2) hours prior to blast detonation. Seismographs shall be located proximate to the excavation site and adjacent to the closest sides of the closest structures (or wells) to the blast. The Contractor shall record the location, time, and ground vibration for each blast on a suitable documentation form and deliver a copy of the form to the Engineer no later than one (1) week after the blast is detonated.

3.04 TRENCH EXCAVATION SAFETY SYSTEM:

- A. The Contractor shall provide a Trench Excavation Safety System in compliance with all federal and state regulations. The safety system shall meet the provisions of the Washington Industrial Safety and Health Act, as set forth in the latest Revised Code of Washington (RCW), as required for trench excavations.
- B. Neither the Engineer nor the Owner will inspect, review, approve, or have any liability for the adequacy of the Contractor's Trench Excavation Safety System. Payment for the Trench Excavation Safety System will be made under a separate Bid Item. Payment for the Trench Excavation Safety System shall not be construed as acceptance or approval of the Contractor's Trench Excavation Safety System.
- C. The bid item for such Trench Excavation Safety System shall reflect the actual cost of providing the system. Bids received with a lower than actual cost may be judged non-responsive and, therefore, rejected.

3.05 LIMITS OF EXCAVATION:

- A. The length of trench excavated in advance of pipe laying shall be kept to a minimum and, in no case, shall exceed 150 feet, unless specifically approved by the Engineer.
- B. The trench shall be of sufficient width to permit proper assembly of the pipe and installation and compaction of bedding and backfill materials. Trench width at the surface of the ground shall be kept to the minimum necessary to install the pipe, but in full conformance with federal, state, and local safety requirements. Trench width shall also conform to applicable Drawing or Details.

3.06 EXCAVATION LINE AND GRADE:

- A. Trench excavation shall be made to the lines and grades indicated by the Drawings and Specifications and/or as established by the Engineer in the field, with proper allowance for all bedding or foundation replacement requirements. Unless specified otherwise in Section 01 01 00 or on the Drawings or Details, excavation shall allow for the installation of bedding material below the pipe as specified herein under 3.09 "Bedding Material Installation and Compaction". If the trench is excavated below the required grade at the option of, or error by, the Contractor, the trench bottom shall be brought back to grade with compacted bedding or foundation replacement material compacted in lifts to 95% density, as herein specified, at no additional cost to the Owner.
- B. Trench excavation planning and operation shall result in the installation of all pipe, appurtenances and structures in full conformance with the installation and testing requirements specified for the particular type of pipe, structure, and/or appurtenances for which the excavation is intended. In the case of water pipe or other pressure pipe installations, the trench shall provide for straight grades between vertical bends shown on the Drawings, with no localized high points. A depth deeper than the specified minimum excavation depth may be required to avoid such localized high points. In the case of gravity sewer pipes, the specified finished pipe grade and alignment will require exacting and careful trench excavation and workmanship to provide a firm trench bottom and pipe foundation. In all cases, a firm and unyielding trench bottom shall be provided for pipe, structure and appurtenance foundation.

3.07 UNSUITABLE FOUNDATION CONDITIONS:

Wherever trench excavation results in a trench bottom that contains voids, is saturated, soft, or is in any other way unsuitable for foundation in the opinion of the Engineer, such trench bottom material shall be removed to a depth approved by the Engineer and disposed of by the Contractor. Approved Foundation Stabilization Material shall be placed and compacted by the Contractor in lifts to a relative density of at least 95%, as herein specified.

3.08 CONTROL OF WATER:

- A. During excavation, installation of pipe, structures and appurtenances, backfill operations, and the placing and curing of concrete, all excavation areas shall be kept free of water except as otherwise specified or designated on the Drawings. The Contractor shall, at all times, control surface and subsurface drainage so as to prevent its entering the work. In no case shall the pipe or appurtenances being installed be used as a conduit to remove or transport surface or subsurface drainage.
- B. The Contractor shall furnish, install, and operate in such locations and, when necessary, such equipment and materials that are required to keep excavations free from water, and shall dispose of water without causing nuisance, damage, or injury to persons or property. He shall, at all times, have sufficient and reliable pumping equipment and pump drives on hand, in good working order, and operational, in spite of all ordinary emergencies, including power outages. He shall also have available, at all times, adequate and competent manpower to operate and maintain such equipment as necessary.
- C. The control of groundwater shall also prevent the softening of trench and excavation bottoms and dewatering materials, equipment, and methods shall prevent the removal of natural soils. Dewatering operations shall draw down subsurface water to a level at least 1 foot below the bottom of the

excavation, result in the maintenance of the undisturbed state of foundation soils, and allow proper pipe, structure, and appurtenance installation, as well as the installation and compaction of all backfill materials to the specified density. Dewatering installation and operations shall not reduce the water level to the extent that it may damage or endanger other structures or improvements in the vicinity.

- D. Open and cased sumps shall not be used as primary dewatering methods for excavations deeper than 3 feet below the static water level.
- E. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the foundation soils to prevent disturbance of compacted backfill materials and prevent flotation or movement of pipe, structures, or appurtenances.
- F. Unless a separate Bid Item is provided, all control of water and dewatering design, labor, materials, and equipment shall be considered incidental to trench excavation and no additional payment will be made therefore.

3.09 BEDDING MATERIAL INSTALLATION AND COMPACTION:

- A. The specified pipe bedding material shall be placed and compacted for all pipe, structures, and appurtenances. All bedding material shall be compacted to 95% relative density, as determined by ASTM D-1557, unless otherwise indicated in Section 01 01 00 or on the Drawings or Details.
- B. In addition to the requirements specified herein, all pipe backfill and compaction methods and equipment shall also conform to the pipe manufacturer's written installation instructions or manuals, which the Contractor shall have on the site. Water settling of the trench to attempt compaction shall not be allowed, unless specifically approved by the Engineer or indicated on the Drawings.
- C. Pipe bedding material shall be placed in the trench in such a manner as to protect the pipe and appurtenances from movement or damage. In general, material shall be placed into the trench by pushing it from the end of the trench at an angle along and over the pipe so that the material is placed in the form of a rolling slope rather than by side filling. Free falling material shall not be allowed to fall directly on the pipe.
- D. Unless specified otherwise in Section 01 01 00 or on the Drawings or Details, a minimum of 4" of bedding material shall be installed under the pipe where no rock exists in the trench bottom and a minimum of 6" under the pipe where the trench bottom is in rock. The trench bottom and bedding shall be hand-graded and compacted to provide uniform and continuous support for the full length of the pipe. Depressions in the bedding shall be hand-formed to allow proper assembly of the pipe. Care should be taken to make the depression no larger than necessary, and to hand-fill and compact bedding material into and around the pipe bell to provide adequate support of the pipe and pipe joint.
- E. Bedding material shall be placed in maximum 8" lifts to the spring line of the pipe, taking care to adequately place and compact the material for the full width of the trench to the specified density, under and around the pipe on both sides evenly, and for its full length, so as to provide adequate lateral pipe support and strength without altering its proper grade and alignment. T-bars of proper weight and shape shall be used for hand-compacting bedding material under and around the pipe, taking necessary precautions to prevent movement of the pipe during the operation.
- F. After placement and compaction of bedding material to the pipe spring line, additional bedding material shall be placed and compacted in sufficient lifts to obtain the specified compaction. Unless

specified otherwise on the Drawings or in Section 01 01 00, bedding material shall be placed and compacted to a depth of at least 12" above the pipe and for the full width of the trench.

- G. Bedding and/or side support material that is disturbed by removal or moving the trench excavation safety system shall be re-compacted to specified density before proceeding with backfilling.

3.10 TRENCH BACKFILL AND COMPACTION:

- A. Unless indicated otherwise on the Drawings, all trench backfill in roadway and other surfaced areas shall be compacted to at least 92% of maximum density, as determined by AASHTO T-180, except the top 2' of backfill under paved areas shall be compacted to 95%. Trench backfill in other areas shall be compacted to at least 90% of maximum density, as so determined. All trench backfill material shall be as specified herein.
- B. The Contractor shall not side fill the trench with backfill material until at least 2' of bedding and backfill material has been placed and compacted. Trench backfill material, as specified, shall be placed and compacted in lifts to the specified density. The Contractor shall select and use compaction equipment such that the pipe and appurtenances are not moved or damaged in any way. In general, heavy self-propelled equipment shall not be operated in the trench until at least 3' of backfill has been placed and compacted.

3.11 BACKFILL SETTLEMENT:

Settling of any trench within one year after final acceptance of the work shall be considered incontrovertible evidence of inadequate compaction. Upon notification of such settlement, the Contractor shall promptly perform such remedial work as may be required to correct the deficiency to the satisfaction of the Owner, including replacement of surfacing materials, at no additional cost to the Owner. If such remedial work is not promptly performed, the Owner may exercise its rights as holder of the required performance bond and make such repairs as it deems fit, recovering the resulting expenses from the bond surety.

3.12 RESTORATION, FINISHING AND CLEAN-UP:

The Contractor shall restore, replace, or repair such surfaces, structures, and improvements as may have been disturbed, removed, or damaged as a result of his operations. All such items shall be returned to a condition equal to that before the work began and to the satisfaction of the Owner. All surplus and waste materials shall be removed and surfaces cleaned. Of particular importance are existing drainage facilities and ditches, which shall be carefully and completely restored to their intended function as soon as possible after disturbance, even if all other work in the area is still under way. Partial or final payments may be withheld if required restorations, repairs, finishing and clean-up are not satisfactorily completed.

3.13 TRENCH BACKFILL SURFACE MAINTENANCE:

- A. Unless required otherwise on the Drawings or specified elsewhere in the Specifications, temporary trench backfill surface restoration and maintenance shall be as required in this paragraph and performed at no additional cost to the Owner.
- B. The Contractor shall diligently and continuously maintain temporary trench surfaces after backfill to provide smooth and firm traffic surfaces, where required, until permanent surfacing is placed. This

maintenance may include placement of crushed rock, oil, and/or temporary pavement materials to keep traffic areas smooth. Dust control shall also be performed as required.

- C. Temporary surfaces shall be maintained by the Contractor until the following operations and items, as required, have been completed and approved by the Engineer:
1. Installation of service connections, lines and appurtenances
 2. Installation of valve boxes, cleanouts, manholes and other surface features
 3. Pipeline, manhole and other testing
 4. Clean-up and restoration of all other physical features
 5. Restoration and repair of disturbed utilities as required
- D. No permanent pavement or other surface replacement or repair shall be undertaken until the above items have been satisfactorily completed and approved by the Engineer.

4.00 MEASUREMENT AND PAYMENT

4.01 GENERAL:

- A. See Section 01 22 00 - Measurement and Payment for General Requirements. See Section 01 01 00 - Special Requirements/Bid Items for possible modifications to Standard Bid Items.
- B. If no specific bid item is provided, measurement and payment shall be considered incidental and shall be included in the bid price for other items of work for the project.

4.02 BID ITEMS:

- A. Special provisions, requirements, revisions to these Bid Items, and/or additional Bid Items, may be included in Section 01 01 00 (green pages) or on the Drawings or Details.
- B. Trenching, Bedding and Backfill
1. This Bid Item shall include all trench excavation, bedding, backfilling and compaction, including placing and compacting, not furnishing, imported bedding and backfill material if required. It shall include transporting and disposing of excess trench excavation material not included in other bid items provided, and finish grading.
 2. Measurement and Payment shall be per Lineal Foot (L.F.), as measured along the installed pipe by the Engineer. Measurement shall be made through fittings, valves, connection details, manholes and clean-outs, as applicable.

C. Furnish Imported Trench Backfill

1. This Bid Item shall include furnishing only (not placing or compacting) imported trench backfill material, in conformance with the applicable material specifications. Also included shall be transporting imported material to the site and transporting and disposing of excess trench excavation material resulting from utilization of imported backfill.
2. Measurement and Payment shall be on a unit price per Cubic Yard (C.Y.) or per Lineal Foot (L.F.), as measured by the Engineer along the installed pipe where imported backfill is placed at the direction of the Engineer. Imported material will be paid for only at the locations where its use is required by the Engineer, or specifically identified on the Plans or elsewhere on these specifications.

D. Trench Foundation Stabilization

1. Includes extra excavation of unsuitable material, furnishing, placing and compacting foundation stabilization material. Also included shall be transporting and disposing of excess excavation material resulting from utilization of imported backfill.
2. Payment shall be made on a unit price Cubic Yard (C.Y.) or Lineal Foot (L.F.) basis, as measured by the Engineer. Trench foundation stabilization shall be paid for only at locations where its use is required by the Engineer or specifically identified on the Plans.

E. Furnish Pipe Bedding

This Bid Item shall include furnishing only (not placing or compacting) bedding material, in conformance with the applicable material specifications. Material may be screened on-site or off-site and imported. Also included in this Bid Item shall be transporting imported bedding material to the site (if required), and transporting and disposing of excess trench excavation material resulting from utilization of imported bedding. Measurement and payment will be on a Lineal Foot (L.F.) basis, as measured to the nearest foot by the Engineer in the field along the installed pipes where bedding is placed. Imported (or screened on-site) bedding material shall be used for all pipe, unless specifically indicated otherwise in the field by the Engineer or specifically identified otherwise on the Plans or elsewhere in the specifications.

F. Trench Excavation Safety System

This Bid Item shall include furnishing and implementing a Trench Excavation Safety System in conformance with the applicable codes and specifications. Measurement and payment will be on a Lump Sum (L.S.) basis or on a Lineal Foot (L.F.) basis, as measured to the nearest foot by the Engineer in the field along the trench in which excavation exceeds a depth of 4 feet and where such safety system is actually used.

G. Rock Excavation

1. When included as a Bid Item, rock drilling and blasting or hoe ramming shall include all work necessary for using pneumatic equipment (“hoe ramming”) or systematically drilling and blasting boulders (larger than 1.0 cubic yard), ledge rock, or other solid rock formations to allow excavation of the pipeline trench as specified herein. Removing, hauling and disposal of oversize,

TRENCH EXCAVATION, BACKFILL AND COMPACTION

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unsuitable, or excess material resulting from rock drilling and blasting or hoe ramming shall be considered incidental and no separate payment will be made therefore. Furnishing imported trench backfill shall be considered incidental and no separate payment will be made unless a separate Bid Item is included for imported backfill. Excavation and backfill operations are included in other Bid Items. Boulders smaller than 1.0 cubic yards shall not be classified as rock requiring rock drilling and blasting or hoe ramming.

2. Measurement and Payment shall be per Cubic Yard (C.Y.) or Lineal Foot (L.F.) of drilled and shot rock or pneumatically fractured rock as indicated on the Bid Form, as measured in place by the Engineer. No drilling and blasting or hoe ramming of rock will be paid for without prior approval by the Engineer that such operations are required. Measurement and payment limits on a C.Y. basis shall not extend beyond the width of the trench bottom or beyond the actual vertical dimensions of rock within the trench. The width of the trench bottom for determining the basis of payment shall be 36" unless specified otherwise in Section 01 01 00. Vertical distances shall be measured from the upper surface of the rock as defined in Paragraph 3.03 C "Rock Excavation", to an elevation 6 inches below the underside of the pipe barrel. Measurement and payment on a L.F. basis shall be for the length of pipe trench where rock drilling and blasting or hoe ramming occurred, not including trench portions where rock was not encountered. All fixed costs for this Bid Item, including pre-blast surveys, shall be included in this Bid Item.

****END OF SECTION****

1.00 GENERAL

1.01 DESCRIPTION OF WORK INCLUDED:

- A. The work described in this Section includes furnishing and installing all water mains, fittings, valves, services, service pipe, thrust restraint and any and all other labor, materials and equipment necessary for the proper completion of the system as shown on the plans and described in the specifications. All required system disinfection and testing is also included in this Section.
- B. Special provisions, requirements and/or revisions to this Specification and/or Bid Item(s) may be included in Section 01 01 00 (green pages) and/or on the Drawings or Details.

1.02 MATERIAL STORAGE AND HANDLING:

- A. The Contractor shall make his own arrangements for adequate area and access thereto for proper and safe storing and protection of all pipe materials and appurtenances prior to installation. All pipe shall be stored on a flat and reasonably level surface, with the full pipe length supported to prevent distortion of the pipe during storage. Pipe shall not be stacked in piles higher than 5 feet. Pipe and other materials shall be unloaded, handled, transported and stored using all possible means to protect the materials and in full conformance with the manufacturer's written instructions, which the Contractor shall have on site. During cold weather, extra care shall be taken in handling all materials.
- B. Submittals shall conform to Section 01 33 00 of the Specifications.

2.00 PRODUCTS

2.01 GENERAL:

All materials required for proper completion of the work shall be new, of the highest quality, in conformance with the applicable AWWA standard, of proper pressure rating for the Owner's system and for the specified test pressure, and subject to the approval of the Engineer.

2.02 WATER MAIN PIPE:

- A. Ductile iron pipe shall be cement mortar lined with push on, mechanical, restrained or non-restrained joints as shown on the Drawings, in accordance with AWWA C104, C111, and C151 of the size shown on the Drawings and/or in the Bid Items included in this Section. See below for restrained joint specifications. Pipe shall be of the wall thickness specified in AWWA C-151/A21.51 for minimum pressure class 350 psi for pipe size 12" and smaller, unless specified otherwise on the Drawings or elsewhere in these Contract Documents. For pipe sizes larger than 12", the wall thickness class and/or pressure class rating shall be as specified on the Drawings or elsewhere in these Contract Documents. All flanged pipe shall be of the thickness specified in AWWA C-115/A21.15.
- B. PVC pipe shall be AWWA C-900 Class 235 for pipe size 12" and smaller, unless specified otherwise on the Drawings or elsewhere in these Contract Documents. For pipe sizes larger than 12", the wall thickness class and/or pressure class rating shall be as specified in the Drawings or elsewhere in these Contract Documents. All pipe dimensions, pressure classes, and dimension ratios (DRs) shall be specified in AWWA C-900/Table 1.

- C. High density polyethylene pipe (HDPE) 2½" and larger shall be DR 9 (200 psi WPR), ductile iron pipe size (DIPS) or steel pipe size (IPS) as needed to coordinate with and connect to other pipe and fittings in this project. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plan from resin of the same specification from the same raw material. All pipe shall be in full conformance with AWWA C906, have nominal burst values of three times the Working Pressure Rating (WPR) of the pipe, and be NSF approved for potable water use. Pipe shall be Driscoplex 5100, Plexco HDPE (PE4710) or approved equal.
- D. High density polyethylene pipe (HDPE) 2" and smaller shall be IPS DR 9 (200 psi WPR). The pipe shall contain no recycled compounds except that generated in the manufacturer's own plan from resin of the same specification from the same raw material. All pipe shall be in full conformance with AWWA C901, have nominal burst values of three times the Working Pressure Rating (WPR) of the pipe, and be NSF approved for potable water use. Pipe shall be Driscoplex 5100, Plexco HDPE (PE4710) or approved equal.
- E. The type(s) of pipe to be used in this project shall be as specified in Section 01 01 00 or on the Drawings or in the Bid Proposal pages. Unless indicated otherwise, only one pipe material shall be used on the project.

2.03 PIPE FITTINGS AND COUPLINGS:

- A. Water main pipe fittings shall be cement mortar lined cast or ductile iron of pressure rating in conformance with the specified pipe, and in conformance with AWWA C104, C110, C111 and C153. Fitting configuration, size and end type shall be as shown on the Drawings and as required for the pipe, valves, details and appurtenances, as specified herein. See below for restrained joint specifications.
- B. All couplings shall be ductile iron of the type and size required by the connecting pipe, material, or appurtenances and of pressure rating at least equivalent to the other materials. The location, size and type of all couplings shall be as shown on the Drawings, or as approved by the Engineer. Ductile iron for center rings, bodies and end rings shall meet ASTM A536. Gaskets shall be virgin SBR, compounded for water service and meeting ASTM D2000 3BA 715. Bolts and nuts shall be high strength, low alloy steel meeting AWWA C111. Straight couplings shall be Romac 501 or approved equal. Flanged coupling adapters shall be used above ground only and shall be Romac FCA 501, or series 2100 megaflange EBAA, IRON, Inc., or approved equal.
- C. All joints with accessories, including gaskets, shall have a minimum working pressure rating equivalent to the minimum working pressure rating of the pipe and shall be in accordance with AWWA C110, C111 and C115, including Appendices.
- D. Gaskets for flanged pipe and fittings shall be a minimum 1/8 inch thick, full-faced or ring, synthetic rubber, and meet the material requirements of ANSI A21.11. Special gaskets may be needed for pipeline pressures over 250 psi per AWWA C111 and C115 and manufacturer's recommendations. Contractor shall provide documentation of gasket pressure rating with submittals.
- E. Fittings for HDPE Pipe
 - 1. Butt Fusion Fittings shall be PE3408 HDPE and in full conformance with ASTM D3261. Molded and fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified in the plans. Fabricated fittings shall be manufactured using Data Loggers. Temperature, fusion

pressure, and a graphic representation of the fusion cycle shall be part of the quality control records. All fittings shall be in full conformance with AWWA C906 and have nominal burst values of three and one-half times the Working Pressure Rating of the fitting.

2. Electrofusion Fittings shall be PE3408 HDPE and in full conformance with ASTM F1055. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans. All electrofusion fittings shall be in full conformance with AWWA C906 and have nominal burst values of three and one-half times the Working Pressure Rating (WPR) of the fitting.
3. Flanged and Mechanical Joint Adapters shall be PE3408 HDPE and in full conformance with ASTM D3261. Fittings shall have a pressure rating equal to the pipe unless otherwise specified on the plans.

2.04 RESTRAINED JOINTS FOR PIPE, VALVES AND FITTINGS FOR DI PIPE:

- A. The type of thrust restraint used shall be as indicated in Section 01 01 00 and/or on the Drawings. If not indicated, restrained joint pipe, valves and fittings, or thrust blocks, at the Contractor's option, shall be used.
- B. All restraining type joints, glands, gaskets, couplings, clamps or other devices used with ductile iron (DI) pipe shall:
 1. Be specifically designed, tested, manufactured, FM approved, and UL listed for the specific type, material, size and class of pipe upon which it is proposed for use and for buried service;
 2. Have bodies (if applicable) made entirely of ductile iron;
 3. Have a minimum tested safety factor of 2.0 times rated pressure of both the device and the pipe for all tests, when tested on the specific pipe type, material, size and class upon which it is proposed for use.
 4. Shall be as manufactured by EBAA Iron, Inc., or approved equal.
 5. Thrust blocks shall be used at connections between an existing water main and new water main. Joint restraint is not allowed because thrust restraint of existing mains is unknown.

2.05 RESTRAINED JOINTS FOR PIPE, VALVES AND FITTINGS FOR PVC PIPE:

- A. The type of thrust restraint used shall be as indicated in Section 01 01 00 and/or on the Drawings. If not indicated, restrained joint pipe, valves and fittings or thrust blocks, at the Contractor's option, shall be used.
- B. All restraining devices other than thrust blocks used on PVC water main pipe shall meet the following requirements:
 1. Mechanical joint restraining devices shall be specifically designed, tested, manufactured, FM approved, UL listed and successfully UNI-B-13 tested for the specific type, material, size and class of pipe upon which it is proposed for use, and for buried service;

2. Push-on joint restraining devices shall be specifically designed, tested, manufactured, FM approved or UL listed or successfully UNI-B-13 tested for the specific type, material, size and class of pipe upon which it is proposed for use, and for buried service;
3. Shall have bodies and tie bolts (if applicable) made entirely of ductile iron;
4. Shall have a minimum tested safety factor of 2.0 times rated pressure of both the device and the pipe for all tests, when tested on the specific pipe type, material, size and class upon which it is proposed for use;
5. Shall be as manufactured by EBAA Iron, Inc., or approved equal.
6. Thrust blocks shall be used at the connection between an existing water main and new water main. Joint restraint is not allowed because thrust restraint of the existing main is unknown.

2.06 VALVES AND VALVE BOXES:

- A. All valves larger than 2" shall be butterfly valves or resilient seat gate valves in accordance with AWWA C504, and C509 or C515, respectively, as indicated on the Drawings, with 2" operating nut (for buried service) or handwheel opening counter clockwise. Butterfly valves shall be Class 150B, Pratt, M & H Dresser or approved equal. Resilient seat gate valves shall be American Darling, M & H Dresser, or approved equal.
- B. Except as shown on the Drawings or Detail Drawings, valve boxes for buried-service valves shall be cast iron two-piece, slide-type, adjustable boxes with cast iron drop type lids marked "Water".
- C. Inside diameter of the bottom portion of the box shall be at least 8"; minimum inside diameter of the upper portion of the box shall be 5-1/4". Only identical cast iron valve box extensions shall be utilized. Valve box complete extension shall range from 48" to 72".

2.07 FIRE HYDRANTS:

Fire hydrants shall conform to AWWA C502 with two 2-1/2" hose connections, one 4-1/2" pumper port and 5-1/2" valve opening. Operating nut shall conform to the Owner's standard.

2.08 WATER SERVICE INSTALLATION/REPAIR MATERIALS:

- A. All materials shall conform to AWWA C800. All service pipe shall be copper unless otherwise specified on the drawings or Section 01 01 00. Except at HDPE service pipe, all materials shall provide electrical conductivity.

1. Copper Service Pipe

Service pipe 1-1/2" in diameter, or less, shall be Type K soft drawn copper tubing, conforming to the applicable AWWA standard for copper water tube. Larger diameter service pipe shall be as shown or specified on the Plans or detail Drawings.

2. HDPE Service Pipe

Shall conform to paragraphs **2.02 D** and **2.03 E** of this Section ~~40-00-00b~~.

3. Service Saddles

Service saddles for ductile iron and steel pipe shall be ductile or malleable iron double strap saddles, Romac Style 202, or approved equal. Service saddles for PVC pipe shall be ductile iron with minimum 2" wide stainless steel strap. Service saddles for HDPE pipe shall be nylon saddle with stainless steel double strap and spring washers.

4. Corporation Stops

Corporation stops shall be high quality bronze water works fittings conforming to AWWA C800, with male iron pipe thread inlets and outlets suitable for the connecting service pipe material, Ford, Mueller or approved equal.

5. Curb Stops and Curb Boxes

Curb stops, if required, shall be high quality bronze water works fittings conforming to the applicable AWWA standard and with the end types shown on the Plans or Details. Standard adjustable, two-piece, cast iron curb boxes shall be properly installed on all curb stops unless shown otherwise on the Drawings. All curb stops and connecting pipe shall be installed using end types that will restrain the curb stop and prevent it from coming off the service pipe under pressure, if the service pipe on the customer side of the stop is not connected. Electrical conductivity shall be adequate for high amperage electrical pipe thawing.

6. Pack Joints

Pack joint couplings shall provide a water-tight seal on all types of service pipe, including existing service pipe materials, and shall provide both positive end restraint and positive and adequate electrical conductivity for high amperage electrical pipe thawing. They shall be Ford "Pack Joint Couplings" for pipe 1 1/4" in diameter and larger, or Mueller 110 compression couplings for pipe 1" in diameter and smaller, with the end types as required for the particular pipe diameter and material encountered.

2.09 UTILITY MARKING TAPE:

A. Detectable

Detectable marking tape shall be 5.0 mil overall thickness, with a 50 gauge aluminum foil core covered by polyethylene. Tape shall be color coded, impregnated with permanent message printing under a mylar layer. Color and message shall be appropriate for specific utility. Tape shall be THORTEC, or equal.

B. Non-Detectable

Non-detectable marking tape shall be 4.0 mil overall thickness polyethylene, color code impregnated, with permanent message printing. Color and message shall be appropriate for specific utility. Tape shall be SHIELDTEC, or equal.

2.10 PIPE LOCATING WIRE AND CLAMPS:

Pipe locating wire shall be #10 insulated THHN solid copper. Clamps for attaching the locating wire to water services shall be UL listed ground clamps commonly used for grounding wire to copper, or galvanized steel water service pipes. Clamps shall be of the appropriate size as required for the wire and service pipe in the field.

2.11 RIGID INSULATION:

Insulation shall be closed cell, extruded polystyrene foam with minimum compressive strength of 25 psi (ASTM D1621-73) and maximum water absorption of 0.3% (ASTM C272-73). Minimum insulation board thickness shall be 2", unless otherwise specified. Insulation shall be installed in locations as shown on the Drawings or where minimum cover cannot be achieved.

2.12 THRUST BLOCKS:

All concrete for thrust blocks shall be made from high-early strength concrete with 3" slump, using six (6) ½ sack mix (611 pounds per cubic yard). Minimum 28-day compressive strength shall be 3,000 psi. All steel used to restrain fittings or valves shall be hot dip galvanized after fabrication and bending and coated with bitumastic after installation.

2.13 POLYETHYLENE ENCASEMENT:

Polyethylene encasement for ductile iron pipe, fittings and appurtenances, where required, shall conform to the latest revision of AWWA C105.

2.14 DOMESTIC INTERIOR PLUMBING SYSTEMS

Domestic interior hot and cold water plumbing system 1 – ½ inch diameter or less, where shown on the Drawings may be crosslinked polyethylene (PEX) pipe. PEX piping and system shall conform with AWWA C904-06 and all sub-referenced standards in the AWWA including but not limited to ASTM F876, ASTM A877 CSA B137.5, NSF/ANSI 14, and NSF/ANSI 61. All pipe and fittings shall be rated for continuous working pressure of 100 psig at 180 degrees F. All fittings used with PEX pipe shall be of cold-expansion design and meet ASTM F877, ASTM F2080, and above referenced requirements.

2.15 OTHER MATERIALS:

All other materials not specifically described, but required for proper completion of the work, shall be new, of the highest quality, in conformance with the applicable AWWA standard, of proper pressure rating for the Owner's system, and subject to the approval of the Engineer.

3.00 EXECUTION

3.01 TRENCHING, BEDDING, AND BACKFILLING:

- A. All trenching, bedding, backfilling, and compaction for water pipelines and appurtenances shall be done in strict conformance to the requirements of Section ~~31 23 0002224~~ of these Specifications.
- B. Pipelines 4" in diameter and larger shall be bedded as specified herein and as shown on the applicable Detail Drawing. Pipelines smaller than 4" in diameter (service pipe) shall be bedded as specified

herein, with a minimum of 4" of pipe zone bedding material underneath and a minimum of 6" to each side and over the top of the pipe, unless specified otherwise in Section 01 01 00, on the Drawings, or in the Details.

3.02 INSPECTION OF MATERIALS:

All pipe and appurtenances shall be inspected before installation for cracks, defects, and workability. All dirt, scale, and burrs shall be removed as required for proper installation.

3.03 PIPELINE INSTALLATION:

A. General

1. All pipe and appurtenances shall be installed in accordance with the manufacturer's published recommendations and the appropriate AWWA Standard, except as modified by these Specifications. The Contractor's on-site representative shall have, at all times, a copy of the manufacturer's installation booklet. A copy of the appropriate installation booklet shall also be provided by the Contractor for the Engineer.
2. All pipe shall be laid on the lines and grades shown on the Drawings. If no pipe grades are shown, all pipe shall be laid on a straight grade without localized high points. In no case shall any pipe have an earth cover less than 5.0 feet, unless shown otherwise on the Drawings, or as may be approved in the field by the Engineer.
3. Maximum allowable pipe or joint deflection shall be 80% of manufacturer's recommended maximum.
4. Unless specifically approved otherwise by the Engineer, pipe laid on slopes steeper than 15% shall be laid uphill, with the bells facing uphill.
5. All water pipelines and appurtenances, including new services, shall be pressure tested and disinfected in accordance with these Specifications.
6. The Contractor shall provide adequate thrust restraint for both the test pressures and for normal system operation.

B. Fittings

All fittings shall be installed on a compacted foundation of bedding material and restrained with restrained joints or thrust blocks as shown on the Drawings and Detail Drawings. A torque wrench shall be used for final tightening of all mechanical joint and flanged end fittings.

C. Restrained Joint Pipe and Fittings

1. The type of thrust restraint used shall be as indicated in Section 01 01 00 and/or on the Drawings. If not indicated, restrained joint pipe, valves and fittings or thrust blocks, at the Contractor's option, shall be used.
2. Restraining type joints, glands, gaskets, couplings, clamps or other devices shall be installed in strict conformance with the manufacturer's written instructions for the specific pipe and fitting on

which it is being installed. Such written instructions shall be in the possession of the installer(s) at all times.

3. All restraining type joints, glands, gaskets, couplings, clamps or other devices shall remain exposed for inspection after assembly prior to backfill whether or not a First Test (see Pipeline Testing) is conducted.
4. Pipe joint restraint shall be provided on all pipe connected to a restrained joint fitting or valve unless a thrust block is used. Unless specified otherwise on the Drawings, the minimum length of pipe with joint restraint shall be as shown on the following table, as adjusted for actual test pressure and pipe depth at time of testing. The length of pipe indicated in the following table shall apply for each pipe connected to the valve or fitting; for example a 40' table value shall mean a minimum 40 feet of restrained joint pipe in each direction from the valve or fitting, at 100 psi test pressure.

**MINIMUM LENGTH RESTRAINED JOINT PIPE AT FITTINGS⁽¹⁾ AND VALVES
PRESSURE 100 PSI⁽²⁾, MIN. COVER DEPTH 4.0'⁽³⁾**

PIPE DIA.	D.I. PIPE ⁽⁴⁾	PVC PIPE ⁽⁴⁾
4", 6"	15'	20'
8", 10"	20'	25'
12"	25'	30'

⁽¹⁾ *One-half of the lengths shown may be used for 22-1/2 degree and 11-1/4 degree elbows.*

⁽²⁾ *For other pressures (i.e., test pressures) multiply by ratio to 100 psi.*

⁽³⁾ *Assumes pipe bedding compacted to minimum 90%.*

⁽⁴⁾ *For dead ends use 150% of the table value for D.I. pipe and use 200% of the table value for PVC pipe.*

D. Valves

Install valves in vertical position on a compacted foundation; check workability before installation. Valves not bolted to a fitting flange shall be installed with thrust blocks and/or restrained joints as specified herein. Furnish and install a valve box for each buried valve.

E. Valve Boxes

1. Set valve boxes during backfilling to be plumb; cushion lower unit from valve body; set top elevation 1/4-inch low in roadways and 1" high in other areas.
2. Extra care shall be taken when installing the upper unit of the valve box to provide adequate foundation under the lip to avoid future settlement of box.

F. Thrust Blocks

Install concrete thrust blocks at all changes in direction and at all connections and branches from the main. Size and place the thrust blocks in accordance with the Detail Drawings and/or as may be shown on the Drawings. Protect concrete during curing period. For restrained joint pipe, valves and fittings, install thrust blocks only where shown on the Drawings; however, at the Contractor's option, temporary blocking for testing may be utilized.

G. Fire Hydrants (New, Reconnect or Replace)

1. Hydrants shall be installed in accordance with the Detail Drawings and/or as shown on the Drawings. Hydrants shall be installed in a plumb position, with the break flange just above the finished grade or finished curb grade. Pumper port shall face the street, unless directed otherwise by the Engineer.
2. Where re-connection of an existing hydrant from an existing main to a new main is required, the Contractor shall preserve and protect the existing hydrant. Hydrant pipe may or may not be replaced, as may be shown on the Drawings or as required by the Engineer in the field. Prior to installing the new main, the Contractor shall expose the existing hydrant pipe to determine connection and grade requirement.
3. Where an existing hydrant is to be replaced by a new one as shown on the Drawings or as directed by the Engineer in the field, the Contractor shall remove the old hydrant full depth, if the new hydrant is to be installed at the same position, or at least 6" below finished grade if the new hydrant is to be installed elsewhere. All pipe and hydrant components left below grade shall be abandoned as specified herein. All removed pipe and components shall be disposed of offsite, unless directed otherwise.

H. Polyethylene Pipe Installation.

1. Joints between plain end pipes and fittings shall be made by butt fusion, and joints between main and saddle branch fittings shall be made using saddle fusion procedures that are recommended by the pipe and fitting manufacturer. The Contractor shall ensure that the person making heat fusion joints have received training the manufacture's recommended procedure. The Contractor shall maintain records of trained personnel. External and internal beads shall not be removed.
2. Polyethylene pipe and fittings may be joined together or to other materials by means of: (a) flanged connections (flanged adapters and back-up rings), (b) mechanical couplings designed for joining Polyethylene pipe or for joining Polyethylene pipe to another material, or (c) electro-fusion. When jointing pipes and fittings the manufacturer's installation instructions shall be followed.
3. Installation shall be accordance with ASTM D2321, manufacturer's recommendations, and this specification.
4. Pipe shall be bedded and backfilled in accordance with Section 31 23 00.

I. Polyethylene Encasement

Polyethylene encasement for ductile iron pipe, fittings and appurtenances will not be required except where called out on the Drawings or in Section 01 01 00. Where required it shall be installed in accordance with AWWA C105, method A, B or C at the Contractor's option unless specified otherwise on the Drawings or in Section 01 01 00.

3.04 CONNECTIONS TO EXISTING PIPELINES:

- A. At the locations shown on the Drawings, connections shall be made to existing pipelines. The Contractor, in advance of pipe trenching operations, shall expose the existing pipeline and determine the connection and grade requirements. Elbows and short lengths of pipe shall be used where necessary to connect to existing mains. Where approved by the Engineer, the new pipe alignment may be adjusted to make the connection. Connection details to existing mains are based on information available on size, type and location of existing pipe. The Contractor shall excavate and expose existing pipe where new mains are to be connected, prior to starting work in the area, to confirm location, depth, type and size of existing items and to confirm fittings and couplings required. The Contractor shall have the proper materials on hand prior to interrupting service and shall organize and perform his work to minimize interruptions. Care should be taken to prevent contamination of existing mains and new pipe and fittings. Disinfect prior to assembly.

3.05 BLOWOFF ASSEMBLIES:

Blowoff assemblies shall be constructed according to Detail Drawing. Location of assembly and distance from main shall be as shown on the Plans, or as directed by the Engineer in the field.

3.06 AIR VACUUM RELIEF STATIONS:

Install manholes, piping, fittings and valve assemblies plumb and vertical according to the Detail Drawings and in the locations shown on the Plans.

3.07 UTILITY MARKING TAPE:

A. Detectable Marking Tape

Unless otherwise indicated on the Plans or in Section 01 01 00, or unless pipe locating wire is installed, detectable utility marking tape shall be installed in all non-metallic pipe installations. Tape shall be placed a minimum of 24" above the pipe, but not less than 12" below finished grade.

B. Non-Detectable Marking Tape

Except where detectable marking tape is installed, non-detectable tape shall be installed in all pipe installations where pipe is not installed in a street right-of-way, whether or not pipe locating wire is installed. Tape shall be placed a minimum of 24" above the pipe, but not less than 12" below finished grade.

3.08 PIPE LOCATING WIRE AND CLAMPS:

Pipe locating wire shall be installed in all non-metallic pipe installations, unless indicated otherwise in Section 01 01 00 and/or on the Drawings. Wire shall be installed directly above and within 3" of the pipe, with care to

prevent damage to the wire. The Contractor shall minimize the use of splices in the locating wire. Splices may be made where approved by the Engineer. Approved splices and anywhere the locating wire insulation is damaged shall be sealed and made waterproof by the Contractor using an approved material to prevent corrosion of exposed wire. Wire shall be attached to each service connection at the main with clamps, as specified, to provide continuity through service pipes or through service locating wire. Wire shall be brought up into all main line valve boxes to the ground surface, with 1" of extra wire. Where mains intersect, or where more than one valve is installed, all wires shall be brought up into all valve boxes using jumper wires. The use of wire nuts is acceptable only inside the upper portion of valve boxes where they are accessible from the surface. Wire shall be brought up outside the lower box and inside the upper valve box section. Install a spacer to prevent the wire from being pinched between the upper and lower box sections. The Contractor shall test and demonstrate the continuity of all locating wires after backfill and compaction.

3.09 RIGID INSULATION:

Rigid insulation shall be placed at the top of the pipe zone bedding, but no more than 12" over the water main or services whenever the minimum depth of cover cannot be achieved, as approved by the Engineer, or where required on the Drawings. The insulation shall be 2' wide and extend 5 additional feet along the length of pipe after minimum cover has been achieved, beyond the particular crossing, or as specified otherwise. Typical installation locations shall include, but not be limited to, creek, culvert, and ditch crossings.

3.10 ABANDONMENT OF EXISTING PIPE:

See General Requirements Section 01 10 00.

3.11 PIPELINE TESTING:

A. General

1. All piping and appurtenances shall be tested as specified herein. All pipeline tests shall be conducted after installation of service saddles and corporation stops, if any, and other appurtenances that are directly connected to or a part of the pipeline. Service pipe shall be tested with the mains, or separately, at the Contractor's option. Also at the Contractor's option, the testing, disinfection, and flushing of any portion of pipeline may be combined into one operation.
2. The Contractor shall notify the Engineer 24 hours in advance of testing operations. All testing shall be done in the presence of the Engineer.
3. All testing equipment, fittings and gauges shall be provided by the Contractor and shall be approved as satisfactory by the Engineer prior to testing. The Engineer may, at any time, require a calibration check of the test pressure gauge.
4. Before testing, at least 36 hours shall elapse after the last concrete thrust block has been cast with high-early-strength cement, and at least seven days shall elapse after the last concrete thrust block has been cast with standard cement, unless otherwise required by the Drawings or Specifications.
5. The Contractor shall provide adequate permanent thrust restraint prior to testing.

B. Pressure and Leakage Testing

1. General

All new piping and appurtenances shall be hydrostatically tested as follows. The following combined pressure and leakage test shall be conducted on each individual section or installed pipe between valves. Interior hot and cold PEX plumbing system may be tested as a whole. Special testing requirements for PEX systems are included herein. For all other water services, unless indicated otherwise on the Drawings or Section 01 01 00, the First test may be conducted or eliminated, at the Contractor's option.

i. First Test:

An initial pressure and leakage test shall be conducted as soon as possible after sufficient backfill has been placed to prevent the movement of the pipe. Backfill shall be placed in such a manner that all couplings, fittings, valves and connections, including service connections, are completely exposed for visual inspection. The Contractor shall provide adequate lateral and vertical restraint to all pipe, valves and fittings during all testing.

ii. Second Test:

A final pressure and leakage test shall be conducted after all backfilling has been completed and before placement of permanent surfacing or structures.

iii. Test Pressure:

Test pressure for all piping shall be 200 psi, unless otherwise indicated in Section 01 01 00 or on the Drawings. The Contractor shall configure his testing setup and procedures such that the pressure against all new and existing valves and fittings shall not exceed their allowable test pressure.

2. Procedure

a. Test Duration:

The total time for each combined pressure and leakage test for each section shall be a minimum of 2 hours.

b. Filling:

The pipeline shall be filled with water for a minimum of 24 hours. Each section of the pipeline shall be filled slowly with water and all air expelled by means of taps at points of highest elevation.

c. Pressurization:

The specified test pressure shall be applied to the pipe and shall be maintained for the specified time. If the test pressure exceeds the capacity of the valves isolating the section of pipeline being tested, the Contractor shall pressurize adjacent sections with sufficient pressure to reduce the differential pressure on the valves to within their rated capacity.

3. Visible Leakage

During the first test, all pipe, couplings, fittings, valves and hydrants shall be examined by the Engineer and Contractor. All cracked or defective elements shall be replaced. Any observed leakage, regardless of the amount, shall be corrected. The test shall be repeated as necessary until all visible leakage has been corrected. The amount of any leakage that cannot be located and repaired shall be accurately measured by the Contractor.

4. Allowable Leakage

- a. During the second test, the amount of water pumped into the lines to maintain the test pressure shall be accurately measured by the Contractor.
- b. The allowable leakage rate for the pipe tested shall be as specified in AWWA C600 or, if not covered by AWWA, then as recommended in the pipe manufacturer's installation guide. If the Contractor elects to eliminate the First Test, however, regardless of the length of pipe being tested, the allowable leakage shall not exceed that for 350 feet of pipe, unless indicated otherwise on the Drawings. If the test leakage rate in any pipe is greater than the allowable, or greater than the leakage measured during the first test, the leakage shall be located and repaired. The test shall be repeated until the leakage rate is less than the allowable.

5. Connections to Existing Piping

The joints that are necessary to connect a pipeline, fitting, or valve to an existing pipeline shall be subjected to a visible leakage test (all joints exposed), conducted at system pressure for at least two (2) hours. All visible leakage shall be corrected by the Contractor. The test shall be repeated as necessary until all visible leakage has been corrected. It is the Contractor's responsibility to ensure that all fittings and pipe are adequately restrained while exposed during testing.

C. PEX Plumbing System Pressure and Leakage Testing

i. Flush and Visual Check

Purge air from plumbing system, cap system and visually check system for leakage.

ii. Preliminary Pressure Test

Pressurize the system to the greater or 1.5 times the maximum operating pressure or 100 psig for 30 minutes

As the piping expands, restore pressure, first at 10 minutes into the test and again at 20 minutes

At the end of the 30-minute preliminary test, pressure shall not fall by more than 8 psig from the maximum and there shall be no leakage.

iii. Main Pressure Test

The test pressure shall be restored and continued as the main test for 2 hours.

The main test pressure shall not fall more than 3 psig after 2 hours.

There shall be no visible leakage.

3.12 PIPELINE DISINFECTION:

A. General

1. It is the Contractor's responsibility to provide adequate disinfection and bacteriological test sampling of all water lines and appurtenances in accordance with the Department of Health requirements. Bacteriological test samples shall be taken at least once for every 1,200 lineal feet of pipe, or less, according to local utility or regulatory standards. It is also the Contractor's responsibility to ensure that neither contaminated water, nor water with strong chlorine solution enters any mains in use.
2. A disinfection method other than that specified herein may be used by the Contractor, provided it meets with the requirements stated herein, as well as AWWA Standard C651, and is specifically approved by the Engineer.

B. Water Pipelines

1. Use hypochlorite tablet method, placing tablets in pipe during laying; maintain scrupulous cleanliness during pipe laying so that no trench water or foreign matter enters pipe.
2. Attach tablets of 5G hypochlorite to top of pipe with potable water grade Permatex No. 1 under tablet only; for each length of pipe, use sufficient tablets for a dose of 50 mg/L.
3. When the pipe installation has been completed, fill the main with water, keeping filling velocity less than 1-ft/sec.; allow water to remain in the pipe for at least 24 hours.
4. Pipe, fittings and couplings connecting to an existing main and which cannot be disinfected with a new main, shall be thoroughly swabbed and flushed with strong chlorine solution immediately prior to installation, as should the existing main where exposed.

C. Flushing

1. After completion of filling, testing, and disinfection, flush heavily chlorinated water from the line by draining at low points until line is completely empty; refill with water and continue to flush main until chlorine residual of less than 1 mg/L is obtained.
2. It is the Contractor's responsibility to provide for the adequate and safe disposal of water flushed from mains.

3.13 WATER SERVICE INTERRUPTION, TEMPORARY WATER SERVICE:

- A. Water service interruption shall be kept to a minimum. Contractor shall install and maintain temporary water mains and services, at his own expense, in order to provide near-continuous water service. All service interruptions shall be coordinated with the Owner.
- B. Material for temporary lines shall be WADOH approved and shall be thoroughly flushed and chlorinated prior to use. Material may be new or used.
- C. Contractor shall provide an individual temporary service for each house or business affected. If more than one service is affected, the temporary main shall be a minimum size of 2" diameter.

- D. The Contractor shall obtain prior approval of the use of a fire hydrant for temporary water service.
- E. Contractor shall use the proper wrench for the hydrant and shall be responsible for any damage that occurs to the hydrant.

4.00 MEASUREMENT AND PAYMENT

4.01 GENERAL:

- A. See Section 01 22 00 - Measurement and Payment for General Requirements. See Section 01 01 00 - Special Requirements/Bid Items for possible modifications to Standard Bid Items. If no specific Bid Item is provided, measurement and payment shall be considered incidental and shall be included in the bid price for other items of work for the project.
- B. Payment for installed items shall be 50% maximum prior to completion of all testing.

4.02 BID ITEMS:

- A. Special provisions, requirements, and revisions to these Bid Items and/or additional Bid Items may be included in Section 01 01 00 (green pages) or on the Drawings or Details.

B. Water Pipe

1. These Bid Items shall include furnishing, installing, testing and disinfection of the specified water pipe including trench excavation, placing and compacting (not furnishing) bedding, backfilling and compaction work as specified in Section 31 23 00, unless a separate Bid Item is provided for same. It shall include pavement removal and replacement or other surface restoration, unless a separate Bid Item is provided for same. It shall also include pipe locating tape or wire, if applicable, unless a separate Bid Item is provided. It shall include polyethylene encasement for ductile iron pipe where required, unless a separate Bid Item is provided. It shall not include pipe joint restraining devices that are included in the Bid Item for the applicable Water Pipe Connection Detail, Fitting or Valve.
2. Payment shall be per Lineal Foot (LF) and shall be based on actual length of pipe installed, tested and accepted, as measured along the pipe, but not including pipe fittings or Details for which separate Bid Items are provided. Measurement shall be to the nearest foot, as measured by the Engineer.

C. CI/DI Fittings

1. These Bid Items shall include furnishing and installing ductile or cast iron fittings which are not included in other Bid Items, of the size indicated. All work and appurtenances related to these items are included, such as restraining type devices or thrust blocks where applicable. It shall include polyethylene encasement for fittings where required, unless a separate Bid Item is provided. These Bid Items include fittings not specifically shown on a Water Pipe Connection Detail but which are required to connect the Detail to an existing main. It shall include pavement replacement or other surface restoration unless a separate Bid Item is provided for same.
2. Measurement and Payment shall be per Each (EA) fitting installed and tested.

D. Water Pipe Connection Details

These Bid Items shall include furnishing and installing all items required to complete the indicated Detail(s) as shown on the Drawings. All work and appurtenances related to these items are included, such as valves, valve boxes, fittings, all restraining devices for fittings and pipe, and/or thrust blocks, excavation, bedding, backfilling and compaction related to the installation of the detail, except elbows or other fittings not shown on the Drawings but required to connect a Detail to an existing main. It shall include polyethylene encasement for fittings and valves where required, unless a separate Bid Item is provided. It shall include pavement replacement or other surface restoration, unless a separate Bid Item is provided for same. It shall include pipe required to connect a Detail to an existing main, unless a separate Bid Item is provided for same. Payment shall be on a Lump Sum (LS) basis for each Detail.

E. Resilient Seat Gate Valves (RSGV)

1. This Bid Item shall include furnishing and installing resilient seat gate valves that are not included in other Bid Items, of the size indicated and as shown on the Drawings. All work and appurtenances related to these items are included, such as excavation, bedding, backfill, valve boxes, restrained type glands, or thrust blocks where applicable. It shall include polyethylene encasement for valves where required, unless a separate Bid Item is provided. It shall include pavement replacement or other surface restoration, unless a separate Bid Item is provided for same.
2. Measurement and payment shall be per each (EA) valve installed and tested.

F. Butterfly Valves (BFV)

1. This Bid Item shall include furnishing and installing butterfly valves that are not included in other Bid Items, of the size indicated and as shown on the Drawings. All work and appurtenances related to these items are included, such as excavation, bedding, backfill, valve boxes, restrained type glands, or thrust blocks where applicable. It shall include polyethylene encasement for valves where required, unless a separate Bid Item is provided. It shall include pavement replacement or other surface restoration, unless a separate Bid Item is provided for same.
2. Measurement and Payment shall be per each (EA) valve installed and tested.

G. Reconnect Fire Hydrant

1. This Bid Item shall include all materials and labor required to preserve and protect the existing fire hydrant (including its valve and pipe if applicable) where shown on the Plans and reconnecting to the new water main. It shall include furnishing and installing the tee, valve (if indicated), tie rods or other restraint and couplings (if necessary) required to complete the fully restrained reconnection to the new main, including all excavation, bedding, backfilling, compaction and related work. It shall include polyethylene encasement for valves and/or fittings where required, unless a separate Bid Item is provided. Restoration and/or pavement replacement shall be included, unless a separate Bid Item(s) is provided for same. Hydrant pipe (including excavation, bedding and backfill) is included in other Bid Item(s).

2. Measurement and payment shall be on a per each (EA) basis for the completed and tested fire hydrant reconnection.

H. New Fire Hydrant Assembly

This Bid Item shall include furnishing and installing a complete assembly as shown on the Detail Drawing and where indicated on the Plans or directed by the Engineer. It shall include furnishing and installing the main line tee, hydrant valve, hydrant, thrust block (if applicable), drain gravel, and all excavation, backfill and compaction for these items. It shall include polyethylene encasement for valves and/or fittings where required, unless a separate Bid Item is provided. Surface restoration(s) shall also be included, unless a separate Bid Item provides for same. Hydrant pipe (including excavation, bedding and backfill) is included in other Bid Item(s).

I. ¾", 1", 1-½", or 2" Service Connection

These Bid Items shall include furnishing and installing saddles and corp stops, as specified herein, for new water service connections or reconnection of existing services to a new main as shown on the Plans or where directed by the Engineer. New service pipe, locating wire, and clamp are also included unless a separate Bid Item(s) is provided for same. In the case of reconnection of existing services to a new main, location and disconnection of the existing service and the installation of a coupling and service pipe is included, unless a separate Bid Item(s) is provided for same. Payment shall be per each (EA) completed connection.

J. ¾", 1", 1-½", or 2" Service Pipe

1. These Bid Items shall include furnishing and installing the specified pipe, locating wire and clamps as required. Also included is excavation, placing and compacting (not furnishing) bedding, backfilling, and compaction work as specified in Section 31 23 00. Pavement or other surface replacement is included, unless a separate Bid Item(s) is included for same.
2. Payment shall be per Lineal Foot (LF) as measured to the nearest foot by the Engineer in the field.

K. ¾", 1", 1-½", or 2" Curb Stop

These Bid Items shall include furnishing and installing the applicable size curb stop in accordance with the Detail Drawings and these Specifications including the curb box. Payment shall be per each (EA) completed installation.

L. Insulation for Service Pipe Installation

This Bid Item shall include all materials and labor required to provide and install the specified thickness of insulation board for water pipe or service where shown on the Drawings. Payment shall be per Lineal Foot (LF) of pipe insulation installed along the pipeline, regardless of pipe size.

****END OF SECTION****

1.00 GENERAL

1.01 DESCRIPTION OF WORK INCLUDED:

- A. The work described in this Section includes furnishing and installing all water meters, meter settings, boxes, vaults, and any and all other labor, materials and equipment necessary for the proper completion of the system as shown on the plans and described in the specifications.
- B. Special provisions, requirements and/or revisions to this Specification and/or Bid Item(s) may be included in Section 01 01 00 (green pages) and/or on the Drawings or Details.

1.02 1.02 QUALITY ASSURANCE:

- A. Meters shall be accepted only from those companies who are actively engaged in the manufacturing of their meters in the United States and who, in the sole judgment of the Owner, have demonstrated satisfactory operation, accuracy and durability. All meters shall be guaranteed against defects in materials and workmanship for a period of at least one (1) year from date of installation.
- B. All meters shall be as manufactured by Sensus or Neptune. Only one meter brand will be allowed for all size meters.
- C. Meters must meet AWWA new meter accuracy requirements. The meters will have an accuracy spread of plus or minus 1% over the normal operating range. All meters will perform to AWWA new meter accuracy standards for a period of 5 years or 500,000 gallons for 5/8", 750,000 gallons for 3/4", and 1,000,000 gallons for 1". The meters will continue to perform to at least AWWA repaired meter accuracy standards for an additional ten (10) years, following the new meter accuracy warranty.

1.03 SUBMITTALS:

Submittals shall conform to Section 01 33 00 of the specifications.

1.04 MATERIAL STORAGE AND HANDLING:

The Contractor shall make his own arrangements for adequate area and access thereto for proper and safe storing and protection of all materials and appurtenances prior to installation. During cold weather, extra care shall be taken in handling all materials.

2.00 PRODUCTS

2.01 GENERAL:

All materials required for proper completion of the work shall be new, of the highest quality, in conformance with the applicable AWWA standard, of proper pressure rating for the Owner's system and for the specified test pressure, and subject to the approval of the Engineer.

2.02 WATER METERS, 5/8" - 2":

- A. Meters shall be direct read and have threaded end connections unless otherwise noted. All meters shall conform to AWWA standard C-700 as most recently revised and shall be Magnetic Drive, Sealed Register, Positive Displacement Oscillating Piston or Nutating Disk Type Cold Water Meters. Meters shall be rated at a minimum of 150 psi working pressure.

- B. The entire meter exterior (except the CI frost bottom), including main case, register bonnet and lid shall be bronze. No external parts may be plastic. All meters shall have a non-corrosive water works bronze outer case with a separate measuring chamber which can be easily removed from the case. All meters shall have cast on them, in raised characters, the size, and direction of flow through the meter. Cast iron frost bottoms, or bronze bottoms shall be provided 5/8", 3/4" and 1". 1-1/2" and 2" meters shall be the split case type with bronze lower and upper shell assemblies. All maincases shall be guaranteed against defects in materials and workmanship for twenty-five (25) years from date of shipment. All external bolts and washers shall be of 300 series stainless steel. Full 3/4" meters shall have 7-1/2" laying length.
- C. The register shall be of the straight reading type and have a large test or sweep hand and a low flow (leak) indicator. **It shall read gallons.** All reduction gearing shall be contained in a permanently hermetically sealed, tamper-proof enclosure made from a corrosion resistant material and will be secured to the upper maincase by means of a locking device located in the interior of the meter so the register cannot be removed externally. The register shall be guaranteed for 25 years.
- D. The bronze register box and lid shall be secured to the maincase by means of a tamper resistant locking device. A locking screw requiring a special manufacturer-supplied tool, or factory installed seal wire, are the only security devices acceptable. Generator registers and remote registers shall be sealed by the Contractor after wiring. The measuring chamber shall be Water Works bronze or a suitable synthetic polymer and shall not be cast as part of the maincase. All assemblies shall be interchangeable in all measuring chamber assemblies of the same size.
- E. There shall be no stuffing box. The motion of the piston or disc will be transmitted to the sealed register through the use of a direct magnetic drive without any intermediate mechanical coupling. All meters must be provided with a corrosion resistant strainer which is easily removable from the meter without the meter itself being disconnected from the pipeline.
- F. Change gears will not be allowed to calibrate the meter. All registers of a particular registration and meter size shall be identical and completely interchangeable.

2.03 TURBINE WATER METERS, 2" - 6":

Meters shall be direct read with flanged connections unless otherwise noted. All meters shall comply with AWWA C-701 as well as all applicable requirements of Paragraph 2.01 of this Section. Strainers shall be of the same manufacturer as the meter, and intended for installation with the specific turbine meter to be installed.

2.04 GENERATOR REMOTE TYPE METERS AND REGISTERS:

Shall comply with AWWA C-706 for Direct-Reading Remote Registration Systems. The transmission wire for all meters shall be suitable and warranted for direct burial. After connection, the connection points at both registers shall be completely sealed in a silicon sealant as recommended by the manufacturer. After installation and testing, a tamper-resistant seal wire shall be attached to both registers. Meters shall be of the same manufacturer as all the meters in the project. The operation and accuracy of the generator register assembly shall be fully warranted as required in these specifications when operating in a wet or flooded pit location.

2.05 CONCRETE METER BOXES:

Shall be as manufactured by Brooks or Fogtite, or approved equal. Boxes for 5/8" x 3/4" and 3/4" meters shall be Brooks 37 Series, boxes for 1" meters shall be Brooks 38 series, boxes for 1-1/2" and 2" meters shall be Brooks

66 series (or the equivalent size Fogtite boxes). Concrete boxes shall be provided with cast iron lids, as well as approved traffic rated cast iron covers where applicable, and shall be as shown on the applicable Detail Drawings. Bases shall be open bottom.

2.06 RECTANGULAR PLASTIC METER BOXES:

- A. Shall be of structural foam construction utilizing HDPE (high density polyethylene) with ASTM D-638 tensile strength of 3,100 to 5,500 psi and ASTM D-790 flexural modulus 100,000 to 210,000 psi. Boxes shall next for shipment and shall provide for a positive interlock of all sections, an integral stainless steel or bronze locking nut molded into the top section. The Contractor shall furnish but not install a stainless steel or bronze penta-head locking bolt with each box. All boxes shall include a cast iron reading lid, hinged with stainless steel pins or nails. Boxes shall have a clear open area of approximately 12" x 20", minimum.
- B. Boxes shall be Carson 1220 series, or Ametek Jumbo 1320 series for 5/8" x 3/4" and 3/4" meter settings (non-traffic only), and shall be as shown on the applicable Detail Drawing.

2.07 COIL TYPE PVC (THERMOPLASTIC) METER BOXES:

Shall be Mueller/McCullough Thermal-Coil Meter Box as shown on the applicable Detail Drawing, 48" in depth, 15" inside diameter, with lockable CI lid, insulating pad and full 3/4" I.D. (net) polybutylene 250 psi tubing. They shall also be provided with ground clamps and wire as shown on the applicable Detail Drawing, integral lock angle inlet meter stop (also angle outlet stop on commercial and multi-family services), and 4" insulating pad. Boxes shall be fully pre-assembled and pre-tested at 175 psi prior to shipment, with a certification regarding no test leakage from the Mueller Company. Boxes shall be sized for 7-1/2" laying length 5/8" x 3/4" and 3/4" meters, with a setting depth of 20" to meter center line.

2.08 INSULATING BLANKET:

Insulating blankets for meter boxes shall be 5/8" thick cross-linked polyethylene closed-cell insulating material. The material shall be carefully cut to fit each size meter box for which it is intended and shall not be folded, damaged or creased. Each pad (one per box) shall be a single 1" minimum thickness, cut with rounded corners to prevent any opening around the inside edges or corners of the box. For concrete boxes the material shall be cut large enough to fit tightly to support itself.

2.09 COPPER SETTERS FOR 5/8" - 1" (METER BOX) INSTALLATIONS:

- A. Shall be of the size and dimensions as required for the applicable meter installation and in accordance with the applicable Detail Drawing, with pack joint end types. Minimum copper setter height shall be 24" from setter inlet centerline to meter inlet centerline.
- B. Copper setters on residential services shall be provided with integral lockwing inlet angle key valve. Copper setters on commercial (including multi-family) services shall be provided with both the specified inlet valve and an angle key outlet valve.
- C. All copper setters shall utilize lead-free solder, have integral saddle nuts and brace pipe eye. Copper setter and type shall provide an electrically conductive connection to copper pipe adequate to conduct high amperage due to service line electrical thawing practices. Copper setters shall be Ford or approved equal.

2.10 COPPER SETTERS FOR 5/8" - 1" (INTERIOR) INSTALLATIONS:

- A. Shall be specifically designed for indoor retro-fit installations, and shall be the specific setter type for each particular situation, such as verticals, corners, walls, drops, etc. Setters shall utilize lead-free solder, have integral saddle nuts and shall have end types as required, utilizing pack joints. A minimum 2 gage stranded copper wire and bronze ground clamps shall be provided with each setter to provide electrical ground should the meter be removed. All setters shall have both inlet and outlet key valves, with lock wing on inlet.
- B. Setters shall be as manufactured by Ford or approved equal. Setter size shall be the same as the existing service pipe and/or the required meter size.

2.11 METER SETTINGS FOR 1-1/2" - 3" METER INSTALLATIONS:

Unless otherwise shown on the drawings or details, these meter settings shall be individually and custom plumbed for each particular installation using galvanized steel pipe, nipples and fittings. All pipe, nipples and fittings shall be threaded, except the inlet meter valve and outlet fitting shall be thread x meter flange to match the flanged meter. Straight or angle inlet valves may be used as the situations warrant. The inlet valve shall be lockable. The outlet (customer) valve shall be a high quality bronze ball or gate valve with hand wheel, with threaded ends. Inside settings shall be grounded as above and shall be of the same size as existing plumbing and meter to be installed. Outside settings shall be of the same size as existing plumbing and meter to be installed and shall be as shown on the applicable Detail Drawing.

2.12 OTHER MATERIALS:

All other materials not specifically described but required for proper completion of the work shall be new, of the highest quality, in conformance with the applicable AWWA standard, and subject to the approval of the Engineer. See Section 40 00 00b for service pipe, curb stops, and pack joint specifications.

3.00 EXECUTION

3.01 TRENCHING, BEDDING, AND BACKFILLING:

All trenching, bedding, backfilling, and compaction for water meters and appurtenances shall be done in strict conformance to the requirements of Section 31 23 00 of these Specifications.

3.02 INSPECTION OF MATERIALS:

All meters and appurtenances shall be inspected before installation for cracks, defects and workability. All dirt, scale, and burrs shall be removed as required for proper installation.

3.03 METER BOX, CURB STOP, SETTER AND METER INSTALLATION:

- A. The Contractor shall be responsible for locating existing services.
- B. All meter boxes and setters shall be installed as shown on the applicable Detail Drawing. The compacted gravel base shall be leveled to insure that the meter box is set plumb and on a firm foundation. Excavation and gravel base shall be carefully measured to result in a finished installation with the box cover set 3/16" low in driving or sidewalk locations and flush with the surrounding finished grade in other locations. In no case shall the box be left in a depression, nor high enough to

cause a hazard. Covers shall be set such that the reading lid opening end (if applicable) faces the street.

- C. Meters shall not be installed in setters until the installation has been thoroughly flushed clean. The Contractor shall provide a short hose as required and flush the installation liberally from the City side to the inlet side of the setter. After installation of the meter, the Contractor shall open an outside hose faucet at the residence or business and flush liberally to pull as much of the service pipe debris as possible out of the customer's service line.
- D. The insulating pad shall be set to fit tightly in concrete boxes, and loosely (flat) on a stiffener ledge in plastic boxes, about 6" above the meter in both cases. No air gap (to the meter) at the edges or corners shall be evident when the pad is in place.

3.04 LARGE METER VAULT INSTALLATIONS:

- A. The meter vault, assembly, pipe, fittings and appurtenances shall be installed in accordance with the applicable Plans and Detail Drawings, and all applicable specifications.
- B. The Contractor's project schedule shall clearly indicate the approximate planned installation dates. At least 5 days notice shall be given the Owner and affected water customer prior to start of any work. The Contractor's schedule, timing, procedure and operation for each installation shall be approved by both the Owner and customer, and no service shut-off shall be made without 24 hour additional notice.
- C. Vaults shall be installed level, on a well-compacted gravel base.

3.05 INSIDE METER INSTALLATIONS:

- A. All inside meter installation locations and meter sizes shall be approved by the Owner prior to start of work. No service pipe, appurtenance, or building plumbing shall be replaced beyond the immediate limits of the meter setting, nor any changes made to the basic plumbing layout or direction(s) of flow of water, without specific written authorization of the Owner and building owner.
- B. All inside meter installations shall include a minimum 2 gage stranded copper wire and bronze ground clamps installed to provide an electrical ground around the meter in accordance with applicable electrical codes. All inside installations shall include a lockable key inlet meter valve and a bronze hand wheel customer valve, same size as original service pipe or meter setting.
- C. All meters and remote registers shall be installed so as to allow convenient visual reading of both registers. Remote register wire shall be installed neatly in as protected and concealed locations as possible, and stapled carefully at 24" intervals. Prior to acceptance, the generator and remote register shall be properly and accurately operating.

3.06 SERVICE LINE REPLACEMENT:

- A. The Contractor shall not replace any service line outside the limits of the meter box installation as shown on the applicable Detail Drawing unless specific authorization is provided by the Owner or Engineer. In cases where a deteriorated iron or steel service line will prevent the connection(s) from being made within these limits, the Engineer or Owner will authorize the Contractor to expose additional service line to the extent necessary to make the installation, if and as determined by the Engineer or Owner.

- B. In no case shall the Contractor proceed further into the private property without the express authorization of the Engineer or Owner and the owner of the affected property.
- C. All work performed under such field direction shall be paid as indicated for Service Pipe, and shall be subject to testing and inspection as specified herein.

3.07 TESTING:

- A. Testing shall be conducted under normal system operating pressure after all items, including the meter, have been installed. All fittings, joints, couplings and connections shall be exposed for visual inspection for leakage.
- B. Testing shall comply with all requirements of Section 40 00 00b.

3.08 DISINFECTION:

Disinfection shall comply with all requirements of Section 40 00 00b.

4.00 MEASUREMENT AND PAYMENT

4.01 GENERAL:

- A. See Section 01 22 00 - Measurement and Payment for General Requirements. See Section 01 01 00 - Special Requirements/Bid Items for possible modifications to Standard Bid Items.
- B. If no specific Bid Item is provided, measurement and payment shall be considered incidental and shall be included in the bid price for other items of work for the project.
- C. Payment for installed items shall be 50% maximum prior to completion of all testing.

4.02 BID ITEMS:

- A. Special provisions, requirements, revisions to these Bid Items, and/or additional Bid Items, may be included in Section 01 01 00 (green pages) or on the Drawings or Details.

1. 5/8" through 1" Meter and Meter Box:

These Bid Items shall include furnishing and installing all materials per the standard detail drawing provided including, but not limited to, meter, meter box, setter, pack joint and insulating blanket. Also included is excavation, furnishing gravel, backfilling and compacting. Pavement or other surface restoration is included unless a separate Bid Item(s) is included for same. Service pipe and curb stops are not included in this Bid Item. Payment shall be on a per each (EA) basis.

2. 1-1/2" and 2" Meter and Meter Box:

These Bid Items shall include furnishing and installing all materials per the standard detail drawing provided including, but not limited to, meter, meter box, valves and fittings, pack joint and insulating blanket. Also included is excavation, furnishing gravel, backfilling and compacting. Pavement or other surface restoration is included unless a separate Bid Item(s) is included for same. Service pipe and curb stops are not included in this Bid Item. Payment shall be on a per each (EA) basis.

3. 3" Meter and Meter Vault:

This Bid Item shall include furnishing and installing all materials per the standard detail drawing provided including, but not limited to, meter, strainer, couplings, meter vault, valves and fittings, and insulating blanket. Also included are excavation, furnishing gravel, backfilling and compacting. Pavement or other surface restoration is included unless a separate Bid Item(s) is included for same. Service pipe and curb stops are not included in this Bid Item. Payment shall be on a per each (EA) basis.

4. 5/8 through 1-1/2" Meter:

These Bid Items shall include furnishing and installing the specified size meter in an existing setter or yoke and shall include any required miscellaneous fittings. Payment shall be on a per each (EA) basis.

5. 3/4" Setter:

This bid item shall include furnishing and installing a 3/4" meter setter including labor and parts necessary to attach it to the existing or new service lines. Also included is removal of the existing meter box prior to setter installation and replacement of the existing meter box following setter installation. Payment shall be on a per each (EA) basis.

6. Concrete or Plastic Meter Box:

These Bid Items shall include furnishing and installing the specified meter box type to the depth shown in the applicable detail drawing. Payment shall be on a per each (EA) basis.

****END OF SECTION****

1.00 GENERAL

1.01 DESCRIPTION:

- A. The work included in this Section consists of furnishing and installing pre-cast concrete manholes, wet wells and dry wells, including steps, pipe connections, drop connections, channels, special drain rock backfill, grouting, top slabs, adjustment rings, frames and covers.
- B. Special provisions, requirements and/or revisions to this Specification and/or Bid Items(s) may be included in Section 01 01 00 (green pages) and/or on the Drawings or Details.

1.02 QUALITY ASSURANCE:

Precast concrete manholes, wet wells and dry wells shall conform to the requirements of ASTM C-478, except as specifically modified herein.

1.03 SUBMITTALS:

Submittals shall conform to Section 01 33 00 of these Specifications and shall include complete manufacturer's literature, shop drawings and details of manholes, wet wells, and dry wells.

1.04 JOB CONDITIONS:

The Contractor shall make all arrangements for sufficient product storage area prior to delivery. All work shall be confined within easements and rights-of-way, unless other arrangements are made with adjacent property owners.

2.00 PRODUCTS

2.01 GENERAL:

All manholes, wet wells, and dry wells shall be constructed of pre-cast reinforced concrete with pre-cast bases.

2.02 CONCRETE:

Cement shall be Type II per ASTM C150. Minimum portland cement content shall be 564 pounds per cubic yard. Water/cement ratio shall not exceed 0.49. Minimum 28-day compressive strength shall be 3,000 psi.

2.03 PRECAST MANHOLE AND DRY WELL SECTIONS:

A. General

- 1. Except as shown otherwise on the Drawings, pre-cast manholes and dry wells shall be minimum 48-inch diameter, conforming to ASTM C478, except the wall thickness shall be 4-inch minimum.

2. Provide eccentric cones for manholes and dry wells or as shown on Drawings. Cones shall have same wall thickness and reinforcement as manhole sections. Top and bottom of cone shall be parallel. Manhole steps shall be cast in the sections by the manufacturer. Manhole joints shall be confined rubber gaskets conforming to ASTM C443. Provide preformed knockouts or cutout holes for pipe, or core drill in field.

B. Testing:

If requested by the Engineer, and prior to delivery of any pre-cast section, tests shall be conducted at the manufacturer's plant at no additional cost to the Owner. The pre-cast sections to be tested will be selected at random from the stockpiled material which is to be supplied for the job. All test specimens will be mat tested and shall meet the permeability test requirements of ASTM C14. The manufacturer shall furnish a written certification of test results to the Engineer if required.

C. Manhole Extensions:

Concrete grade rings for extensions shall be a maximum of 6 inches high, and constructed to the same standards as pre-cast manhole sections. Minimum reinforcement shall be one No. 4 bar.

2.04 MANHOLE STEPS:

Manhole steps shall be Grade 60 No. 4 bar reinforced copolymer polypropylene plastic, or substitute acceptable to Engineer. Manhole steps shall have integral restrains to prevent side slippage of feet.

2.05 PIPE ADAPTERS:

Manhole pipe adapters for entry coupling of pipe shall be Kor-N-Seal or a PVC manhole adapter as manufactured by GPK Products, Inc., or a Dura-Seal III gasket as manufactured by Dura-Tech, Inc., or approved equal. Gasket material shall comply with the provision of ASTM D2000 3 BA715.

2.06 FRAMES AND COVERS:

Frames shall be cast iron conforming to the provisions of ASTM A48, Class 30 or better, or ductile iron conforming to the provisions of ASTM A536, Grade 80-50-06, minimum weight 158 pounds. Non-skid manhole covers shall be ductile iron conforming to the provisions of ASTM A536, Grade 80-55-06, minimum weight 118 pounds, with word "sewer" embossed. Provide 1" diameter pick hole in cover. If required in Section 01 01 00, bolt down tamperproof frames and covers shall be provided. Grates for dry wells shall be ductile iron conforming to the provisions of ASTM A536, Grade 80-55-06 unless otherwise specified on the plans. Frames and covers shall provide a minimum 24-inch diameter opening. Strength requirements shall be per Fed. Spec. RR-F-621D. Castings shall be free of porosity, shrink cavities, cold shots or cracks, and all surface defects which impair serviceability. Frames and covers shall be machine ground on seating surfaces so as to insure non-rocking fit in any position and interchangeability.

2.07 WATERTIGHT FRAME AND COVER:

Watertight frames and covers shall comply with all requirements of this section and shall provide the following:

3/8" x 1/4" machined groove in frame, 3/8" square neoprene gasket set in groove, three locations drilled and tapped for 5/8" stainless steel Allenhead bolts, solid cover with integral lifting pocket.

2.08 NON-SHRINK GROUT:

Grout for sealing lifting holes, joints and pipe connections shall be non-metallic non-shrink grout, and shall be Five-Star Grout as manufactured by U.S. Grout Corporation, or approved equal.

2.09 BEDDING:

Bedding material for under manhole and wet well bases shall be pipe bedding material as specified in Section 31 23 00.

2.10 SPECIAL BACKFILL FOR DRY WELLS:

Unless other or additional requirements are required by the Drawings, special backfill material for dry well installation or restoration shall be washed natural gravel with a maximum size of 3" and a minimum size of 1-1/2".

2.11 OTHER MATERIALS:

All other materials not specifically described in this Section but required for a complete operating installation, shall be new, first quality of their respective kinds as selected by the Contractor subject to approval of the Engineer.

3.00 EXECUTION

3.01 EXCAVATION, BACKFILL AND COMPACTION:

A. General

All excavation, bedding, backfilling and compaction for manholes, wet wells and dry wells shall conform to Section 31 23 00, unless required otherwise herein or on the Drawings.

B. Bedding

Pre-cast manhole and wet well base sections shall be placed on a well-graded granular bedding course 6" in thickness and extending either to the limits of the excavation or to a minimum of 12" outside the outside limits of the base section. In the latter case, the balance of the excavated area shall be filled with select material well tamped to the level of the top of the bedding to positively prevent any lateral movement of the bedding when the weight of the concrete structure is placed upon it. The bedding course shall be firmly tamped and made smooth and level to assure uniform contact and support of the pre-cast elements.

3.02 INSTALLATION:

A. Pre-cast Sections

1. Sections shall be carefully checked upon delivery to the site and again after installation. Any damaged sections that cannot be satisfactorily repaired to the satisfaction of the Engineer shall be removed and replaced at no additional cost to the Owner.
2. Manhole and wet well base sections shall be carefully placed on the prepared bedding so as to be fully and uniformly supported in true alignment, and making sure that all entering pipes can be inserted on proper grade. Pre-cast sections shall be placed and aligned to provide vertical sides and vertical alignment of the ladder rungs (where applicable). All lift holes and joints shall be thoroughly wetted and then be completely filled with non-shrink grout, smoothed and pointed both inside and out, to ensure water tightness.
3. In pre-cast manhole sections where steel loops have been provided in lieu of lift holes, the loops shall be removed flush or below the surface after the manhole has been completed. No sharp cutoff protrusions will be permitted. If concrete spalling occurs as a result of the loop removal or a recessed area exists, the area shall be restored in a workmanlike manner to a uniform smooth surface with mortar.

B. Steps

Steps shall be firmly secured to the manhole sections, shall be evenly spaced 12 inches on center and vertically aligned as shown on the Drawings, and shall project uniformly from the inside wall. Steps shall be cast in manhole sections or installed by being driven into a drilled or formed hole per manufacturer's recommendations. Chipping out or drilling an oversized hole and grouting in the steps will not be acceptable.

C. Pipe Connections

1. Each pipe connection to a manhole, wet well or dry well shall be as shown on the Drawings and as specified herein. Entry couplings shall be installed per manufacturer's recommendations. The opening shall be preformed or cored. Breaking an opening with a sledge hammer or other impact device is not acceptable.
2. The ends of all pipes shall be trimmed flush with the inside walls unless otherwise shown on Drawings. All joints and all openings cut through the walls shall be completely grouted and watertight on both inside and outside surfaces.

D. Channels

1. Channels shall be made to conform accurately to the sewer grade and shall be brought together smoothly with well-rounded junctions satisfactory to the Engineer. Channel sides shall be carried up vertically to the crown elevation of the various pipes, and the concrete shelves shall be smoothly finished and warped evenly with slopes to drain. Channel sections shall not be smaller than the connecting pipes. Channel surface shall have a smooth trowel finish. All channels with deviations not acceptable to the Engineer shall be removed and reconstructed at no additional cost to the Owner.

2. A temporary plywood cover shall be provided and installed on each manhole to protect the finished and cleaned channel. Any debris shall be removed before the cover is finally removed for installation of the permanent cast iron frame and cover. The only exception to providing this temporary cover is when a manhole frame and cover is immediately installed in place after the channel is completed.

E. Adjusting to Grade

Only pre-cast concrete adjustment rings shall be used in manhole or dry well construction. Bricks, rock fragments, or other materials are not acceptable. Preliminary manhole rim elevations are shown on the Drawings. The Contractor shall set the rim elevations to the elevation and slope of the surrounding final pavement or ground as directed by the Engineer. All adjustment rings and shims shall be mortared in place. The adjustment section shall then receive a 3/8" coating of mortar grout on the inside and outside. The frame shall also be set in mortar.

3.03 TESTING:

- A. Manholes requiring testing, and all wet wells, shall be tested by either the vacuum or the exfiltration method, as directed by the Engineer or indicated on the Plans. A minimum of 20% of the manholes shall be tested. After completion of manholes the Engineer will inform the Contractor which manholes shall be tested. Prior to testing, the manhole shall be completely constructed, and all inlet and outlet pipes shall be plugged.

1. Exfiltration Method

The Contractor shall fill the manhole with water to a depth of six feet (unless indicated otherwise on the Drawings) above the highest pipe invert with water. Four hours after the manhole has been filled, the Contractor shall refill the manhole to the original water level and commence the test. The Contractor shall keep the water surface to the 6-foot level for a 2-hour period. The leakage rate shall not exceed 0.2 gallons per hour per foot of test head above the pipe invert elevation. Manholes or wet wells which fail the test shall be repaired and retested until they pass.

2. Vacuum Method

- a. Before any testing the Contractor shall get approval from the Engineer for all equipment, gages and methods. Prior to testing, plug influent and effluent pipes.
- b. The test head shall be placed at the top of the CI frame to test the entire manhole height including grade rings.
- c. A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9 inches. The manhole shall pass if the test time is in accordance with the following table:

MANHOLES, WET WELLS AND DRY WELLS

Depth of Manhole	Minimum Time (sec.)		
	48" Dia. MH	60" Dia. MH	72" Dia. MH
4 or less	7	9	11
6	11	14	17
8	14	18	23
10	17	23	28
12	21	28	34
14	25	32	40
16	28	37	45
18	32	41	51
20	35	46	57
22	39	51	62
24	42	55	68
26	46	60	74
28	49	64	80
30	53	69	85

- B. The Contractor shall repair and retest all manholes that fail the test, at no additional cost to the Owner. The method of repair shall be acceptable to the Owner.

3.04 INSPECTION:

All manholes, wet wells, and dry wells shall be completely clean prior to request for final inspection. Cleaning shall include, but not be limited to: debris removal; removal of mortar, dirt, and asphalt from steps; and removal of asphalt from the manhole frame and cover.

4.00 MEASUREMENT AND PAYMENT

4.01 GENERAL:

- A. See Section 01 22 00 - Measurement and Payment for General Requirements. See Section 01 01 00 - Special Requirements/Bid Items for possible modifications to Standard Bid Items.
- B. If no specific bid item is provided, measurement and payment shall be considered incidental and shall be included in the bid price for other items of work for the project.

4.02 BID ITEMS:

- A. Special provisions, requirements, revisions to these Bid Items, and/or additional Bid Items, may be included in Section 01 01 00 (green pages) or on the Drawings or Details.
- B. Each manhole or dry well will be measured by the Engineer to the nearest one-tenth (0.10) of a foot, from invert at the centerline of manhole or from the floor of the dry well, vertically to the top of the frame. Drop connections will be measured vertically from invert to invert.

C. Standard Manhole

1. Includes all earthwork, furnishing and installing pre-cast sections, cover (unless a separate Bid Item is provided for furnishing ring and cover), pipe connections and channeling (including interior drops). Standard manhole depth shall be considered ten (10) feet.
2. Payment shall be made on a per each (EA.) basis.

D. Shallow Manhole

1. Shall be complete compensation for all labor, material and equipment required for complete installation of shallow manholes as indicated in Detail Drawing No. 02563-2. Includes all earthwork, furnishing and installing pre-cast sections, frames and covers (unless a separate Bid Item is provided for furnishing frames and covers) and pipe connections per the Drawings.
2. Payment shall be made on a per each (EA.) basis.

E. Standard Dry Well

1. Includes excavation, bedding, backfilling, compaction, grouting, installing and furnishing ring and slotted cover (unless a separate Bid Item is provided for furnishing ring and slotted cover), pre-cast sections, pipe connections (if required), special backfill material and poly sheeting as well as any additional earthwork not included in other Bid Items. Standard dry well depth shall be considered 10 feet.
2. Payment shall be made on a per each (EA.) basis.

F. Extra Dry Well Depth

Involves furnishing and installing dry well depths in excess of 10 feet.

G. Watertight Frames and Covers

This Bid Item shall be complete compensation for the **Differential Cost Increase** between the standard MH frame and cover and the watertight MH frame and cover.

H. Wet Well

1. Includes excavation, bedding, backfilling, compaction, top slab, pipe connections, hopper bottom fillet, grouting and testing. It includes furnishing and installing hatches (specified elsewhere).
2. Payment shall be made on a per each (EA.) basis.

I. Exfiltration Manhole Testing

1. Includes performing exfiltration tests of those manholes installed by the Contractor and selected by the Engineer, in conformance with this specification.

2. Payment shall be made per each (EA.) manhole selected by the Engineer and actually tested.

J. Vacuum Manhole Testing

1. Includes performing vacuum tests of those manholes installed by the Contractor and selected by the Engineer, in conformance with this specification.
2. Payment shall be made per each (EA.) manhole selected by the Engineer and actually tested.

****END OF SECTION****

1.00 GENERAL

1.01 DESCRIPTION:

- A. The work included in this Section consists of furnishing and installing storm drains including storm drain pipe, manholes, catch basins and inlets, along with all appurtenances as shown on the Drawings and specified herein.
- B. Special provisions, requirements and/or revisions to this Specification and/or Bid Item(s) may be included in Section 01 01 00 (green pages) and/or on the Drawings or Details.

1.02 SUBMITTALS:

Submittals shall conform to Section 01 33 00 of these Specifications and shall include complete manufacturer's literature, drawings and installation instructions.

1.03 MATERIAL STORAGE AND HANDLING:

The Contractor shall make his own arrangements for adequate area and access thereto for proper and safe storing and protection of all pipe materials and appurtenances prior to installation. All pipe shall be stored on a flat and reasonably level surface, with the full pipe length supported to prevent distortion of the pipe during storage. Pipe shall not be stacked in piles higher than 5 feet. Pipe and other materials shall be unloaded, handled, transported and stored using all possible means to protect the materials, and in full conformance with the manufacturer's written instructions, which the Contractor shall have on site. During cold weather extra care shall be taken in handling all materials.

1.04 PROTECTION OF LIVE SEWERS:

All existing live storm sewers including inlets, catch basins and drywells shall remain in service at all times. Adequate provisions shall be made for collection and disposal of existing and potential storm sewer flow if any existing sewers are damaged. Any damage to the Owner's existing system shall be repaired with materials meeting these specifications at no cost to the owner, to a condition equal to or better than that which existed prior to the damage.

2.00 PRODUCTS

2.01 STORM DRAIN PIPE:

Storm drain pipe material and size shall be as noted on the Drawings and shall meet the following requirements:

A. PVC

Pipe shall be PVC conforming to ASTM D3034 for SDR 35. Joints shall conform to ASTM D3212 with restrained gaskets conforming to ASTM F477.

B. PWRIB

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Pipe shall be PWRIB, as manufactured by PW Pipe of Eugene, Oregon. Pipe material shall be PVC conforming to ASTM D1784, Cell Class 12364B. Gasket materials shall conform to ASTM F477. Pipe construction shall conform to ASTM F794, AASHTO M304 and ASTM D3212.

C. Corrugated Polyethylene Pipe

Corrugated polyethylene pipe shall be high-density polyethylene corrugated pipe with smooth interior and watertight gasketed joints as manufactured by Advanced Drainage Systems (ADS), Blue Seal Water Tight as manufactured by Hancor, or equal. Corrugated polyethylene culvert pipe and storm sewer pipe shall conform to WSDOT/APWA Sections 7-02, 7-04 and 9-05, latest edition.

D. CMP

Both aluminum and steel storm sewer pipe shall conform to WSDOT/APWA Section 7-04, latest edition.

2.02 STORM DRAIN MANHOLES AND DRYWELLS:

- A. Refer to Section 03 40 00 and the Detail Drawings.
- B. Size shall be as indicated on the Drawings or Bid Sheet. Storm drain manholes shall be provided with metal frames and grate or with 24" dia. manhole ring and cover, as indicated on the Drawings.

2.03 CATCH BASINS AND INLETS:

- A. Catch basins shall conform to all requirements of WSDOT/APWA Type 1, Type 1L, Type 1P or Type 2, as indicated on the Drawings. (Standard Plan, WSDOT latest edition or as included in the Contract Documents). Size of Type 2 catch basins shall be as indicated on the Drawings or Bid Sheet and shall be provided with metal frames and grate or with 24" dia. manhole ring and cover, as indicated on the Drawings.
- B. Inlets shall conform to the requirements of WSDOT/APWA Standard Plan latest edition or as included in the Contract Documents.

2.04 METAL FRAMES AND GRATES:

Frames and grates for catch basins and inlets shall be per WSDOT/APWA Standards for solid metal cover, metal frame and vaned or other grate as indicated on the Drawings. (Standard Plan, WSDOT latest edition, or as included in the Contract Documents).

2.05 MANHOLE RING AND COVER:

Manhole ring and cover shall conform to WSDOT/APWA Type I standard, or other Type as indicated on the Drawings or Bid Sheet. Lettering shall be "STORM". (Standard Plan, WSDOT latest edition, or as included in the Contract Documents).

2.06 UTILITY MARKING TAPE:

Non-detectable marking tape shall be 4.0 mil overall thickness polyethylene, color code impregnated, with permanent message printing. Color and message shall be appropriate for specific utility. Tape shall be SHIELDTEC, or equal.

2.07 OTHER MATERIALS:

All other materials not specifically described in this Section, but required for a complete and operating installation, shall be new, first quality of their respective kinds as selected by the Contractor subject to the approval of the Engineer.

3.00 EXECUTION

3.01 INSPECTION OF MATERIALS:

All pipe, manholes, catch basins and appurtenances shall be inspected before installation for cracks, defects, and workability. All dirt, scale, and burrs shall be removed as required for proper installation. Defective materials shall not be installed and shall be immediately removed from the project.

3.02 TRENCHING, BEDDING, AND BACKFILLING:

All trenching, bedding, backfilling, and compaction for storm drains and appurtenances shall be done in strict conformance to the requirements of Section 31 23 00 of these Specifications.

3.03 PIPELINE INSTALLATION:

A. General

1. All pipe and appurtenances shall be installed in accordance with the manufacturer's published recommendations and any appropriate WSDOT/APWA Standards, except as modified by these Specifications. The Contractor's on-site representative shall at all times have a copy of the manufacturer's installation booklet. A copy of the appropriate installation booklet shall also be provided by the Contractor for the Engineer.
2. All pipe shall be laid on the lines and grades shown on the Drawings. Variance from established line and grade shall not be greater than 1/16th of an inch per inch diameter and not to exceed 0.1 ft, provided that such variation does not result in a level or reverse sloping invert.

3.04 UTILITY MARKING TAPE:

Unless otherwise indicated on the Plans or in Section 01 01 00, non-detectable utility marking tape shall be installed in all pipe installations where pipe is not installed in a street right-of-way. Tape shall be centered over the pipe and placed at 24" below the final surface grade.

3.05 STORM DRAIN MANHOLE, CATCH BASIN AND INLET INSTALLATION:

- A. Installation methods and materials shall comply with all requirements of Section 03 40 00.
- B. Storm drain manholes, catch basins and inlets including pipe connections shall be watertight.

3.06 STORM DRAIN PIPE TESTING:

- A. All storm drains shall be tested as specified herein after all backfilling has been completed and before placement of permanent surfacing. The Contractor shall notify the Engineer 24 hours in advance of testing operations. All testing shall be done in the presence of the Engineer.
- B. All testing equipment, plugs, fittings, and gauges shall be provided by the Contractor and shall be approved as satisfactory by the Engineer prior to testing. The Engineer may at any time require a calibration check of the test pressure gauge.
- C. If any pipeline fails to meet the requirements of the test method used, the Contractor shall determine at his expense the source of leakage and shall repair or replace all defective materials and/or workmanship at his expense. The complete pipe installation shall meet the requirements of the test method used before being considered acceptable.
- D. Storm drain cleaning and testing shall be in full conformance with the Cleaning and Testing requirements of Section 7-04, Storm Sewers, of the latest edition of the Standard Specifications for Road Bridge and Municipal Construction (WSDOT/APWA) except as modified herein.

3.07 STORM DRAIN INSPECTION:

All pipe and structures shall be thoroughly cleaned prior to requested final inspection. All storm drain lines shall be “lamped” between manholes by the Engineer. In addition to lamping, storm sewers pipelines are subject to television inspection by the Engineer. Any deficiencies shall be repaired by the Contractor. All subsequent inspections made by the Engineer to verify that deficiencies have been corrected shall be at the Contractor’s expense.

3.08 STORM DRAIN MANHOLE AND CATCH BASIN TESTING AND INSPECTION:

Acceptance testing and inspection shall be performed on all storm drain manholes and catch basins and shall comply with all requirements of Section 03 40 00.

3.09 CATCH BASIN GRADE ADJUSTMENT

Where indicated on the plans or directed by the Engineer in the field, the grate on an existing catch basin or manhole shall be adjusted either upward or downward as indicated or directed. Upward adjustments of 4” or more shall be made using pre-cast concrete risers or grade rings. Upward adjustments of less than 4” shall be made using either pre-cast concrete risers or grade rings or concrete pavers. Downward adjustments shall be made by removing or replacing existing risers, rings or pavers.

4.00 MEASUREMENT AND PAYMENT

4.01 GENERAL:

- A. See Section 01 22 00 – Measurement and Payment for General Requirements. See Section 01 01 00 – Special Requirements/Bid Items for possible modifications to Standard Bid Items.

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- B. If no specific bid item is provided, measurement and payment shall be considered incidental and shall be included in the bid price for other items of work for the project.
- C. Payment for installed items shall be 50% maximum prior to completion of all testing.

4.02 BID ITEMS:

Special provisions, requirements, revisions to these Bid Items, and/or additional Bid Items, may be included in Section 01 01 00 (green pages) or on the Drawings or Details.

A. Storm Drain Pipe

1. Diameters and materials are listed in the Bid Form.
2. The Bid Item(s) shall include furnishing and installing all pipe, fittings and appurtenances. They shall also include the trench excavation, removal of excess materials, placing and compacting (not furnishing) bedding material, backfilling, and compacting as specified in Section 31 23 00 unless a separate bid item is provided for same. They shall include testing as specified in this Section. They shall include pavement, concrete, or lawn removal and replacement or other surface restoration unless a separate bid item is provided for same. They shall also include pipe locating tape or wire if applicable, unless a separate bid item is provided. Payment shall be per Lineal Foot (LF) and shall be based on actual length of pipe installed, tested and accepted, as measured along the pipe, through fittings and between centers of manholes, catch basins or inlets. Measurement shall be to the nearest foot by the Engineer.

B. Storm Drain Manhole

1. Diameters and types are listed in the Bid Form. It includes all earthwork, furnishing and installing pre-cast sections, ring and cover or frame and grate (unless a separate Bid Item is provided for furnishing ring and cover or frame and grate), and pipe connections. Testing of manholes is included in this Bid Item.
2. Payment shall be made on a per each (EA) basis.

C. Catch Basin or Inlet

1. Diameters and types are listed on the Bid Form. It includes all earthwork, furnishing and installing pre-cast section, frame and grate (unless a separate Bid Item is provided for furnishing frame and grate) and pipe connections. Testing of catch basins is included in this Bid Item.
2. Payment shall be made on a per each (EA) basis.

D. Catch Basin or Inlet Grade Adjustment

1. This bid item shall be complete compensation for labor and materials including excavation, installation or removal of risers, grade rings or pavers, reinstallation of grate, backfill, compaction and surface restoration unless a separate bid item is provided on the bid schedule.

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2. Payment shall be per each (EA) or per vertical foot (VF) for each catch basin or inlet for which a grade adjustment is required and completed. Payment for only one adjustment per catch basin or inlet will be made. Multiple payments for multiple adjustments to the same catch basin or inlet will not be made. For payment per vertical foot, measurement shall be for the final grate elevation as compared to the existing grate grade. Adjustments made to a fraction of a foot will be rounded to the nearest half-foot.

****END OF SECTION****

1.00 GENERAL

1.01 DESCRIPTION:

- A. The work included in this Section consists of furnishing and installing sanitary wastewater pipelines, including gravity sewers, force mains, and side sewers, along with all appurtenances such as cleanouts, stubouts, fittings, valves and valve vaults as shown on the Drawings and specified herein.
- B. Special provisions, requirements and/or revisions to this Specification and/or Bid Item(s) may be included in Section 01 01 00 (green pages) and/or on the Drawings or Details.

1.02 SUBMITTALS:

Submittals shall conform to Section 01 33 00 of these Specifications and shall include complete manufacturer's literature, drawings and installation instructions.

1.03 MATERIAL STORAGE AND HANDLING:

The Contractor shall make his own arrangements for adequate area and access thereto for proper and safe storing and protection of all pipe materials and appurtenances prior to installation. All pipe shall be stored on a flat and reasonably level surface, with the full pipe length supported to prevent distortion of the pipe during storage. Pipe shall not be stacked in piles higher than 5 feet. Pipe and other materials shall be unloaded, handled, transported and stored using all possible means to protect the materials, and in full conformance with the manufacturer's written instructions, which the Contractor shall have on site. During cold weather extra care shall be taken in handling all materials.

1.04 PROTECTION OF LIVE SEWERS:

All existing live sewers including septic tanks and drain fields shall remain in service at all times. Adequate provisions shall be made for disposal of existing sewage flow if any existing sewers are damaged. Any damage to the owner's existing system shall be repaired with materials meeting these specifications at no cost to the owner, to a condition equal to or better than that which existed prior to the damage.

2.00 PRODUCTS

2.01 GRAVITY SEWER PIPE:

A. Pipe

Pipe for gravity and side sewers shall be PVC conforming to ASTM D3034 for SDR 35. Joints shall conform to ASTM D3212 with restrained gaskets conforming to ASTM F477.

B. Fittings

Fittings for PVC pipe shall be injection molded or factory solvent cemented tees or wyes of the same material as pipe. Fittings shall have sufficient strength to withstand handling and load stresses normally encountered. Fittings for connecting new sewer pipe to existing sewer pipe shall be Fernco or approved equal.

2.02 PRESSURE SEWER PIPE:

A. Force Main and Fittings

1. Force mains 4 inches in diameter and larger for ductile iron or PVC pipe or 3 inches in diameter and larger for polyethylene (PE) shall conform to the following:
 - a. Ductile iron pipe shall be cement mortar lined of the thickness specified in AWWA C151/A21.51 for the minimum pressure class for each pipe size with push-on joints (except where shown otherwise on the Drawings) conforming to AWWA C151 and C111. Fittings shall be cast or ductile iron of pressure rating in conformance with the specified pipe, and in conformance with AWWA C110, C153 and C111. Fitting configuration, size and end type shall be as shown on the Drawings and as required for the pipe, details and appurtenances.
 - b. PVC pipe 4 inches to 12 inches shall be DR 25 and conform to AWWA C900, PVC pipe 14 inches to 48 inches shall be DR 32.5 and conform to AWWA C905. PVC pipe, couplings, and fabricated fittings shall be Type I, Grade I, and made from virgin PVC resin that has been compounded to provide physical and chemical properties that equal or exceed cell class 12454 as defined in ASTM D1784. Laying lengths shall be 20 feet. Pipe joints shall be push-on with pipe barrel and gasket bell end dimensions and tolerances shall conform with AWWA C900 and as specified in ASTM D2122.
 - c. Polyethylene (PE) pressure pipe shall be manufactured from a PE 3608 resin. The resin material shall meet the specifications of ASTM D 3350 with a minimum cell classification of 345464C. PE piping may be joined by thermal butt fusion (ASTM 3261), socket fusion, electrofusion, flange assemblies, or mechanical methods capable of conveying fluid at the design pressure of the piping system. Electrofusion fittings shall have a manufacturing standard of ASTM F1055.
2. Force main smaller than 4 inches for PVC or 3 inches for PE shall conform to the following:
 - a. PVC pressure pipe shall meet the requirements of ASTM D2241, latest revision for the standard thermoplastic pipe dimension ratio (SDR 17). Laying lengths shall be 20-feet. Pipe shall be made from the PVC plastic extrusion compound meeting the requirements of Type I, Grade I, material as described in ASTM Specifications D 1974. Pipe joints shall be either push-on or solvent weld. Push on joints shall conform to ASTM D-3139, using a rubber gasket conforming to ASTM F-477.
 - b. Materials used for the manufacture of PE pipe and fittings shall be made from a PE 3608 or PE 4710 resin meeting cell classification 345464C per ASTM D3350; and meeting Type III, Class C, Category 5, Grade P34 per ASTM D1238. Dimensions and workmanship shall be as specified by ASTM D3035. Fittings and transitions shall meet ASTM D3261. PE pipe shall have a minimum Standard Dimension Ration (SDR) of 9. PE pipe shall be joined with butt, heat fusion joints as outlined in ASTM D2657 and conform to the Generic Butt Fusion Joining Procedure for Field Jointing of Polyethylene Pipe.

B. Couplings

All couplings shall be cast or ductile iron of the type and size required by the connecting pipe, material or appurtenances, and of pressure rating at least equivalent to the other materials. They shall be Smith-Blair, Dresser or approved equal.

C. Special Pipe and Fittings

Gaskets for flanged pipe and fittings shall be 1/8 inch thick, full face, red rubber, and meet the material requirements of ANSI A21.11.

D. Field Flanges

Field flanges shall meet the design class and flange pattern of the flange it is to mate with. Body material shall be ductile iron meeting or exceeding ASTM A536.71. Set screws shall be corrosion resistant AISI 4140 steel alloy or ductile iron. Gasket shall be virgin SBR compounded for water or sewer service and meeting ASTM D-2000 3 BA715. Flanges shall allow a minimum joint deflection of 2° for nominal pipe sizes up through 10”, shall be UL tested and approved, and shall be Romac or approved equal. All field flanges which are buried or submerged shall be coated with bitumastic after installation.

2.03 JOINT RESTRAINTS:

Restraint for mechanical joints (ductile iron pipe only), where indicated on Drawings, shall be ductile iron flexible wedging action gland restraining devices for mechanical joints, UL listed, FM approved, and shall be Megalug as manufactured by EBBA Iron, Inc., or approved equal.

2.04 GATE VALVES:

- A. Gate valves 4 inch diameter and larger shall be resilient seat gate valves (RSGV) conforming to AWWA C509, with handwheel or operating nut opening counter clockwise.
- B. Gate valves smaller than 4 inch diameter shall be double disc, parallel seat type with non-rising stem and o-ring seals conforming to AWWA C500. Seat rings and disc rings shall be bronze. Handwheel or operating nut opening counter clockwise.
- C. Except as shown on the Drawings or Detail Drawings, valve boxes for buried-service valves shall be cast iron two-piece slide-type adjustable boxes with cast iron drop type lids marked “sewer”. Inside diameter of the bottom portion of the box shall be at least 8”; minimum inside diameter of the upper portion of the box shall be 5-1/4”. Only identical cast iron valve box extensions shall be utilized. Valve box complete extension shall range from 48” to 72” or as approved by the Engineer.

2.05 CHECK VALVES:

Unless indicated otherwise on the Drawings or in another specification all check valves shall have cast iron body, Buna-N rubber flapper, external backflow device, and shall be Apco Series 100 rubber flapper swing check valve with backflow device or approved equal.

2.06 UTILITY MARKING TAPE:

Non-detectable marking tape shall be 4.0 mil overall thickness polyethylene, color code impregnated, with permanent message printing. Color and message shall be appropriate for specific utility. Tape shall be SHIELDTEC, or equal.

2.07 PIPE LOCATING WIRE AND CLAMPS

Pipe locating wire shall be #10 THHN solid copper. Clamps for attaching the locating wire to force mains shall be UL listed ground clamps commonly used for grounding wire to copper, or galvanized steel service pipes. Clamps shall be of the appropriate size as required for the wire and service pipe in the field.

2.08 LOCATING WIRE BOXES

Access to the locating wire shall be installed in a valve box type enclosure. The boxes shall be cast iron two-piece, slide-type, adjustable boxes with cast iron drop unmarked lids. Inside diameter of the bottom portion of the box shall be a least 8 inches; minimum inside diameter of the upper portion of the box shall be 5 ¼ inches.

2.09 OTHER MATERIALS:

All other materials not specifically described in this Section, but required for a complete and operating installation, shall be new, first quality of their respective kinds as selected by the Contractor subject to the approval of the Engineer.

3.00 EXECUTION

3.01 TRENCHING, BEDDING, AND BACKFILLING:

All trenching, bedding, backfilling, and compaction for wastewater pipelines and appurtenances shall be done in strict conformance to the requirements of Section 31 23 00 of these Specifications.

3.02 INSPECTION OF MATERIALS:

All pipe, fittings, and appurtenances shall be inspected before installation for cracks, defects, and workability. All dirt, scale, and burrs shall be removed as required for proper installation. Defective materials shall not be installed and shall be immediately removed from the project.

3.03 PIPELINE INSTALLATION:

A. General

1. All pipe and appurtenances shall be installed in accordance with the manufacturer's published recommendations and any appropriate WSDOT/APWA Standards, except as modified by these Specifications. The Contractor's on-site representative shall at all times have a copy of the manufacturer's installation booklet. A copy of the appropriate installation booklet shall also be provided by the Contractor for the Engineer.

2. All pipes shall be laid on the lines and grades shown on the Drawings. For gravity sewers, variance from established line and grade shall not be greater than 1/32nd of an inch per inch diameter and not to exceed ½ inch, provided that such variation does not result in a level or reverse sloping invert.
3. Gravity side sewers shall be laid to a line and grade between the main sewer tee branch and the right-of-way margin, in conformance with applicable Detail Drawings included in the Contract Documents. Elevation at the property line or at the edge of the easement shall be as shown on the plans.

B. Fittings

All underground fittings shall be installed on a compacted foundation of bedding material and shall be restrained with thrust blocks or restrained joints as shown on the Drawings. A torque wrench shall be used for final tightening of all mechanical joint and flanged end fittings.

3.03 UTILITY MARKING TAPE:

Unless otherwise indicated on the Plans or in Section 01 01 00, non-detectable utility marking tape shall be installed in all pipe installations where pipe is not installed in a street right-of-way. Tape shall be centered over the pipe and placed at 24" below the final surface grade.

3.04 FORCE MAIN LOCATING WIRE AND CLAMPS:

Pipe locating wire shall be installed with all non-metallic pipe installation, unless shown otherwise on the Drawings. Wire shall be installed directly above and within 3" of the pipe, with care to prevent damage to the wire. The Contractor shall use splices only when and where approved by the Engineer and shall use only materials approved by the Engineer to achieve a sealed and waterproof splice to prevent corrosion or discontinuity of the exposed wire. The Contractor shall

3.05 OTHER REQUIREMENTS:

A. Sewer Main and Side Sewer Proximity to Water Supply Lines

Contractor shall maintain vertical and horizontal separation between potable water lines and sanitary sewer lines in accordance with Section C1-9 of the Criteria for Sewage Works Design, Ecology Publication No. 98-37.

Any side sewer which at any point will lie within 10 feet of a water supply line shall be constructed so that it will be at least 18 inches in elevation below the water supply line. If this requirement will prohibit a connection of the side sewer, the Contractor shall proceed under such method and with such materials as may be detailed on the plans, or as approved by the Engineer.

3.06 PIPELINE TESTING:

A. General

1. All gravity sewers (including side sewers) and force mains shall be tested as specified herein after all backfilling has been completed and before placement of permanent surfacing. The Contractor shall notify the Engineer 24 hours in advance of testing operations. All testing shall be done in the presence of the Engineer.

2. All testing equipment, plugs, fittings, and gauges shall be provided by the Contractor and shall be approved as satisfactory by the Engineer prior to testing. The Engineer may at any time require a calibration check of the test pressure gauge.
3. If any pipeline fails to meet the requirements of the test method used, the Contractor shall determine at his expense the source or sources of leakage and shall repair or replace all defective materials and/or workmanship at his expense. The complete pipe installation shall meet the requirements of the test method used before being considered acceptable.
4. All hydraulic testing that include connection to potable water sources shall adhere to cross connection control requirements.

B. Gravity Sewer Cleaning and Testing

1. Gravity sewer cleaning and testing shall be in full conformance with the Cleaning and Testing requirements of Section 7-17, Sanitary Sewers, of the latest edition of the Standard Specifications for Road Bridge and Municipal Construction (WSDOT/APWA) except as modified herein.
2. All side sewers shall be included in the main wastewater pipeline test section and shall be taken into account when computing allowable leakage.

C. Pressure Sewer Testing

1. All pressure sewer force main pipe shall be hydrostatically pressure tested for leakage. Tests shall be conducted at the lowest point in the system; or otherwise as approved by the Engineer. Length of tests shall be two hours minimum. Contractor shall supply hoses and pumps for moving water as required.
2. Prior to making pressure leakage tests, the Contractor may fill the pipe with clear water to permit absorption; however, tests must then be completed within 24 hours after filling. Pipeline shall be filled slowly to allow all air to be expelled.
3. Pressured sewer pipelines shall be pressure tested at the greater of 150% of the system design operating pressure or 225 psi unless indicated otherwise on the plans. No leakage will be allowed.
4. PE pressured sewer pipelines shall be conducted in accordance with ASTM F2164, Field Leak Testing of Polyethylene Pressure Piping Systems Using Hydrostatic Pressure as summarized below:
 - a. Purge Air: fill test section with water. To allow air to escape from the test section, flow velocities during filling should not exceed the capacities of air release devices or other openings used to release entrapped air.
 - b. Pressurizing – Initial Expansion Phase: When the test section is completely filled and purged of air, gradually increase pressure in the test section to the required test pressure. Add make-up water as necessary to maintain maximum test pressure for 4 hours.

- c. Test Phase: Reduce test pressure by 10 psi and monitor pressure for 1 hour. Do not increase pressure or add make-up water. If no visual leakage is observed and pressure during the test phase remain steady (within 5% of the test phase pressure) for the 1 hour test phase period, a passing test is indicated.
- d. If retesting is necessary, depressurize the test section and allow the test section to relax for at least 8 hours, correct any faults or leaks and retest.

3.07 GRAVITY SEWER INSPECTION:

In addition to testing (outlined in Section 3.06) a final visual inspection of all gravity sewer mains will be conducted by the Engineer. All manholes and pipelines shall be thoroughly cleaned prior to requesting final inspection. Final inspection shall include “lamping” which is a method of visually inspecting the sewer main between two manholes. Lamping utilizes reflected sunlight or a light beam as a light source. The light is directed down the pipe from one manhole to the next to allow for visual inspection of the pipeline. In addition to lamping, sewer lines are also subject to television inspection by the Engineer, if deemed necessary. Any deficiencies discovered by inspection(s) shall be repaired by the Contractor. All subsequent inspections made by the Engineer to verify that deficiencies have been corrected shall be at the Contractor’s expense.

3.08 LOCATOR WIRE INSPECTION AND TESTING:

Locator wire installation shall include access to the wire a maximum of every 1,000 feet in a locator wire box or other as approved by the Engineer, and grounding to the box as necessary for standard locator equipment. The Contractor shall test and demonstrate the continuity of the installed locating wire after backfill and compaction and prior to installation of permanent surfacing.

3.09 ABANDONMENT OF EXISTING PIPE:

See General Requirements Section 01 10 00.

4.00 MEASUREMENT AND PAYMENT

4.01 GENERAL:

- A. See Section 01 22 00 – Measurement and Payment for General Requirements. See Section 01 01 00 – Special Requirements/Bid Items for possible modifications to Standard Bid Items.
- B. If no specific bid item is provided, measurement and payment shall be considered incidental and shall be included in the bid price for other items of work for the project.
- C. Payment for installed items shall be 50% maximum prior to completion of all testing.

4.02 BID ITEMS:

Special provisions, requirements, revisions to these Bid Items, and/or additional Bid Items, may be included in Section 01 01 00 (green pages) or on the Drawings or Details.

A. PVC or DI Wastewater Pipelines

- 1. Diameters and materials are listed in the Bid Form.

2. The Bid Item(s) shall include furnishing and installing all pipe, fittings (except service tees) and appurtenances. They shall also include the trench excavation, removal of excess materials, placing and compacting (not furnishing) bedding material, backfilling, and compacting as specified in Section 31 23 00 unless a separate bid item is provided for same. They shall include testing as specified in this Section. It shall include pavement, concrete, or lawn removal and replacement or other surface restoration unless a separate bid item is provided for same. It shall also include pipe locating tape or wire if applicable, unless a separate bid item is provided. Payment shall be per Lineal Foot (LF) and shall be based on actual length of pipe installed, tested and accepted, as measured along the pipe, through fittings and between centers of manholes or cleanouts for sewers where applicable. Measurement shall be to the nearest foot by the Engineer.

B. Service Tees

1. Includes furnishing and installing the specified service tees. Diameters and materials are listed in the Bid Form.
2. Payment shall be made on a per each (EA) basis.

C. Reconnect Existing Side Sewers

1. Includes furnishing and installing all pipe, fittings, and appurtenances required to reconnect the existing side sewers indicated on the Drawings. It shall not include furnishing the service tee which is paid for under a separate Bid Item. It shall include locating the existing side sewers, trench excavation, removal of excess material, placing bedding material, backfilling, compacting, and disposal of removed side sewer pipe.
2. Payment shall be per lineal foot (L.F.) as measured in the field to the nearest foot by the Engineer along the pipe from the centerline of the new sewer main to the point of reconnection to the existing side sewer. Additional side sewer pipe and/or surfacing damaged by the Contractor beyond the limits indicated on the Plans or approved by the Engineer shall be replaced with new materials by the Contractor at no additional cost to the owner.

D. Gate Valves

1. Included shall be furnishing and installing the valves and appurtenances as shown on the Drawings. Includes valve, valve box, fittings, gaskets and earthwork.
2. Payment to be on a unit price per each (EA) or Lump Sum basis.

****END OF SECTION****

1.00 GENERAL

1.01 DESCRIPTION:

- A. This Section includes the work necessary to replace, and restore as required by these Specifications, directed in the field, or as indicated on the Drawings, all pavement, gravel surfacing, curbs, curb and gutters, and sidewalks damaged either directly or indirectly by the Contractor's operations. It shall also include installation of new pavement, gravel surfacing, curbs, curb and gutters, and sidewalks as indicated on the Drawings or as directed in the field by the Engineer.
- B. Special provisions, requirements and/or revisions to this Specification and/or Bid Item(s) may be included in Section 01 01 00 (green pages) and/or on the Drawings or Details.
- C. See also Sections 31 00 00 "Earthwork" and/or 31 23 00 "Trench Excavation, Backfill and Compaction", if included, for related surface removal specifications. See also Section 32 11 33 Cement Treated Base, if included.

1.02 QUALITY ASSURANCE:

All materials shall comply with the latest version of the WSDOT Standard Specifications for Road, Bridge and Municipal Construction and the current Amendments.

1.03 SUBMITTALS:

Submittals shall conform to Section 01 33 00 of these Specifications and shall include test results and samples, as indicated herein.

2.00 PRODUCTS

2.01 CRUSHED SURFACING:

- A. The material shall consist of uniform quality, clean, tough, durable fragments of rock or gravel, free from flat, elongated, soft or disintegrated pieces and other objectionable matter. Material shall meet the requirements of crushed surfacing specified in WSDOT Standard Specifications and Amendments.
- B. Test results, or other evidence satisfactory to the Engineer, shall be provided by the Contractor to show that the proposed material meets the requirements prior to material delivery to the project. Provide a physical sample if requested by the Engineer.
- C. Base course and top course material shall comply with the following sieve analysis:

SURFACE IMPROVEMENTS AND RESTORATION

SIEVE SIZE	% PASSING BY WEIGHT	
	Base Course	Top Course
1-1/4" square	100	
1" square	80-100	
3/4" square		100
5/8" square	50-80	
1/2" square		80-100
U.S. No. 4	25-45	46-66
U.S. No. 40	3-18	8-24
U.S. No. 200	7.5 max	10.0 max

2.02 ASPHALT CONCRETE (HMA):

All asphalt concrete shall be hot plant-mixed asphalt (HMA). Mix design, components and installed HMA shall be in compliance with current WSDOT Standard Specifications as amended in the APWA GSP, of the class(es) shown on the Bid Form.

HMA for pre-leveling shall be CL 3/8: PG 64-28 unless specified otherwise on the Drawings or in Section 01 01 00.

2.03 ASPHALT PRIME (TACK COAT):

Asphalt prime coat shall be liquid CSS-1 or RC-250 emulsified asphalt or approved equal.

2.04 CONCRETE:

Concrete for curbs, sidewalks, driveways, and other items shall be Portland cement concrete with a minimum 28 day compressive strength of 3,500 psi, no less than 5-1/2 sacks of cement per cubic yard, and a maximum 3" slump. All concrete shall be air entrained (5%).

2.05 EARLY STRENGTH CONCRETE APPROACH:

Where called for in Section 01 01 00 or on the Drawings or Details, early strength concrete driveway approaches shall conform to WSDOT Section 5-05.3(18) for Cement Concrete Approach, including Section 5-05.3(17) for Opening to Traffic. Typically, these are called out as "Cement Concrete Approach [3, 7, or other]-Day."

3.00 EXECUTION

3.01 GENERAL:

- A. The Engineer and Owner reserve the right to vary the type of surfacing as may best serve the interests of the Owner.
- B. All Portland cement concrete sidewalks, curbs, driveways and other surfaces shall be formed, placed, consolidated and finished to provide a high quality dense finished surface with the type of finish appropriate for the type of surface. All dimensions shall be accurate, all edges straight and true, and all surfaces free of depressions or high points. All work shall match thickness, elevation and dimensions of existing adjoining surfaces.

- C. Unless otherwise shown on the Drawings, all surfaces damaged by the Contractor's operations shall be repaired or replaced by the Contractor. In addition to the requirements of this Section, all work shall conform to the applicable requirements of WSDOT Standard Specifications and Amendments, and local town and county standards.

3.02 INTERIM SURFACE MAINTENANCE:

A. Dust Control

The Contractor's attention is directed to Section 01 10 00 regarding dust control requirements. Following backfill and compaction, excavated areas shall be finish graded level with existing surfaces. Adjacent pavement areas shall be brushed and washed down to remove all soil and rocks. The Contractor shall maintain all backfilled areas to provide a smooth travel surface free of holes, soft spots and rocks. Apply water, dust-palliative or oil as required to adequately control dust as approved by the Engineer or Owner.

B. Maintenance Schedule

All temporary surfaces shall be maintained and repaired regularly by the Contractor as required to provide a smooth, dust-free roadway surface. During adverse weather, the Contractor shall inspect and repair temporary surfaces weekly.

C. Special Areas

Pavement replacement in driveways and parking areas shall be done within one (1) week of completion of backfill, unless specific authorization is given otherwise by the Owner or Engineer. All surface restorations in pedestrian traffic areas shall be made as soon as possible after backfill, in no case later than five (5) days after backfill, unless specific authorization is provided otherwise. In the interim, all driveways, parking areas, and pedestrian traffic areas shall be finished with a minimum 2" of compacted crushed rock base course material temporary surface.

D. Roadways

1. When pavement replacement in roadways is not made within three (3) weeks following backfilling, interim surfacing shall be provided as follows:
 - a. All excess material shall be removed and adjacent surfaces washed and broomed. The unpaved area shall be given an application of RC-250 asphalt at the rate of 0.2 to 0.3 gallons per square yard, and sufficient aggregate for a "blotter", which shall serve as temporary pavement replacement until such time as permanent pavement is placed.
 - b. The temporary surface shall be maintained and repaired as required until the permanent surface is placed.
 - c. Temporary fill shall be removed as required for installation of permanent surfacing. The Contractor shall be responsible for the proper disposal of all waste material. Such material shall be disposed of at a site procured by the Contractor. The Contractor shall receive prior approval from all applicable local and state agencies, regarding his operations and methods, prior to disposing of waste material.

2. All costs for all temporary surfacing and its maintenance and removal shall be considered incidental and shall be included in the cost for bid items of work provided.

3.03 ASPHALT CONCRETE (HMA) PAVEMENT:

A. Requirements

All HMA mix design(s), materials, submittals, preparation, placement, compaction and finished surfaces shall comply with the current edition of WSDOT Standard Specifications as amended by the APWA GSPs.

B. Subgrade

Prepare subgrade as specified to a smooth even grade at the specified compaction and at the proper grade for installation of the specified thickness of permanent surfacing materials. Trim existing pavement edges to a straight and vertical edge with a pavement saw or cutter. Remove all damaged, lifted or otherwise unsound remaining pavement to provide a sound edge for joining new pavement.

C. Crushed Surfacing

Place crushed surfacing base course and top course material to the depth required as specified in the Drawings or in Section 01 01 00 of these Specifications, but in no case less than 4” total depth, and compact to 95% maximum density to provide a smooth unyielding surface.

D. Cement Treated Base (CTB)

If included in the project, CTB shall be placed in accordance with Section 32 11 33 to the specified depth, width, lines and grades.

E. Tack Coat

After crushed surfacing top course has been graded and compacted, and just prior to placing asphalt pavement, apply an asphalt tack coat to all existing pavement edges, valve boxes, manhole covers, curb faces and other appurtenances in the area to be paved.

F. HMA Pre-Leveling

Place an HMA pre-leveling course where shown on the Drawings and/or in Section 01 01 00. If not specifically shown, place a pre-level course where necessary to result in a finished final pavement surface that complies with these specifications.

G. HMA Placement and Compaction

1. Place asphalt concrete on the prepared crushed surfacing to a required depth, as specified in the Drawings and/or in Section 01 01 00, and/or on the Bid form, but in no case less than 2” except for pre-leveling. The nominal compacted depth of any layer of any course shall not exceed the depth as specified in the WSDOT Standard Specifications and Amendments. Spread and level with hand tools or a mechanical spreader as required by the area to be paved. Bring asphalt to proper grade and compaction by rolling or the use of adequate hand

- tampers where rolling is impossible or impractical. Asphalt concrete shall be compacted to a minimum 92.0% Rice Density.
2. Unless specified otherwise, the required total depth of HMA shall not include pre-leveling course.
 3. Power rollers shall provide 200 to 300 pounds per lineal inch. Begin rolling from the outside edge of the replacement pavement and work toward the existing pavement, lapping ½ width of the roller.
 4. The finished surface shall be a dense, thoroughly compacted pavement which is hard, smooth, free of roller marks, and shows no appreciable movement under the roller wheels or compactor. It shall be unyielding, true to thickness and grade, free draining and conform to the grade specified and/or crown of the adjoining existing pavement, with no irregularities.

H. Weather Conditions

Asphalt shall not be applied to saturated material, or during rain, snow, sand or dust storms, or any imminent storms that may adversely affect the finished pavement. Asphalt shall not be placed when:

1. the atmospheric temperature is less than 40 degrees F
2. during heavy rainfall, or
3. when the surface upon which it is to be placed is frozen.

I. Protection of Structures

Provide any coverings necessary to protect exposed existing structures or improvements of any nature from splashing oil and asphalt. Remove any asphalt or oil that gets on or in such structures or improvements. Conduct all compaction operations in such a manner and with care to avoid damage to existing structures and improvements.

J. Locating and Adjusting Manholes, Drywells, Catch Basins and other Utilities to Grade

The Contractor shall locate and adjust frames and covers or grates for all existing utility structures including: sanitary manholes, drywells, storm manholes, catch basins, grate inlets, survey monuments, water valve boxes and any other utility or item(s) requiring adjustment to final grade.

The existing cast iron ring and cover on manholes and catch basin and inlet frame and grate shall first be removed and thoroughly cleaned for reinstalling at the final elevation. From that point, the existing Structure shall be raised or lowered to the required elevation. The materials and method of construction shall conform to the requirements specified herein, and the Structure shall conform to the requirements of the WSDOT Standard Plans except as approved by the engineer. In the event the all or portions of the existing structure(s) are damaged, or if directed by the Engineer, all or portions of the structure shall be replaced at the material cost of the new structure or at no cost if replacement structure(s) are provided by the Owner.

Precast concrete adjustment rings shall be used in manhole construction. Final adjustment shall be made using waterproof non-shrink grout, mortar or metal shims. Polyethylene adjustment rings may also be used, subject to the acceptance of the Engineer.

The Contractor shall set the rim elevations at 1/4-inch to 3/8-inch below the surrounding final pavement or ground elevation. All adjustment rings, concrete bricks or shims shall be mortared in place. The adjustment section shall then receive coating of waterproof non-shrink mortar grout on the outside with the mortar struck off and pointed on the inside. The casting shall also be set in mortar.

Warping of grades in lieu of manhole frame adjustment shall not be allowed. Joints in the brick or ring adjustment shall be filled with grout. The castings shall be seated in grout placed on the top course. A 3/8-inch thick mortar lining shall be installed inside and out of the adjustment section to provide a smooth, watertight finish.

Rings and frames shall be placed on common brick or cement concrete adjusting rings, bound with mortar, and wedged up to the proper grade. Mortar alone shall not be used. Debris shall not be deposited in the sewer, drainage structure, valve vault, or other similar structure from this operation. Debris shall be removed at Contractor's own expense.

The metal ring or frame on manholes, catch basins, and similar structures within areas of asphalt pavement construction or resurfacing shall be adjusted prior to placing the top lift of asphalt (wearing course).

Adjustments of all utility castings shall be made in the same manner as manholes and catch basins. If no specific bid item is provided adjustment of utilities to grade is considered incidental.

K. Curb Exposure

1. The Contractor shall maintain 6" curb exposure.
2. Where existing grade is adjusted to obtain required curb exposure, Contractor shall be responsible to maintain existing drainage characteristics throughout the project, although occasional grade revisions may be required to improve drainage and shall be considered incidental to the work.
3. Where existing curb has irregular grade, pavement shall be placed to result in uniform grade with minimum curb exposure of not less than 3".

L. Surveying Requirements

The Contractor shall utilize a licensed surveyor to re-establish roadway sections and adjust finished grade elevations to accommodate curb exposure, street cross slope requirements and maintain drainage characteristics.

M. Pavement Marking

Contractor shall place temporary spotting or completely re-establish lane markings immediately after pavement replacement. All pavement marking (lane marking, crosswalks, parking markings, etc.) shall be permanently re-established with five (5) days of pavement restoration.

N. Excess Materials

Dispose of all excess and waste materials in full accordance with local and state requirements and as specified in these Contract Documents.

O. Responsibility for Settlement of Surfaces

Settlement of resurfaced areas within the warranty period shall be the sole responsibility of the Contractor. The Contractor shall promptly repair all such areas upon notification from the Engineer or Owner at no additional cost.

3.04 CONCRETE DRIVEWAYS, SIDEWALKS AND CURBS:

- A. The Contractor shall replace portland cement concrete driveways, sidewalks and curbs to the same section, width, depth, line and grade as that removed or damaged, or as specified in the Drawings and Details. Edges shall be sawcut straight and vertical. Compaction shall be adequate to prevent settlement.
- B. Form construction, placement and finish of concrete shall result in finished work that matches the existing surfaces. Replace concrete between scored or expansion joints, and make replacements to minimize a patched appearance.
- C. Provide a 4” thick compacted base course of crushed rock. Place concrete to the same thickness as the existing or as specified in the Drawings, but not less than 4”. Provide score joints with steel finishing tool, and a full depth expansion joint at adjoining edge with existing concrete.
- D. New concrete driveway, sidewalk, curb and curb and gutter installations shall conform to applicable portions of the above requirements and as specified on the Drawings and Details.

3.05 ASPHALT DRIVEWAYS, SIDEWALKS AND PARKING AREAS:

Asphalt driveways, sidewalks and parking areas shall be replaced as specified above for asphalt concrete pavement.

3.06 GRAVEL SURFACE PLACEMENT:

Replace all existing gravel or crushed rock surfaces and/or place new gravel surfaces as shown on the Drawings with crushed rock as specified for crushed surface base course and top course, to a depth of 4” or as shown on the Drawings. Grade smooth and compact to blend smoothly with adjacent areas.

4.00 MEASUREMENT AND PAYMENT

4.01 GENERAL:

- A. See Section 01 22 00 – Measurement and Payment for General Requirements. See Section 01 01 00 – Special Requirements/Bid Items for possible modifications to Standard Bid Items. If no specific bid item is provided, measurement and payment shall be considered incidental and shall be included in the provided Bid Items.

- B. Payment for surface improvements or surface restoration Bid Items shall be at locations indicated on the Drawings. No additional payment will be made for restoring surfaces damaged outside of the indicated payment areas. Interim surface and surface maintenance as specified shall be included in all Bid Items as applicable.

Surface restoration, gravel surface replacement other than that specifically provided for in a Bid Item below, fine grading and clean-up of gravel, unimproved or dirt areas shall be considered incidental and the cost shall be included in the provided Bid Items.

4.02 BID ITEMS:

- A. Special provisions, requirements, revisions to these Bid Items, and/or additional Bid Items, may be included in Section 01 01 00 (green pages) or on the Drawings or Details.

B. AC Pavement Removal

This Bid Item shall include removal of all existing asphaltic pavement of any type and as indicated on the Drawings or required in the field, including pavement cutting, removal of excess material to a depth to accommodate gravel base and pavement replacement as indicated on the Drawings or in other Bid Items, and hauling away and disposing of removed material. It shall include interim surface maintenance as applicable and required. Measurement and payment shall be on square yard (S.Y.) basis, as measured in the field by the Engineer.

C. AC (HMA) Pavement Placement

This Bid Item shall include furnishing, placing, compacting and finishing the specified crushed surfacing base and top course and asphalt concrete (HMA) pavement to the depths indicated in the Bid Item, Specifications or on the Drawings. Where CTB is constructed it is paid for under other Bid Items (see Section 32 11 33). Measurement and payment shall be on a unit price square yard (S.Y.) basis, as measured in the field by the Engineer. Placement of gravel shoulder on roadways without curb, where required, is not included in this Bid Item.

If no separate AC Pavement Removal or Asphalt Pre-Leveling bid items are provided, no separate payment will be made and cost for same shall be included in the provided Bid Items.

D. Asphalt Pre-Leveling

This Bid Item shall include furnishing, placing and compaction of HMA pre-leveling course where shown on the Drawings and/or in Section 01 01 00, or if not specifically shown, place a pre-level course where necessary to result in a finished pavement and surface that complies with these specifications. Measurement and payment shall be on a unit price square yard (S.Y.) basis as measured in the field by the Engineer. If no Asphalt Pre-Leveling Bid Item is provided, the cost for same shall be included in the AC (HMA) Pavement Placement Bid Item.

E. Integral Curb and Sidewalk Removal

Bid Item shall include removing and disposing of existing integral curb and sidewalk including saw cutting, in accordance with these Contract Documents. It shall include interim surface maintenance as applicable and required. Measurement and payment shall be made on a unit price lineal foot (L.F.) basis. Measurement shall be the horizontal distance measured along the face of the curb. Payment for removal of curb and sidewalk associated with utility service lateral

installations will be limited to a maximum of 15 lineal feet per sewer service installation and 10 lineal feet per water service installation. Payment for removal of wheel chair ramps shall be included in this bid item for integral curb and sidewalk or separate curb and sidewalk bid items as applicable.

F. Integral Curb and Sidewalk Placement

Bid Item shall include placing integral curb and sidewalk including finishing, base course, concrete, and incidentals necessary to complete this item in accordance with these Contract Documents. Measurement and payment shall be made on a unit price lineal foot (L.F.) basis. Measurement shall be the horizontal distance measured along the face of the curb. Payment for replacement of curb and sidewalk associated with utility service lateral installations will be limited to a maximum of 15 lineal feet per sewer service installation and 10 lineal feet per water service installation. Payment for wheel chair ramps shall be included in this bid item for integral curb and sidewalk or separate curb and sidewalk bid items as applicable.

G. Integral Curb and Driveway Apron Removal

Bid Item shall include removing and disposing of existing integral curb and driveway including saw cutting, in accordance with these Contract Documents. It shall include interim surface maintenance as applicable and required. Measurement and payment shall be made on a unit price lineal foot (L.F.) basis. Measurement shall be the horizontal distance measured along the face of the curb. Payment for removal of curb and driveway associated with utility service lateral installations will be limited to a maximum of 15 lineal feet per sewer service installation and 10 lineal feet per water service installation.

H. Integral Curb and Driveway Apron Placement

Bid Item shall include placing integral curb and driveway including finishing, base course, concrete, and incidentals necessary to complete this item in accordance with these Contract Documents. Measurement and payment shall be made on a unit price lineal foot (L.F.) basis. Measurement shall be the horizontal distance measured along the face of the curb. Payment for replacement of curb and driveway associated with utility service lateral installations will be limited to a maximum of 15 lineal feet per sewer service installation and 10 lineal feet per water service installation.

I. Concrete Curb Removal

This Bid Item shall include removing and disposing of existing concrete curb only, whether or not a sidewalk exists. It shall include saw cutting, in accordance with these Contract Documents. It shall include interim surface maintenance as applicable and required. Measurement and payment shall be on a unit price lineal foot (L.F.) basis. Measurement shall be the horizontal distance measured along the face at the curb. Payment for removal of curb associated with utility service lateral installations will be limited to 15 lineal feet per sewer service installation and 10 lineal feet per water service installation. Payment for curb only (not integral with sidewalk) removal associated with driveway aprons or wheel chair ramps shall be included in this Bid Item.

J. Concrete Curb Placement

This Bid Item shall include placing concrete curb only, whether or not a sidewalk exists. It shall include finishing, base course, concrete and incidentals necessary to complete this item in accordance with these Contract Documents. Measurement and payment shall be on a unit price lineal foot (L.F.) basis. Measurement shall be the horizontal distance measured along the face at the curb. Payment for replacement of curb associated with utility service lateral installations will be limited to 15 lineal feet per sewer service installation and 10 lineal feet per water service installation. Payment for curb only (not integral with sidewalk) placement associated with driveway aprons or wheel chair ramps shall be included in this Bid Item.

K. Concrete Curb and Gutter Removal

This Bid Item shall include removing and disposing of existing concrete curb and gutter only, whether or not a sidewalk exists. It shall include saw cutting, in accordance with these Contract Documents. It shall include interim surface maintenance as applicable and required. Measurement and payment shall be on a unit price lineal foot (L.F.) basis. Measurement shall be the horizontal distance measured along the face at the curb. Payment for removal of curb and gutter associated with utility service lateral installations will be limited to 15 lineal feet per sewer service installation and 10 lineal feet per water service installation. Payment for curb and gutter only (not integral with sidewalk) removal associated with driveway aprons or wheel chair ramps shall be included in this Bid Item.

L. Concrete Curb and Gutter Placement

This Bid Item shall include placing concrete curb and gutter only, whether or not a sidewalk exists. It shall include finishing, base course, concrete and incidentals necessary to complete this item in accordance with these Contract Documents. Measurement and payment shall be on a unit price lineal foot (L.F.) basis. Measurement shall be the horizontal distance measured along the face at the curb. Payment for replacement of curb and gutter associated with utility service lateral installations will be limited to 15 lineal feet per sewer service installation and 10 lineal feet per water service installation. Payment for curb and gutter only (not integral with sidewalk) placement associated with driveway aprons or wheel chair ramps shall be included in this Bid Item.

M. Concrete Flatwork Removal

This Bid Item includes saw cutting (if needed), removal and disposal of miscellaneous concrete flatwork including sidewalks, driveways, aprons and concrete slabs as specified on the Drawings or approved in the field by the Engineer. Measurement and payment shall be made on a unit price square yard (S.Y.) basis as measured in the field by the Engineer. This item does not include curb, curb and gutter, integral curb/ sidewalk or curb/driveway that are included in previous Bid Items.

N. Concrete Flatwork Placement

This Bid Item includes placement of miscellaneous concrete flatwork including sidewalks, driveways, aprons and concrete slabs as specified on the Drawings or approved in the field by the Engineer. Measurement and payment shall be made on a unit price square yard (S.Y.) basis as measured in the field by the Engineer. Base course gravel for slabs is incidental to this item and

SURFACE IMPROVEMENTS AND RESTORATION

Section 32 10 00 – Page 11

separate payment is not made. This item does not include curb, curb and gutter, integral curb/sidewalk or curb/driveway that are included in previous Bid Items.

O. Gravel Surface Placement

This Bid Item shall include furnishing, placing, compacting and finishing crushed rock surfacing in roadway, driveway and other areas to replace existing crushed rock disturbed during construction, and/ or new areas as indicated on the Drawings. Payment will be on a unit price cubic yard (C.Y.), square yard (S.Y.) or on a lump sum (L.S.) basis. This Bid Item also includes gravel surfacing of shoulders as are adjacent to paved roads without curbs and as approved by the Engineer. This Bid Item does not include crushed surfacing as base or top course under asphalt.

P. Cement Concrete Approach - () Day

This Bid Item shall be as specified above for Integral Curb and Driveway Apron Placement.

Q. Locate and Adjust Existing Manhole, Catch Basin or Drywell

This Bid Item shall be measured per each (EA) and shall be full payment for furnishing all tools, labor, equipment, and materials to locate, inventory, lower and protect existing structures prior to excavation or construction of CTB or other base and surfacing as needed and adjust existing structures to finished grade.

Work includes but is not limited to: locating and inventorying structures, structure excavation Class B including haul, interim adjustments up or down as may be required, excavation, removal and safely storing existing structures or components for re-installation as applicable, backfilling, compaction, protection of structures, provisions for continued street drainage, base replacement and pavement patching, surfacing and restoration of adjacent areas and removing construction debris after construction is complete, all in accordance with the Drawings and specifications.

When no Bid Item is provided on the Bid Form this work is considered incidental to the project and no payment shall be made.

R. Locate and Adjust Existing Valve Box

This Bid Item shall be measured per each (EA) and shall be full payment for furnishing all tools, labor, equipment, and materials to locate, inventory, lower and protect existing water valve boxes prior to excavation or construction of CTB or other base and surfacing as needed and adjust existing valve boxes to finished grade.

Work includes but is not limited to: locating and inventorying structures, structure excavation Class B including haul; interim adjustments up or down as may be required, excavation, removal and safely storing existing structures or components for re-installation as applicable, backfilling, compaction, protection of structures, provisions for continued street drainage, base replacement and pavement patching, surfacing and restoration of adjacent areas and removing construction debris after construction is complete, all in accordance with the Drawings and specifications.

SURFACE IMPROVEMENTS AND RESTORATION

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When no Bid Item is provided on the Bid Form this work is considered incidental to the project and no payment shall be made.

Water valve box adjustment for new valves is included in payment for valves. See Section 33 14 00.

****END OF SECTION****

1.00 GENERAL

1.01 DESCRIPTION:

- A. The work included in this section consists of replacing and restoring all existing lawn and other landscaping damaged directly, or indirectly, by the Contractor's operations and includes seeding, topsoil, sod, shrubs, trees and other items as required by these Specifications or indicated on the Drawings. It also includes the installation of new materials, as indicated on the Drawings.
- B. Special provisions, requirements, and/or revisions to this Specification and/or Bid Item(s) may be included in Section 01 01 00 (green pages) and/or on the Drawings or Details.

1.02 QUALITY ASSURANCE:

- A. For actual installation of seeding, sod and other landscape work, utilize personnel who are thoroughly experienced with the materials and methods required. All material shall conform to federal, state and local laws.

B. Trees, shrubs and perennials:

Provide all plants of the quantity, size, genus, species, and variety shown and scheduled for landscape work, and complying with requirements of ANSI Z60.a "American Standard for Nursery Stock." Provide healthy, vigorous plant stock, grown in recognized Inland Northwest nurseries, in accordance with good horticultural practice and free of apparent disease and defects. If the specified landscape material is not obtainable, submit early proof of non-availability, together with proposal for use of equivalent material, in a timely manner.

1.03 SUBMITTALS:

Submittals shall conform to Section 01 33 00 of the Specifications and shall include:

1. Seeding:

Copies of certificates of inspection which include variety, purity and germination. Test shall have been performed within six months.

2. Sod:

Copies of certification from grower certifying the grass species and location of field from which sod was cut.

3. Trees and Shrubs:

Copies of certification from nursery certifying common and botanical name.

1.04 JOB CONDITIONS:

Proceed with and complete restoration work as rapidly as portions of site become available, working within seasonal limitations for each kind of work required.

1.05 SPECIAL WARRANTY:

Warranty any sod, trees, and shrubs for a period of one year after date of Substantial Completion against defects, including death and unsatisfactory growth, except for defects resulting from neglect by Owner, abuse or damage by others, or unusual phenomena or incidents that are beyond Contractor's control. Remove and replace items found to be dead or in unhealthy condition during warranty period. Make replacements during growth season following end of warranty period. Replace items that are in doubtful condition at end of warranty period, unless, in opinion of Engineer, it is advisable to extend warranty period for a full growing season.

2.00 PRODUCTS

2.01 TOPSOIL:

Topsoil for restoration work shall be friable, free-draining sandy loam, or loamy sand free of rocks, roots, and deleterious materials. Topsoil shall be free of materials which are prohibitive to plant growth, such as excessive salinity, alkalinity, or concentration of lead or arsenic. Obtain topsoil from local sources or from areas having similar soil characteristics to that found at project site. Obtain topsoil only from naturally well-drained sites where topsoil occurs in depths of not less than 4"; do not obtain from bogs or marshes.

2.02 SEED:

A. Purity, inert material and germination shall be in accordance with state and federal laws. Seed mix as follows:

1. Lawn Seed Mix

Gnome Kentucky Bluegrass	32%
Newport Kentucky Bluegrass	33%
Affinity Perennial Ryegrass	18%
Evening Shade Perennial Ryegrass	17%

2. Cover Crop Seed Mix

Rueben Canada Bluegrass	34%
Annual Ryegrass	33%
Hard Fescue	33%

3. Pasture Grass Seed Mix

Orchard Grass	30%
Lawn Tall Fescue	30%
Intermediate Wheat Grass	25%
Smooth Broome Grass	10%
Alfalfa	5%

2.03 SOD:

Sod for placement of lawn shall be 100% Bluegrass, A-34, Aldelphi, Bonnie Blue, Fylking, or Merion. Submit certification of percentages and variety of seed involved to Engineer for approval. Sod is to be free of poa anna (annual bluegrass) and all pests and disease. It shall be no more than 30 months old. Sod

shall not be cut from field more than 24 hours prior to delivery to project site. All sod shall be one continuous cut from one field.

2.04 SHRUBS AND TREES:

- A. Plants shall be healthy, in vigorous growing condition, and be guaranteed true to size, name and variety. Nomenclature shall be listed in Standardized Plant Names, Second Edition, 1942.
- B. Size and quality shall be equal to existing plants or as shown on the Plans. Plants shall be No. 1 nursery grown, freshly dug, of normal growth and habit, and free from diseases and insects.

2.05 FERTILIZER:

Fertilizer shall be a standard commercial grade of the kind and quantity specified herein. All fertilizer shall be furnished in standard unopened containers with weight and manufacturer's analysis clearly marked.

1. <u>Lawn Fertilizer</u>	
Total Nitrogen	20%
Available Phosphoric Acid	20%
Water Soluble Potash	10%
2. <u>Cover Crop Fertilizer</u>	
Total Nitrogen	18%
Available Phosphoric Acid	10%
Water Soluble Potash	10%
Sulphur	7%
3. <u>Pasture Fertilizer</u>	
Total Nitrogen	16%
Available Phosphoric Acid	20%
Potassium	0%
Sulphur	14%

2.06 MULCH:

Mulch shall be wood cellulose fiber. Wood cellulose fiber mulch shall be specially processed wood fiber containing no growth or germination inhibiting factors and shall be dyed a suitable color to facilitate inspection of the placement of the material.

2.07 TACKIFIER:

Mulch shall include a tackifier. Tackifier shall be RMB, or approved equal.

2.08 SLOPE STABILIZATION BLANKET:

Slope stabilization blanket shall consist of a mat of curled wood excelsior of 80% six-inch, or longer, fiber length. The top side of the blanket shall be covered with a photodegradable extruded plastic mesh. Blanket shall be Curlex brand, as manufactured by American Excelsior Company, or equal.

2.09 PLANT MATERIALS:

Provide all plant of the quantity, size, genus, species, and variety shown and scheduled for landscape work and complying with requirements of ANSI Z60.a “American Standard for Nursery Stock.”

3.00 EXECUTION

3.01 GENERAL:

- A. All plant materials shall be installed in accordance with the grower’s recommendations and/or in accordance with locally acceptable best landscape practice, and as approved by the Engineer.
- B. All tools and equipment shall be 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.

3.02 LAWN REMOVAL:

In areas where removal and replacement of existing lawn is feasible, 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 four (4) inches, taking care to keep all 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 three (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.

3.03 SOD STORAGE:

- A. As the sod scalping proceeds, the sod strips shall be placed in neat piles at convenient locations and from then on they shall be maintained in a continuously damp condition until the sod strips are replaced on the lawn. In no case shall the sod remain in piles longer than two (2) days before replacement on the lawn.
- B. New sod delivered to the site shall be installed the same day as delivered.

3.04 SOIL PREPARATION:

- A. Contractor is responsible for any adverse drainage conditions that may affect plant growth, unless he contacts the Engineer immediately, indicating any possible problems. Prior to placing topsoil, review existing soil conditions for any contaminants that may have been discarded by other trades and notify Engineer immediately if any contaminants are present.

B. Lawn Soil Preparation:

Subgrade depths for lawn areas shall be minus 4” to allow for topsoil per the Engineer’s approval. Some subgrade preparation may be required. Scarify all compacted subgrades to promote proper drainage for plant growth. Remove debris from areas. Float or drag subgrades to produce smooth uniform surfaces. Distribute excess soil evenly throughout areas to be planted.

C. Cover Crop Seeding Preparation:

Scarify soil surface to promote proper drainage. Remove debris from area. Flatten soil surface to produce a smooth surface.

3.05 TOPSOIL PLACEMENT:

For lawn areas to be sodded or seeded, place 4” of topsoil and rake surface to a smooth uniform finish and compact to 80% dry maximum density. Set finished grade of topsoil 1-1/4” below top of adjacent pavement or sidewalk for sod installation, level of adjacent pavement, or sidewalk for areas to be seeded.

3.06 SOD INSTALLATION:

- A. Damaged or deteriorated existing sod, which is deemed by the Engineer not acceptable for reuse, shall be disposed of by the Contractor. The Contractor shall replace the loss of existing sod with new sod.
- B. Install sod so that all joints are tight and smooth on a smooth, moist, and lightly compacted surface. Lay sod such that long edges are parallel to contours and perpendicular to slope. Alternate joints in running bond fashion. Roll sod. Final rolling process must provide uniform surface. Contractor shall adjust grade irregularities as required. Irregularities of 1” will be maximum acceptable tolerance.

3.07 SEEDING:

- A. Seeding shall not be done during windy weather or when the ground is frozen, saturated or otherwise untillable.
- B. The exact time for seeding will be determined by actual weather conditions. The normal satisfactory period shall be considered as being between May 1 and September 1.

1. Lawn Seeding:

- a. Fertilizer shall be applied at a rate of six (6) pounds per thousand (1,000) square feet.
- b. Lawn seed shall be seeded over all areas to be put into lawn at a rate of eight (8) pounds per thousand (1,000) square feet.
- c. After seeding, ground horticultural peat moss shall be spread 1/4-inch deep over all seeded areas.

2. Cover Crop Seeding:

- a. Seeding may be performed by hydro-seeding or blowing. Equipment must be capable of obtaining an even distribution of materials at the proper rates.
- b. Fertilizer shall be applied at a rate of two hundred fifty (250) pounds per acre.
- c. Grass seed shall be applied at a rate of sixty (60) pounds per acre.

- d. Mulch shall be applied at a rate of two thousand (2,000) pounds per acre.
- e. Tackifier shall be applied at a rate of forty (40) pounds per acre.

3.08 STABILIZATION BLANKET INSTALLATION:

Area shall be prepared, fertilized, and seeded prior to installation of blanket. Unless otherwise noted or indicated on the Drawings, slopes steeper than 3:1 that will be seeded shall be provided with slope stabilization blanket.

3.09 PLANTING:

- A. Use planting soil beneath and around cavity between plant ball or roots and pit sides. Tamp base firmly, place plant or tree, tamp soil in layers, thoroughly water each layer, and loosen and fold burlap away from top of ball into pit. Fill balance of cavity with planting soil. Soak and continuously maintain adequate moisture.
- B. Use approved root transplanting compounds and herbicides for bulbs and plants to prevent disease and assure best plant growth. If deciduous trees or shrubs are moved when in full leaf, spray with anti-desiccant at nursery before moving and spray again two weeks later.
- C. Prune, thin out, and shape shrubs in accordance with standard horticultural practice. Prune trees only to remove injured or dead branches, if any. Prune shrubs to retain natural character.
- D. Wrap trunks of trees 1-½ inches in caliper and larger. Start at ground and cover trunk to a height of first branching and securely attach.
- E. Support trees immediately after planting by staking and/or guying to maintain trees in plumb position.
- F. Apply mulch to a depth of 3 inches around the plant. Fertilize all plants at time of planting.
- G. Planting areas with decorative rock, or bark shall include a geotextile type weedmat.

3.10 MAINTENANCE:

Maintenance shall begin following installation of material and shall continue until final acceptance of project or approved conditional acceptance. Work includes protection, watering, weeding, cultivating, mowing, tightening and repairing of guys, removal of dead materials, resetting plants to proper grades or upright position, and other operations necessary to proper growth and survival of all plant materials. All erosion shall be corrected at Contractor's expense.

3.11 FINAL INSPECTION:

Final inspection for seeded areas will not be made until thirty (30) days following completion of all seeding, fertilizing, and mulching as specified. Damage caused by the Contractor to areas which have been seeded or sodded shall be repaired and/or replaced by the Contractor at his own expense.

4.00 MEASUREMENT AND PAYMENT

4.01 GENERAL:

- A. See Section 01 22 00 – Measurement and Payment for General Requirements. See Section 01 01 00 – Special Requirements/Bid Items for possible modifications to Standard Bid Items.
- B. If no specific bid item is provided, measurement and payment shall be considered incidental and shall be included in the bid price for other items of work for the project.
- C. No additional payment will be made for restoring surfaces damaged outside of the respective pay limits.

4.02 BID ITEMS:

Special provisions, requirements, revisions to these Bid Items, and/or additional Bid Items, may be included in Section 01 01 00 (green pages) or on the Drawings or Details.

A. Lawn Seeding

- 1. Includes subgrade preparations, topsoil placement, furnishing and installing all components and maintenance.
- 2. Payment shall be on a unit price square yard (SY) or lump sum (LS) basis.

B. Cover Crop Seeding or Pasture Grass Seeding

- 1. Includes soil preparation and the furnishing and installing of all cover crop or pasture seed components and maintenance.
- 2. Payment shall be on a unit price square yard (SY) or lump sum (LS) basis.

C. Slope Stabilization Blanket

- 1. Includes furnishing and placing the slope stabilization blanket.
- 2. Payment shall be on a unit price square yard (SY) or lump sum (LS) basis.

D. Sod

- 1. Includes subgrade preparation, top soil placement, furnishing and installing sod and maintenance.
- 2. Payment shall be on a unit price square yard (SY) or lineal foot (LF) or lump sum (LS) basis.

E. Shrubs and Trees

1. Includes furnishing and installing all shrubs, trees and plants necessary for replacement or as shown on the drawings.
2. Payment shall be on a lump sum (LS) basis.

****END OF SECTION****

Request for Design Variance Form

Attachment 1 – Request for Design Variance

Project Name: _____

Date: _____

List below the deviations from the City of Pateros Design Standards you are proposing. For each variance requested, explain the reason why the City Design Standards cannot be met, and describe how the proposed variance will satisfy requirements for safety, function, fire protection, appearance, and maintainability. Attach additional supporting information as needed.

Submitted by – (please print): _____

Company: _____

Signature: _____



PRECONSTRUCTION CONFERENCE RECORD

PART 1 – GENERAL:

Project Name: _____

Name of Jurisdiction: _____ Date: _____

Engineering Firm: _____

Contractor: _____ Phone No.: _____

Superintendent: _____

Location of Pre-Construction Conference: _____

Date: _____ Time: _____

Attendees (*Representatives of the jurisdiction, engineering firm, Contractor, other*): See Attached

PART 2 – RESPONSIBILITIES:

A. Responsibilities of the Consulting Engineer (*Does not “supervise” the Contractor’s employees, equipment, or operations*):

- As Owner’s representative, the Engineer interprets plans and specifications, makes periodic site visits, provides a resident inspector, and prepares “Partial Payment Estimates”, “Outlay Reports”, and “Change Orders” with transmittal letter to the Owner and to funding agency. The Engineer also reviews the Contractor’s as-built and shop drawings.

B. Responsibilities of the Jurisdiction (*Actual contracting organization*):

- Owner processes Change Orders and Partial Payment Estimates and makes payments to the Contractor within the time required by the Contract Documents.
- Complies with funding conditions and loan approval conditions, if applicable; channels communication to the Contractor through the Engineer, and reviews the project for acceptance after the Engineer recommends acceptance.

C. Responsibilities of the Contractor (*Review contract terms*):

- Oversee all subcontractor work; responsible for all subcontractor submittals.
- The Prime Contractor must have a representative with authority on the job site at all times when work is being done by his crews or subcontractors, including cleanup.
- Responsible for construction safety techniques.
- In general, perform work required in the Contract Documents in a workman-like manner; maintain constant communication with Engineer by pointing out potential problems; and provide advance notice of needed engineering services.

PART 3 – GENERAL DISCUSSION OF CONTRACT:

A. Initiating Construction (*Notice to Proceed*):

- The Notice to Proceed will be dated on _____ making the completion date _____.

B. Completion time for the Contract (Does everyone understand the contract requirements and methods for computing time?):

- As per Section 01010, paragraph 1.00.D.: The Contract Time shall be counted from the date designated in the Notice to Proceed and shall run continuously ____ working days until all work is fully complete.

C. Liquidated damages:

- \$_____ per calendar day, see Section 01010.

D. Requests for extensions of Contract time (how should they be handled?):

- Written notice is required from the Prime Contractor (not from subcontractors) in the form of a Change Order Request to the Engineer within 7 days of the occurrence of the event giving rise to the claim or request.
- Documentation shall be submitted within 30 days. It shall be broken down in sufficient detail as to permit the reviewer to identify the basis and reasonableness of the adjustments requested.

E. Procedures for making progress payments:

PERIOD ENDING	TO VARELA	TO CITY	COUNCIL MEETING

- Contractor and inspector to review Pay Request at scheduled construction meeting following submittal of pay request.
- Project Engineer will prepare Pay Estimate with construction costs and recommend payment by the Owner.
- The Owner will then process and release of funds.
- Note: A 5% retainage will be withheld in accordance to Contract Documents.

F. Other requirements of the Contract and Specifications which deserve special discussion by all participants:

- The Contractor shall work closely with the City to keep the existing irrigation system operable during construction and shall assist the City at project completion to repair the system as necessary to ensure adequate and even coverage.

PART 4 – CONTRACTOR’S SCHEDULE:

A. Analyze the Work Schedule in enough detail to enable the Consulting Engineer to plan his operations (*Consideration must be given to the needs of the jurisdiction and the planned operations of other contractors*):

- Contractor to submit a monthly updated Construction Schedule with monthly Pay Estimate.
- General Conditions require the Contractor to submit a Construction Schedule and Payment Schedule prior to the first Partial Pay Estimate.
- The Contractor shall note that the Owner’s contact from _____ to _____ will be _____.

PART 5 – SUBMITTALS:

A. Contractor will supply a list of submittals with the completion of the Construction Schedule.

- Submittals will be transmitted with the supplied “Submittal Schedule.”
- The Schedule must reflect a reasonable amount of time for the Engineer to review and comment on the submittals.
- “Hot” submittals should be marked accordingly for prioritizing the review process.
- All submittals will be sent to the Engineer’s office to be reviewed and distributed.
- Submittals marked “Rejected and Resubmit” shall be resubmitted in their entirety.
- The Stormwater Pollutant Prevention and Spill Prevention Plans shall be submitted prior to construction.

PART 6 – CHANGE ORDERS:

A. Procedures to be followed in obtaining approval of Change Orders:

- Per General Conditions.
- Written notice of the need for a change in time/price submitted within 7 days of receiving the field order.
- Documentation for the basis of the change in Contract time or price submitted within 30 days.
- The Change Order must be approved by the Owner before payment can be remitted.

PART 7 – RRI’S (REQUESTS FOR INFORMATION):

A. Procedures to be followed in issuing RFI’s:

PART 8 – STAKING OF WORK:

A. Responsibilities of the Owner:

PART 9 – PROJECT INSPECTION:

A. Responsibilities of the Owner:

- Stay informed of the project status.

B. Safety and sanitary regulations:

- The Owner’s or Engineer’s presence or approval does not indicate implied or stated adherence to state or federal safety or other regulations or codes, which is solely the responsibility of the Contractor.

PART 10 – ACCEPTANCE OF WORK:

A. Requirements for final acceptance of work:

- As stated in the Contract Documents, the Owner will not accept the project until the Engineer makes a recommendation of acceptance.

B. Special testing or site clean-up requirements:

PART 11 – OTHER ISSUES:

A. As-built Drawing Audit

- Inspector will conduct periodic drawing audits of the designated Record Drawings.

B. Construction Meeting will be held at _____ weekly on _____ at _____ : _____ a.m.

C. Labor requirements:

- State prevailing wage rates apply.

D.

E.

NOTED AND AGREE WITH, but understood not to be a modification of any existing contract or agreement.

Signature of Jurisdiction Representative

Signature of Consulting Engineer

Signature of Contractor

Signature of RD Representative

PRECONSTRUCTION CONFERENCE ATTENDEES

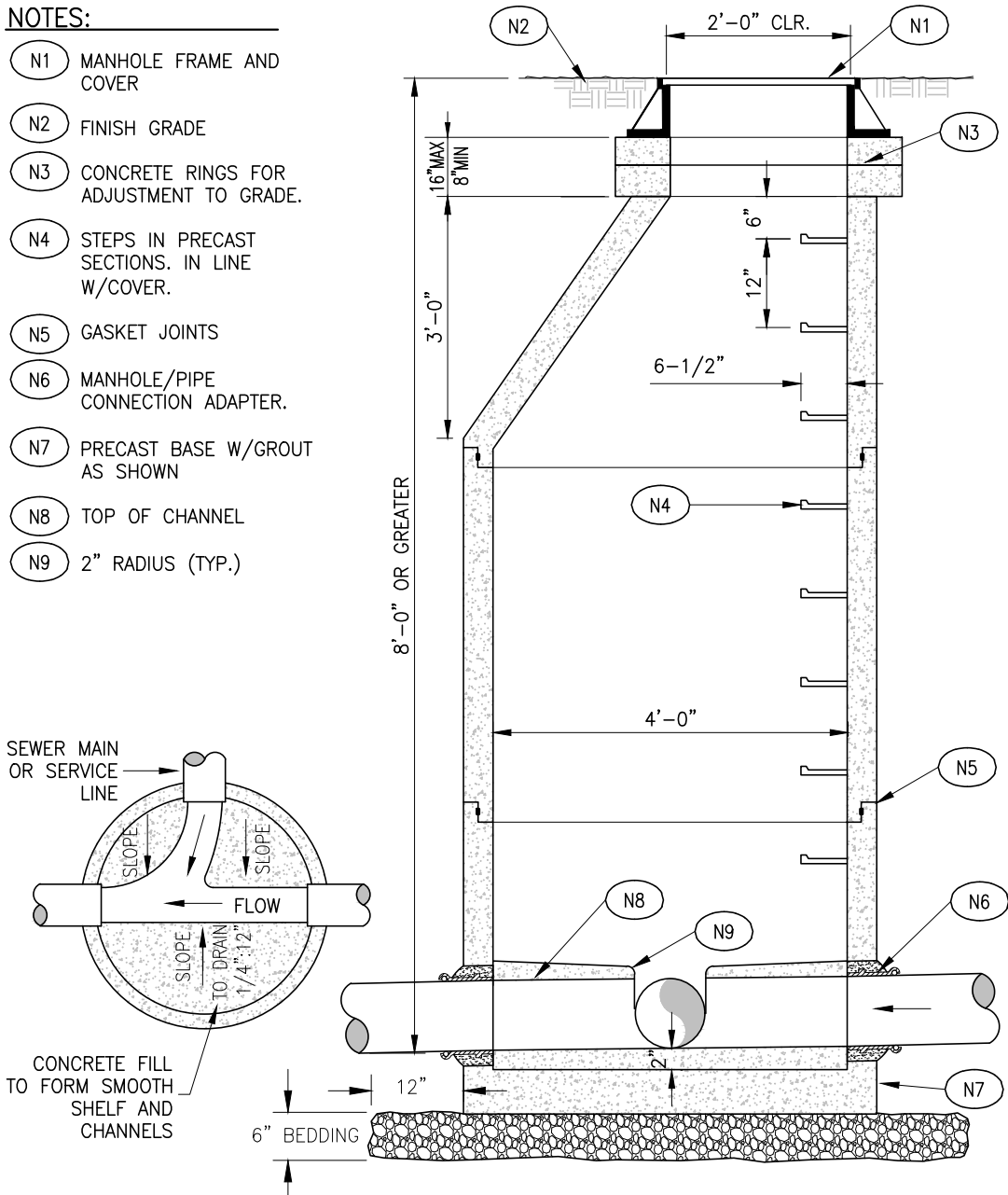
PROJECT NAME: _____ CONFERENCE DATE: _____

	NAME	COMPANY	PHONE	EMAIL
1				
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Standard Construction Detail Drawings
(TO BE INSERTED)

NOTES:

- (N1) MANHOLE FRAME AND COVER
- (N2) FINISH GRADE
- (N3) CONCRETE RINGS FOR ADJUSTMENT TO GRADE.
- (N4) STEPS IN PRECAST SECTIONS. IN LINE W/COVER.
- (N5) GASKET JOINTS
- (N6) MANHOLE/PIPE CONNECTION ADAPTER.
- (N7) PRECAST BASE W/GROUT AS SHOWN
- (N8) TOP OF CHANNEL
- (N9) 2" RADIUS (TYP.)



03 40 00-1 STANDARD MANHOLE TYPE I-48

N.T.S.

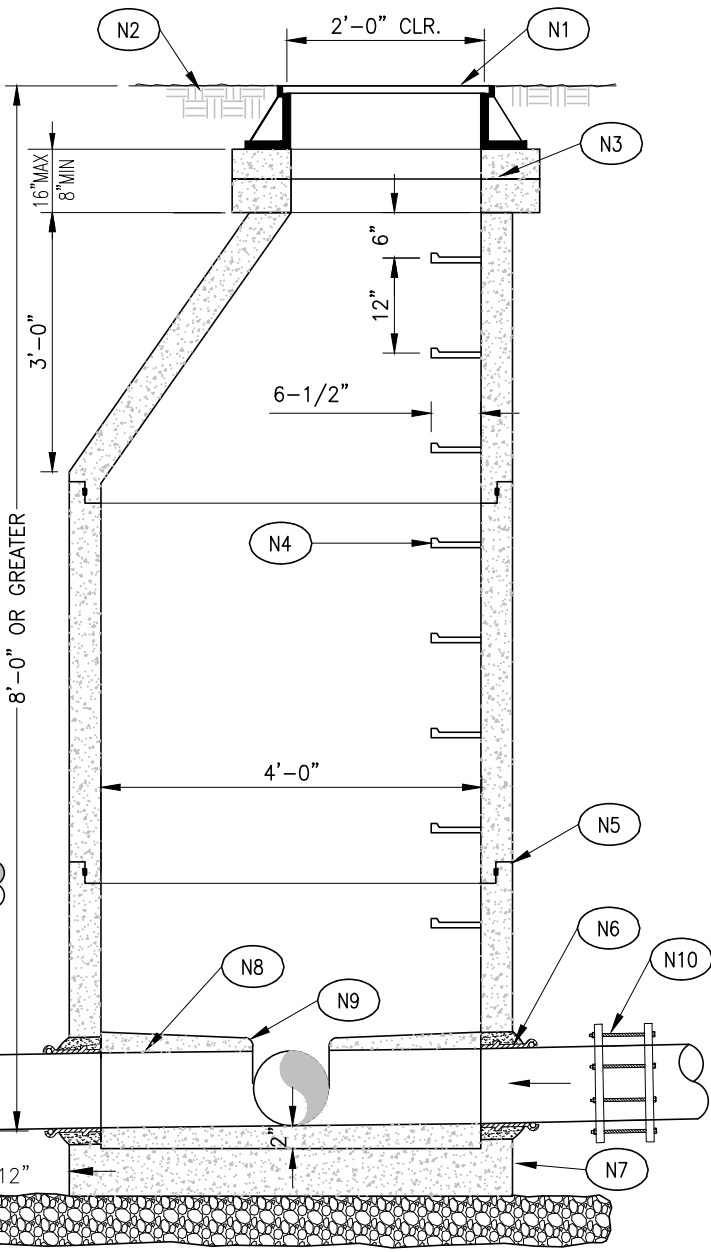
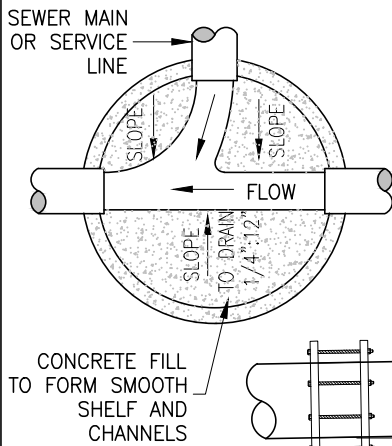
**CITY OF PATEROS, WA
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NOTES:

- (N1) MANHOLE FRAME AND COVER
- (N2) FINISH GRADE
- (N3) CONCRETE RINGS FOR ADJUSTMENT TO GRADE.
- (N4) STEPS IN PRECAST SECTIONS. IN LINE W/COVER.
- (N5) GASKET JOINTS
- (N6) MANHOLE/PIPE CONNECTION ADAPTER.
- (N7) PRECAST BASE W/GROUT AS SHOWN
- (N8) TOP OF CHANNEL
- (N9) 2" RADIUS (TYP.)
- (N10) ROMAC CPLG OR EQUAL TO CONNECT TO EXIST. MAINLINE



03 40 00-1A

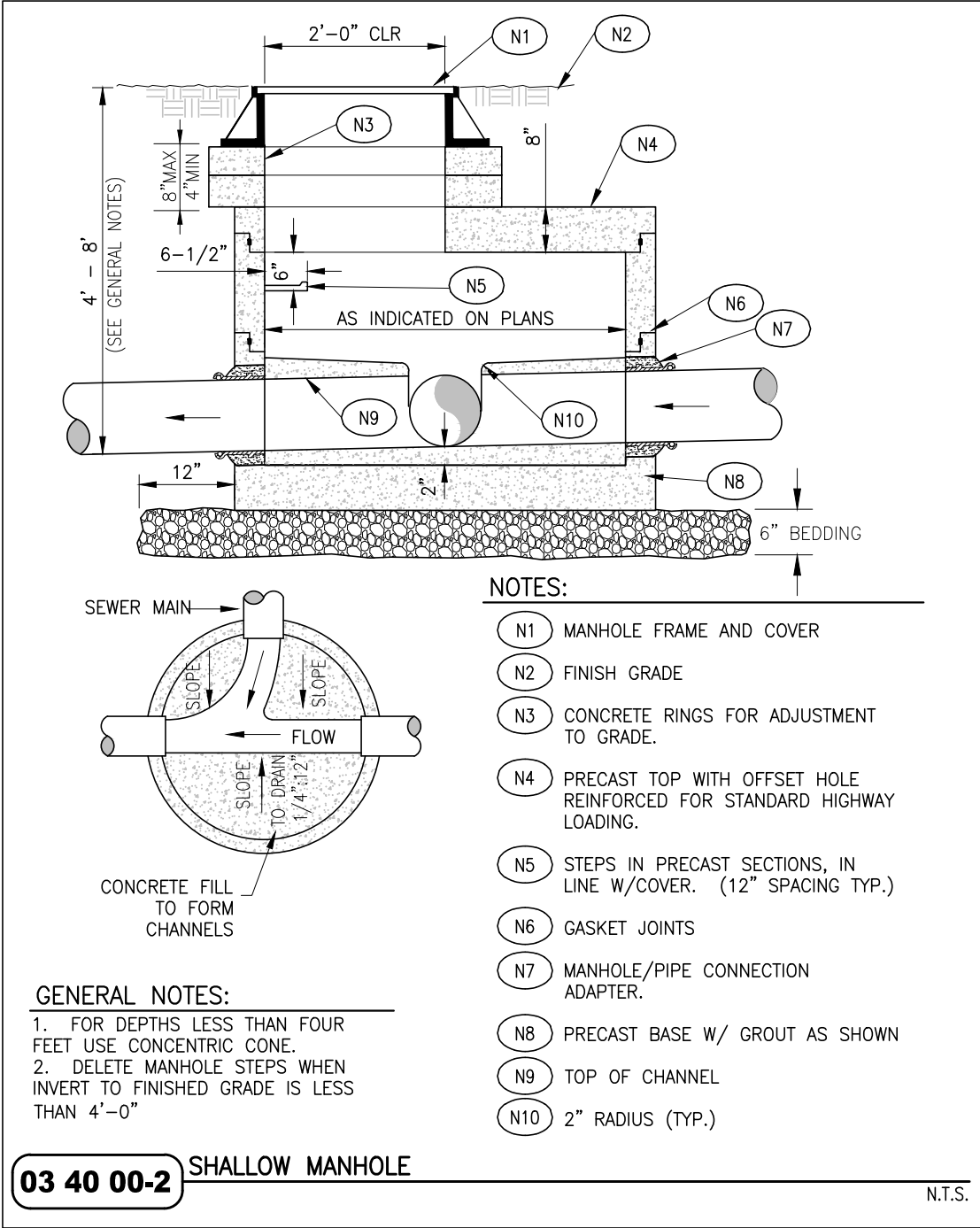
STANDARD MANHOLE TYPE I-48 ON EXISTING SEWER

N.T.S.

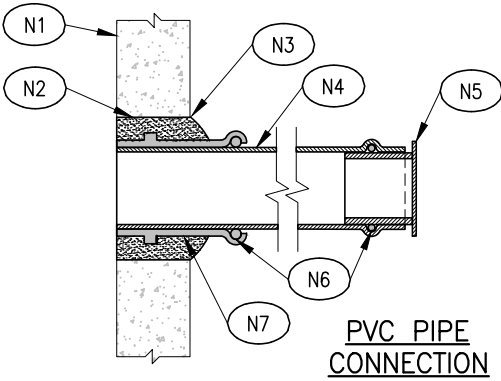
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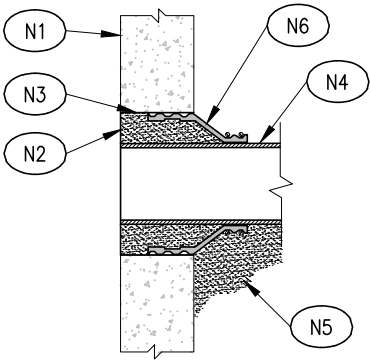
<p>CITY OF PATEROS, WA STANDARD CONSTRUCTION DETAIL DRAWINGS</p>			
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PVC PIPE CONNECTION

NOTES:

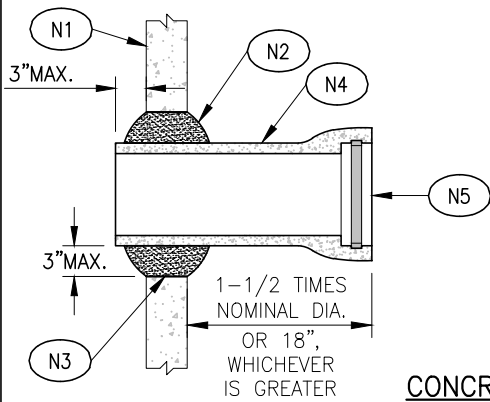
- (N1) MANHOLE WALL
- (N2) WATERPROOF NON-SHRINK GROUT
- (N3) OPENING SHALL BE CAST AT FACTORY OR CORE DRILLED IN FIELD
- (N4) PVC PIPE (TYP.)
- (N5) PIPE PLUG OR CAP (IF APPLICABLE)
- (N6) GASKET (TYP.)
- (N7) MANHOLE ADAPTER (TYP.)



HDPE/D.I. PIPE CONNECTION

NOTES:

- (N1) MANHOLE WALL
- (N2) WATERPROOF NON-SHRINK GROUT
- (N3) OPENING SHALL BE CAST AT FACTORY OR CORE DRILLED IN FIELD
- (N4) SMOOTHWALL HDPE/D.I. PIPE (TYP.)
- (N5) COMPACTED BEDDING FOUNDATION
- (N6) KOR-N-SEAL BOOT OR EQUAL



CONCRETE PIPE CONNECTION

NOTES:

- (N1) MANHOLE WALL
- (N2) WATERPROOF NON-SHRINK GROUT
- (N3) OPENING SHALL BE CAST AT FACTORY OR CORE DRILLED IN FIELD
- (N4) CONCRETE PIPE
- (N5) WATER TIGHT PIPE PLUG (IF APPLICABLE)

03 40 00-3

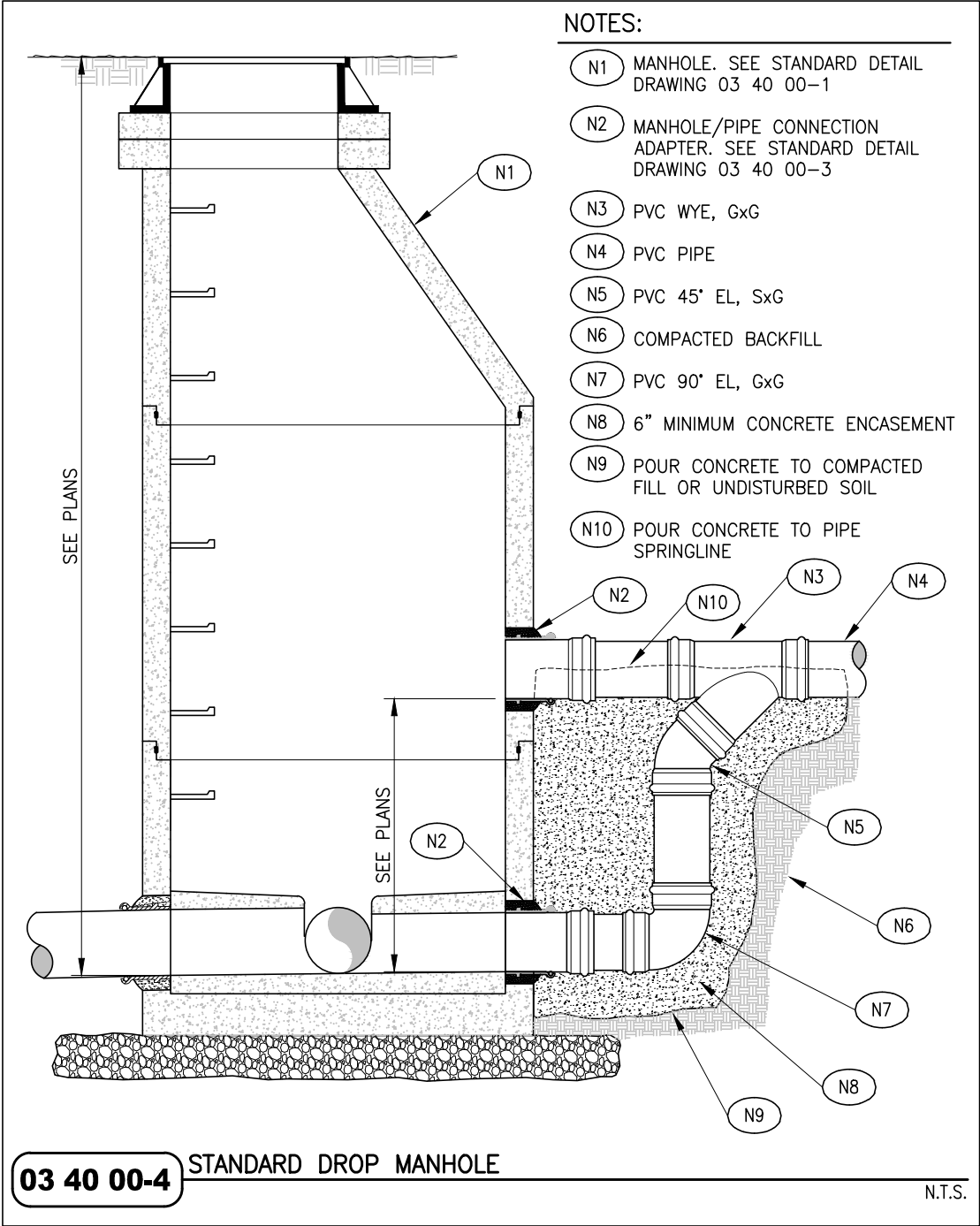
MANHOLE PIPE CONNECTION

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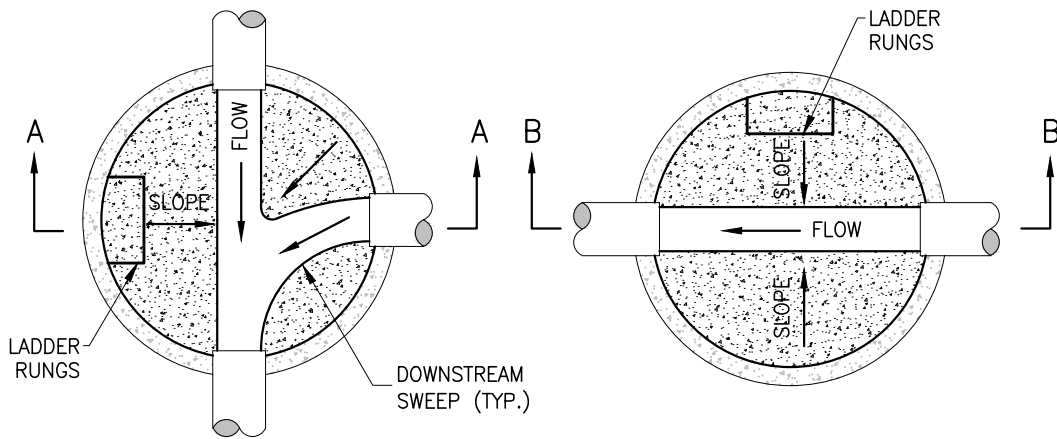




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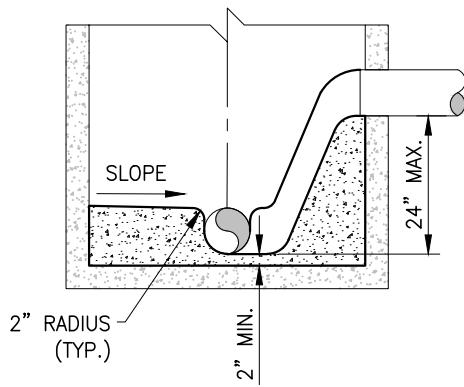


PLAN

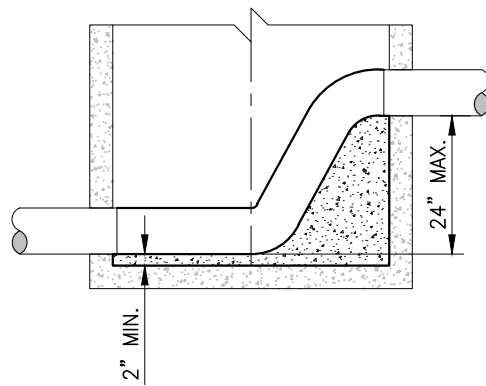
PLAN

NOTES:

1. THE CHANNEL SHALL HAVE A SMOOTH FINISH. THE SHELF SHALL HAVE A LIGHT BROOM FINISH.
2. SLOPE SHELF AT 1/4" PER FOOT.



SECTION A-A



SECTION B-B

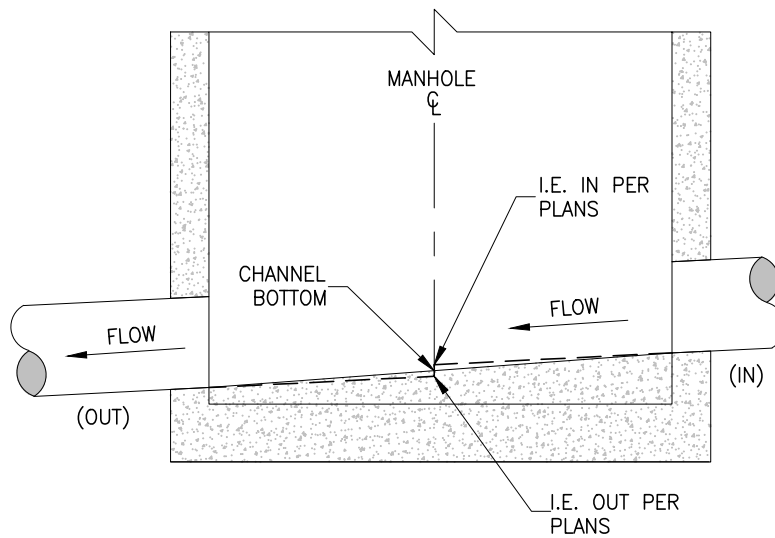
03 40 00-5 MANHOLE CHANNELING

N.T.S.

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NOTES:

1. ELEVATIONS SHOWN ON THE PLANS ARE AT THE CENTERLINE OF THE MANHOLE.
2. THE ELEVATIONS AT THE MANHOLE WALL IS EQUAL TO THE PLAN ELEVATION LESS THE FALL (OR PLUS THE RISE) FROM THE MANHOLE CENTER LINE TO THE MANHOLE WALL, AT THE SLOPE IN THE PLANS.

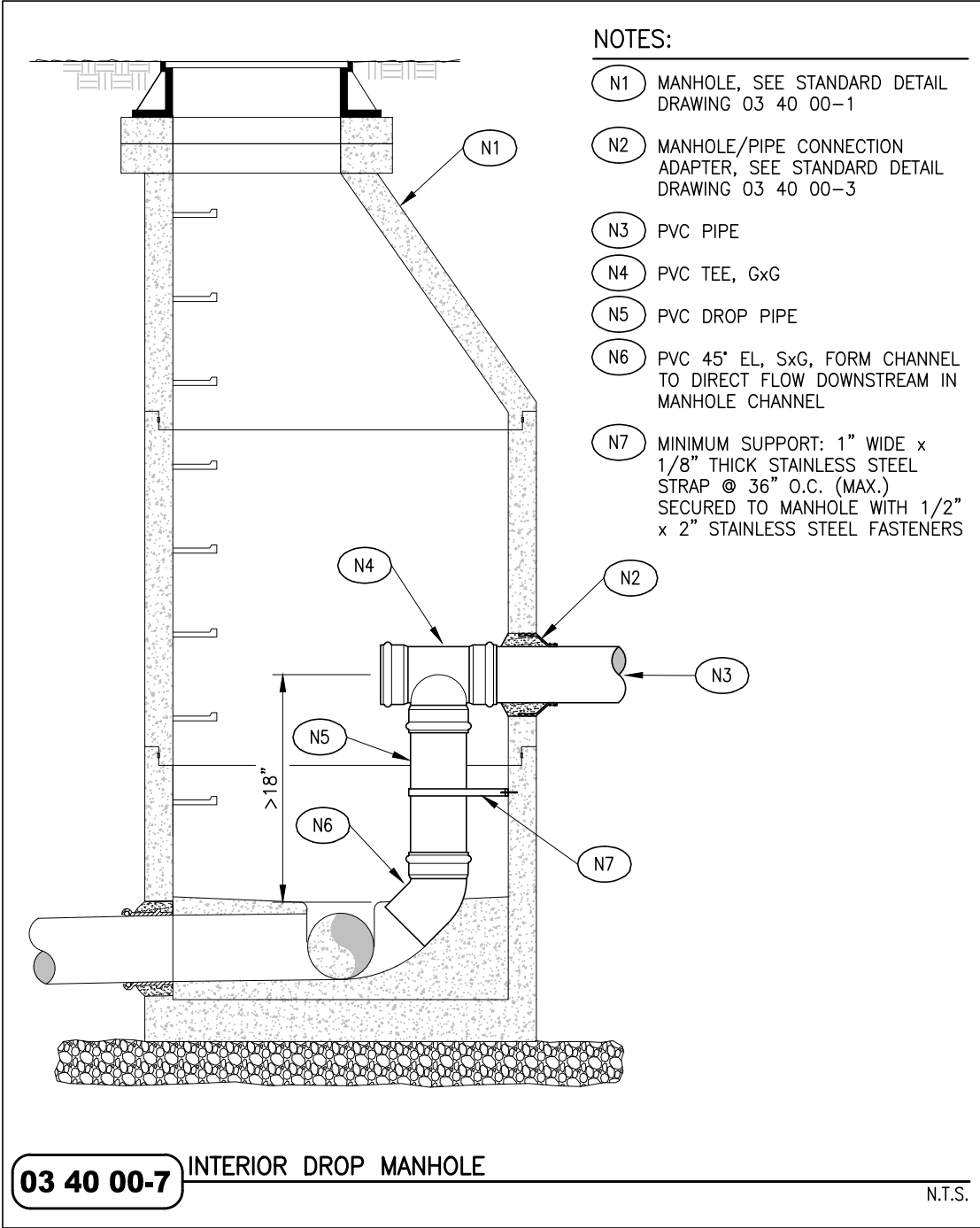
03 40 00-6 MANHOLE INVERT ELEVATION DETAIL

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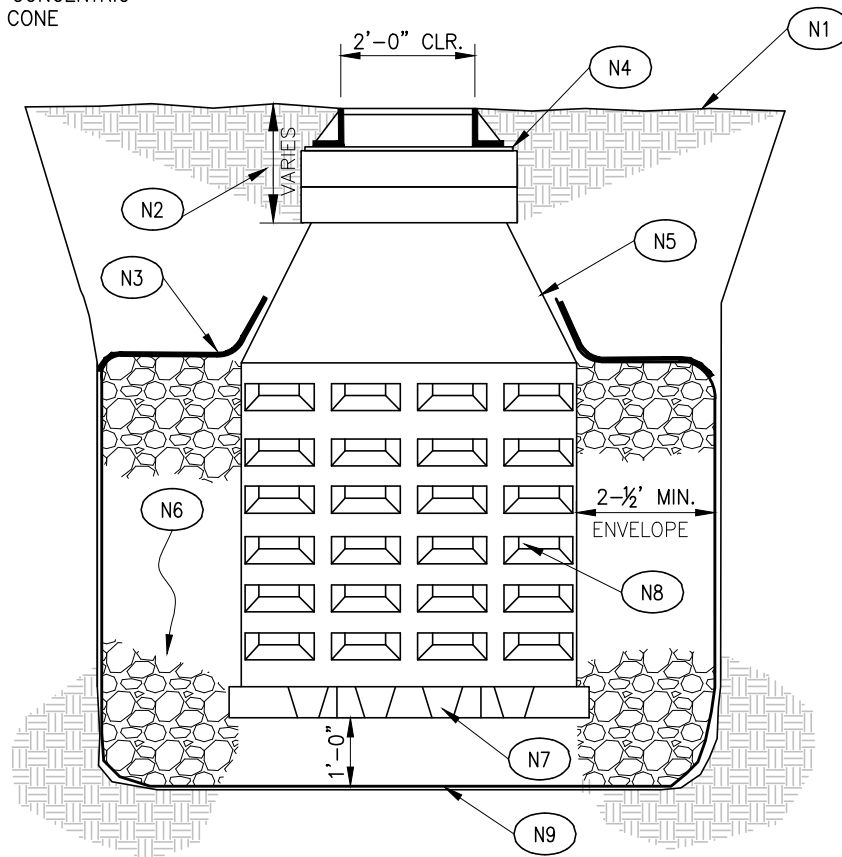


NOTES:

- (N1) FINISH GRADE
- (N2) MAX 2 COURSES OF CONC. RINGS FOR ADJUSTMENT TO GRADE
- (N3) 10 MIL POLY SHEETING COVER
- (N4) 4" x 24" CI RING AND SLOTTED COVER
- (N5) 24" TALL CONCENTRIC DRYWELL CONE
- (N6) MIN. 15 C.Y. 1-1/2" TO 3" WASHED DRAIN ROCK ALL AROUND
- (N7) 5" x 60" CONC. BASE WITH 24" OPENING
- (N8) 52" x 48" DIA. PERF. BARRELS
- (N9) PROVIDE GEO-FABRIC CONTAINMENT

GENERAL NOTES:

1. ECCENTRIC CONE MAY BE USED IF APPROVED OR DIRECTED BY ENGINEER.
2. WHEN USED IN GRASS OR GRAVEL AREAS, THE GRATING RIM SHALL BE SET ABOVE THE SURROUNDING FINISH GRADE.



03 40 00-8

STANDARD DRYWELL

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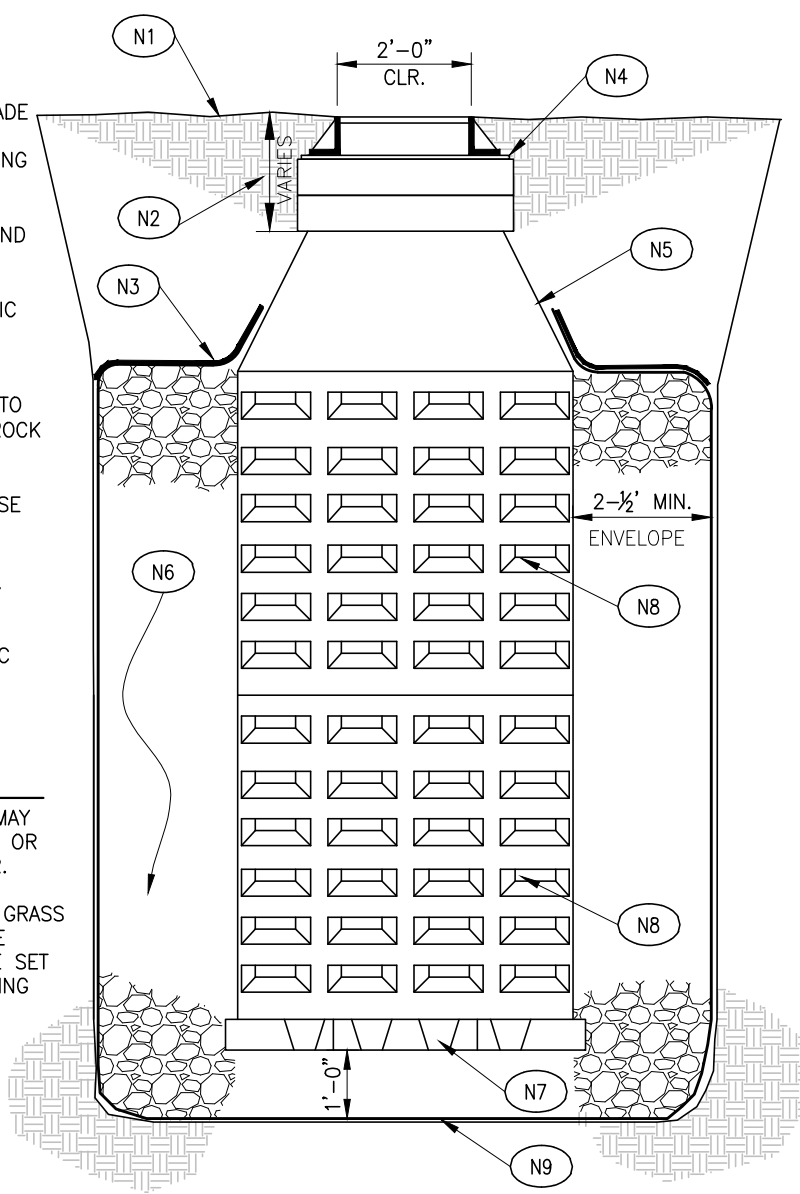


NOTES:

- (N1) FINISH GRADE
- (N2) MAX 2 COURSES OF CONC. RINGS FOR ADJUSTMENT TO GRADE
- (N3) 10 MIL POLY SHEETING COVER
- (N4) 4" x 24" CI RING AND SLOTTED COVER
- (N5) 24" TALL CONCENTRIC DRYWELL CONE
- (N6) MIN. 30 C.Y. 1-1/2" TO 3" WASHED DRAIN ROCK ALL AROUND
- (N7) 5" x 60" CONC. BASE WITH 24" OPENING
- (N8) 2 - 52" x 48" DIA. PERF. BARRELS
- (N9) PROVIDE GEO-FABRIC CONTAINMENT

GENERAL NOTES:

1. ECCENTRIC CONE MAY BE USED IF APPROVED OR DIRECTED BY ENGINEER.
2. WHEN USED IN GRASS OR GRAVEL AREAS, THE GRATING RIM SHALL BE SET ABOVE THE SURROUNDING FINISH GRADE.



03 40 00-9

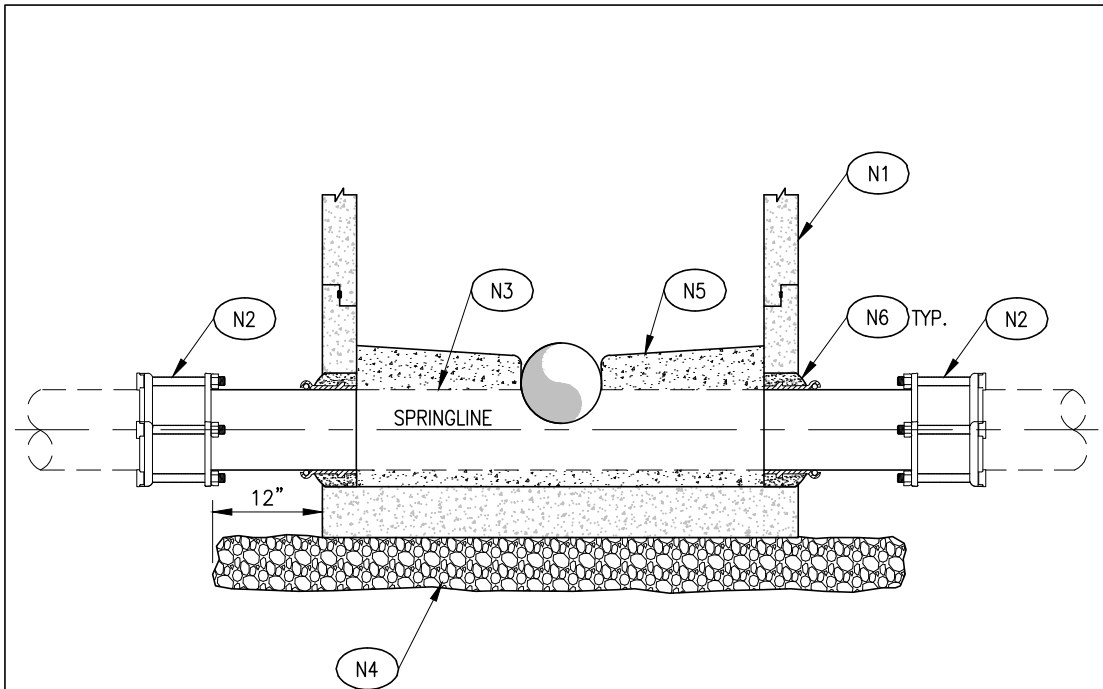
EXTRA DEPTH DRYWELL

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NOTES:

- (N1) STANDARD MANHOLE
- (N2) ROMAC COUPLING OR EQUAL TO CONNECT TO EXISTING SEWER
- (N3) CUT, REMOVE AND DISPOSE EXISTING SEWER PIPE
- (N4) 6" OF COMPACTED BEDDING TO 95%
- (N5) CAST CHANNEL WITH 3000 PSI (MIN.) REFER TO STANDARD DETAIL
- (N6) REFER TO DETAIL 03 40 00-3 (TYPICAL), CORE DRILL OR PRECAST CONNECTION TO MANHOLE

GENERAL NOTES:

1. THE ENTRY ANGLE OF THE NEW SEWER CONNECTION. RELATIVE TO THE EXISTING SEWER MAIN INLET SHALL BE 90° OR LESS
2. IF THE NEW SEWER CONNECTION IS A MAINLINE WITH A
 - A. DIAMETER EQUAL TO OR SMALLER THAN 1/2 DIAMETER OF THE EXISTING SEWER MAIN. THE NEW SEWER MAIN SHALL BE AT OR ABOVE THE CREST OF THE EXISTING SEWER MAIN.
 - B. DIAMETER GREATER THAN 1/2 THE DIAMETER OF THE EXISTING SEWER MAIN. THE NEW SEWER MAIN SHALL BE AT OR ABOVE THE SPRINGLINE OF THE EXISTING SEWER

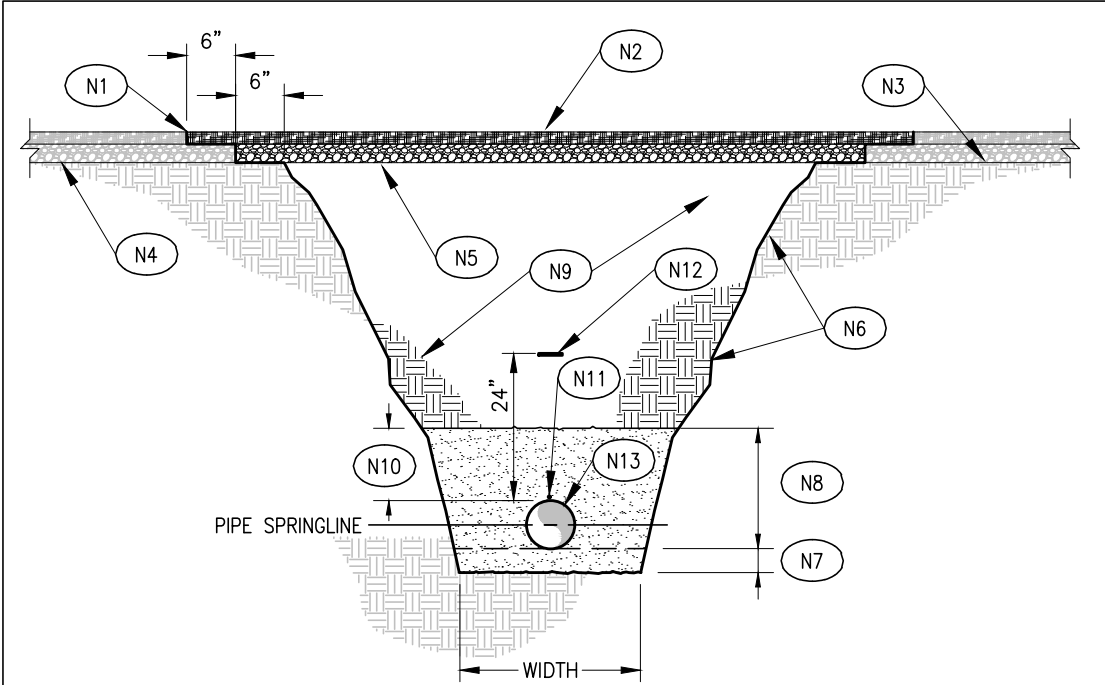
03 40 00-10 NEW MANHOLE ON EXISTING SEWER

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SEE SECTION 31 23 00

NOTES:

- (N1) SAWCUT EXISTING PAVEMENT (TYP.)
- (N2) NEW AC (DEPTH AS SPECIFIED)
- (N3) EXISTING GROUND LINE OR STREET SUBGRADE
- (N4) EXISTING AC PAVEMENT AND BASE COURSE (IF ANY)
- (N5) NEW BASE COURSE (DEPTH AS SPECIFIED)
- (N6) SLOPE AND/OR SHORE PER TRENCH SAFETY REQUIREMENTS
- (N7) BEDDING MATERIAL, 4" OVER SOIL, 6" OVER ROCK
- (N8) BEDDING MATERIAL (SEE TECHNICAL SPECIFICATIONS)
- (N9) TRENCH BACKFILL (SEE TECHNICAL SPECIFICATIONS)
- (N10) 12" UNLESS OTHERWISE SPECIFIED IN SECTION 31 23 00 OR ON THE DRAWINGS.
- (N11) PIPE LOCATING WIRE
- (N12) UTILITY MARKING TAPE
- (N13) PIPELINE

GENERAL NOTES:

1. SEE SECTION TECHNICAL SPECIFICATIONS, SECTION 31 23 00 FOR SPECIFIED MATERIALS, INSTALLATION AND COMPACTION REQUIREMENTS

31 23 00

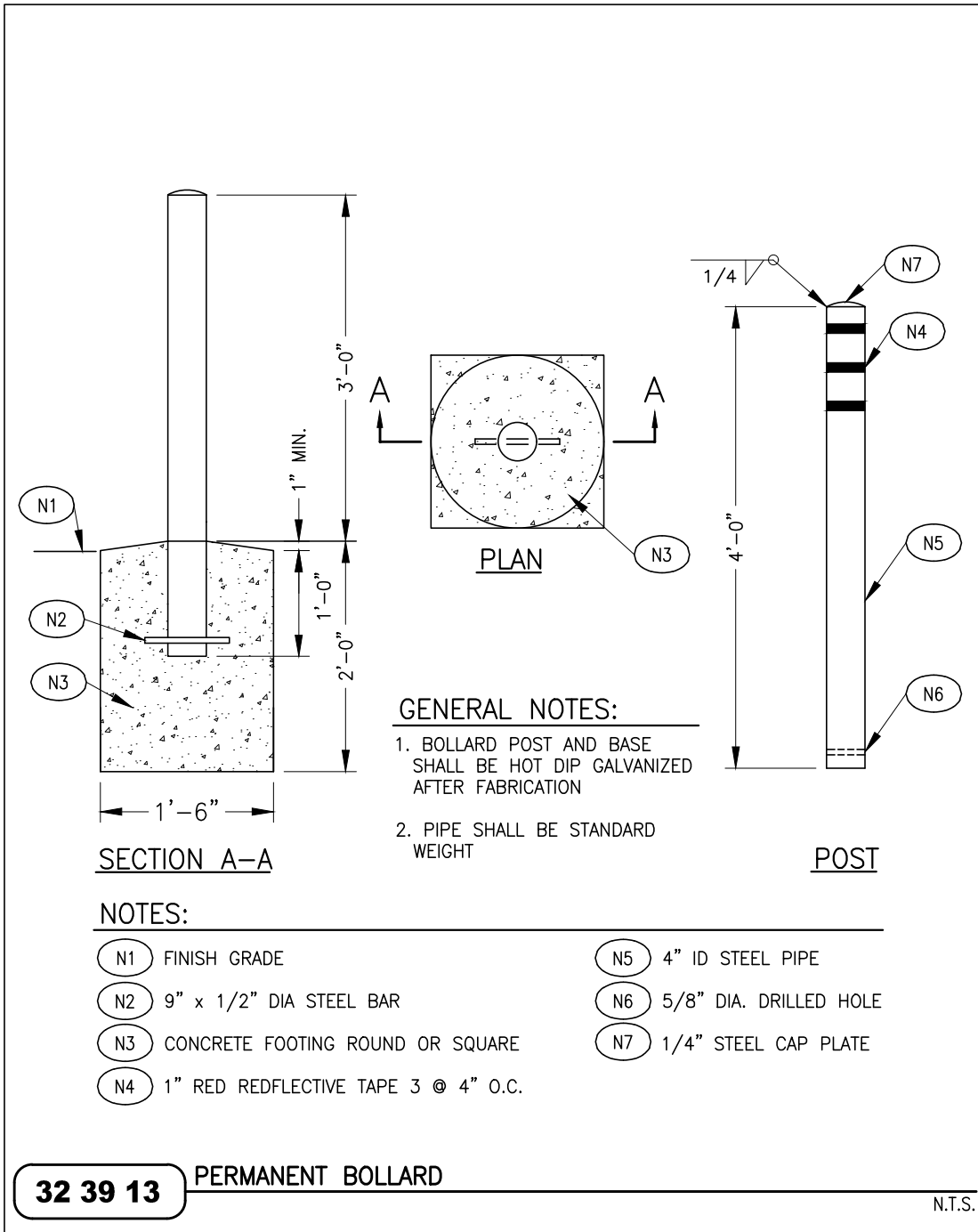
TRENCH EXCAVATION

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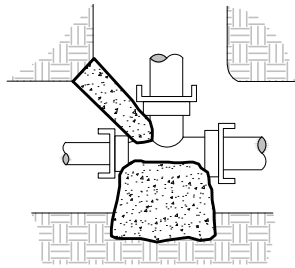
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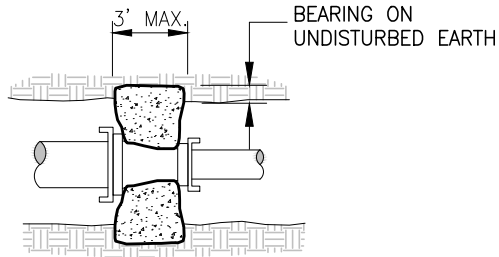




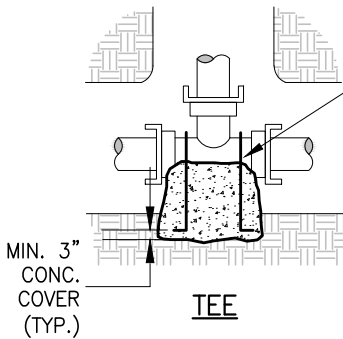
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TEE REDUCING IN LINE

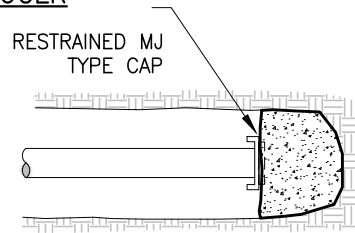


REDUCER



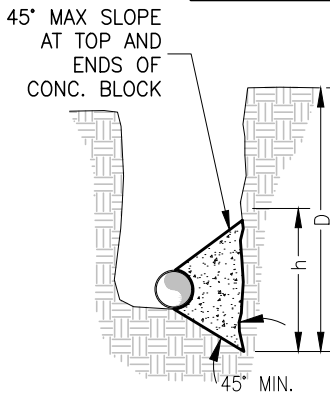
TEE

FOR TEES WITH FLANGED VALVE(S) ON RUN. INSTALL 2-#5 EPOXY COATED REBAR AROUND FITTING FOR LATERAL RESTRAINT. BARS SHALL BE HOOKED AND SET 18" MIN. IN CONC. FIT SNUG ON FITTING AND EPOXY CHIPS TOUCHED UP.



CAPPED END

THRUST BLOCK LAYOUT FOR HORIZONTAL PRESSURES



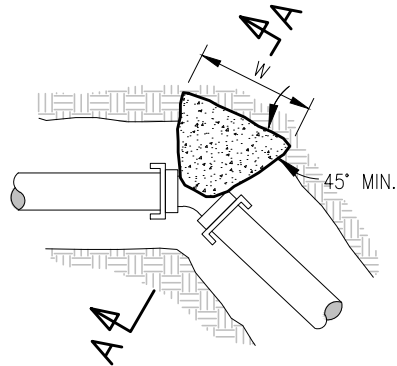
SECTION A-A THRUST BLOCK

CRITERIA FOR HORIZONTAL BENDS

"h" IS LESS THAN OR EQUAL TO ONE HALF OF "D", "W" SHALL BE GREATER THAN "h" BUT LESS THAN 2 TIMES "h"

A=hW
A=BEARING AREA

HORIZONTAL BENDS



HORIZONTAL ELBOW

GENERAL NOTES:

1. THIS DETAIL DRAWING APPLICABLE FOR FITTINGS OF ALL END TYPES.
2. ALL CONCRETE THRUST BLOCKS SHALL BE ADEQUATELY CONSOLIDATED IN PLACE.
3. SEE TABLE FOR MINIMUM BEARING AREA REQUIREMENTS.

33 14 00-1

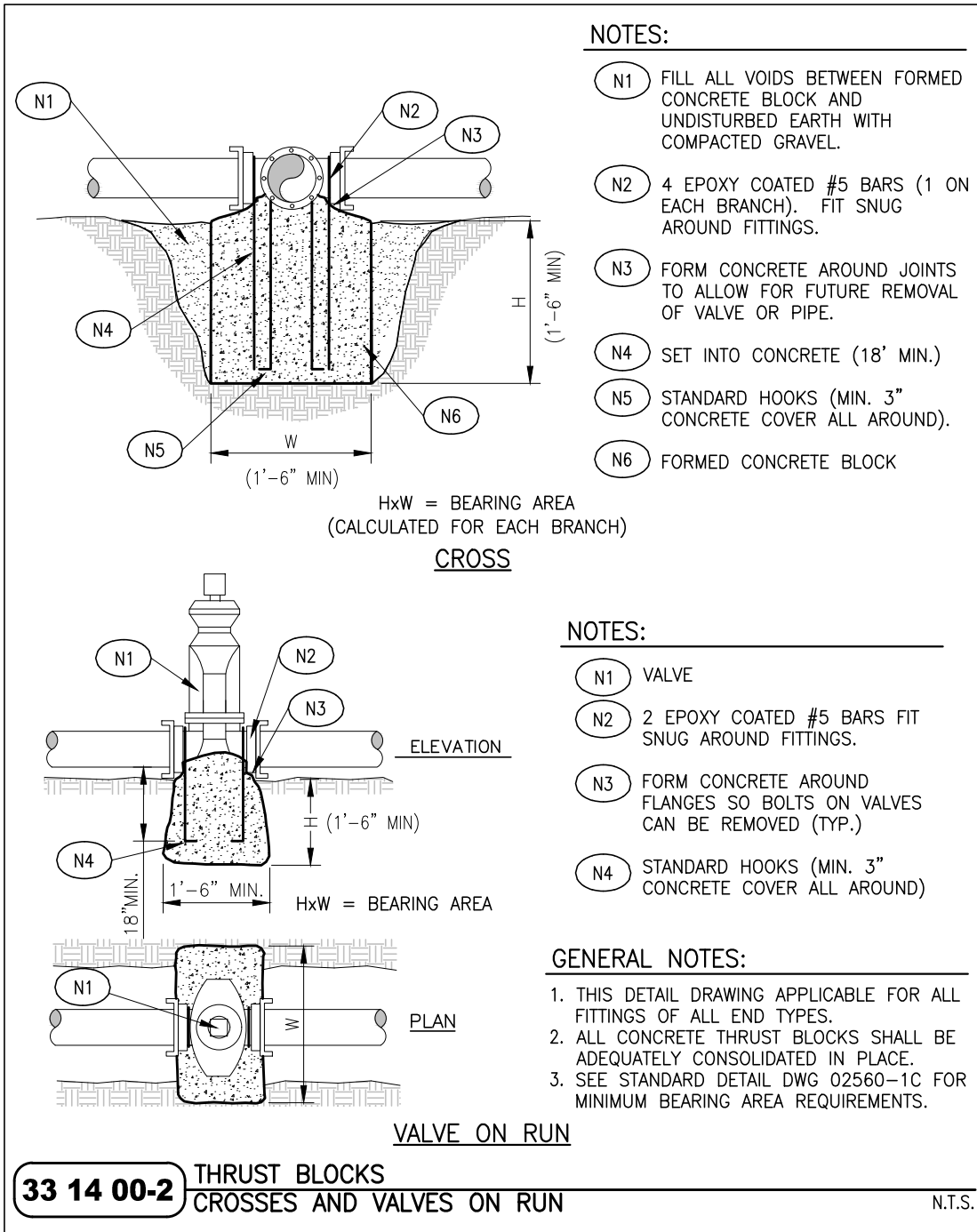
**THRUST BLOCKS
TEES, REDUCERS, ENDS AND ELBOWS**

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THRUST BLOCK MINIMUM BEARING AREA*
(SQ. FT. AT 100 PSI PRESSURE)

SIZE PIPE	TEE W/VALVE(S) ON RUN, 90° EL	45° EL	22-1/2' & 11-1/4' EL	VALVES, DEAD ENDS TEE W/O VALVE ON RUN
4	2	2	2	2
6	4	2	2	3
8	6	4	2	5
10	9	5	2	7
12	13	7	4	10
14	18	10	5	13

* SOIL BEARING CAPACITY 1500 PSF PRIOR TO BACKFILL

GENERAL NOTES:

1. FOR PRESSURES OTHER THAN SHOWN MULTIPLY THE TABLE VALUE BY A RATIO OF PRESSURE OVER 100psi (i.e.) $\frac{\text{PRESSURE}}{100\text{psi}}$
2. FOR SOIL BEARING CAPACITIES OTHER THAN 1500 PSF, MULTIPLY THE TABLE VALUE OF MIN. BEARING AREA REQUIRED BY A RATIO OF 1500 PSF OVER ACTUAL SOIL BEARING CAPACITY

(i.e. $\frac{1500 \text{ psf}}{\text{ACTUAL SOIL BEARING CAPACITY}}$)

33 14 00-3 THRUST BLOCKS
MINIMUM BEARING AREA

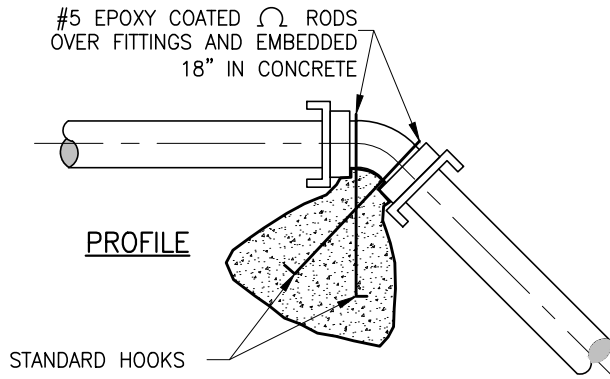
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GENERAL NOTES:

1. PLACE CONCRETE SUCH THAT JOINTS AND JOINT ACCESSORIES ARE ACCESSIBLE FOR REPAIRS
2. THE REQUIRED THRUST BLOCK VOLUMES FOR SPECIAL CONNECTIONS ARE TO BE SHOWN ON THE PLAN; e.g. 6 INDICATES 6 CUBIC YARDS OF CONCRETE ARE REQUIRED.
3. IF NOT SHOWN ON PLANS, REQUIRED VOLUMES AT FITTINGS SHALL BE AS INDICATED BELOW, ADJUSTED IF NECESSARY, TO CONFORM TO THE TEST PRESSURE(S) STATED IN THE SPECIFICATIONS.
4. VOLUMES AND SPECIAL BLOCKING DETAILS SHOWN ON PLANS TAKE PRECEDENCE OVER VOLUMES AND THE BLOCKING DETAIL SHOWN ON THIS STANDARD DETAIL.
5. THRUST BLOCKS FOR VERTICAL UP-BENDS SHALL BE THE SAME AS FOR HORIZONTAL BENDS.

FITTINGS SIZE	VOLUME OF THRUST BLOCK IN CU. YDS.			
	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
4	.8	.4		
6	1.8	.9	.4	
8	3.2	1.7	.8	.3
10	4.9	2.6	1.3	.5
12	7.0	3.7	1.8	.8
14	9.5	5.0	2.5	1.2
16	12.0	6.4	3.1	1.4

NOTES:

ABOVE VOLUMES BASED ON TEST PRESSURES OF 150 p.s.i. AND THE WEIGHT OF CONCRETE= 4050lb./cu.yd. TO COMPUTE VOLUMES FOR DIFFERENT TEST PRESSURES, USE THE FOLLOWING EQUATION: VOLUME= (TEST PRESSURE/150) X (TABLE VALUE)

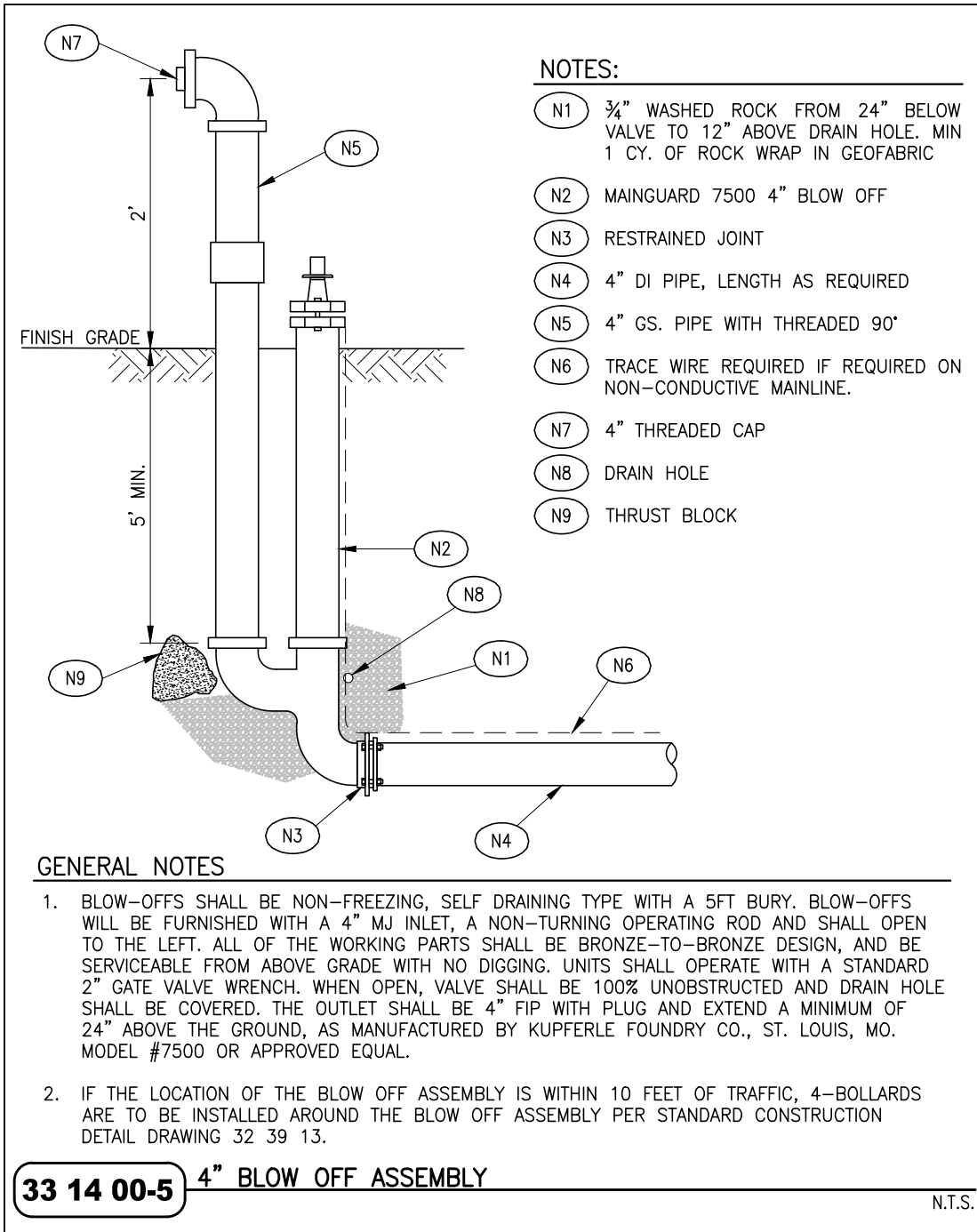
33 14 00-4 THRUST BLOCKS
VERTICAL DOWN-BENDS

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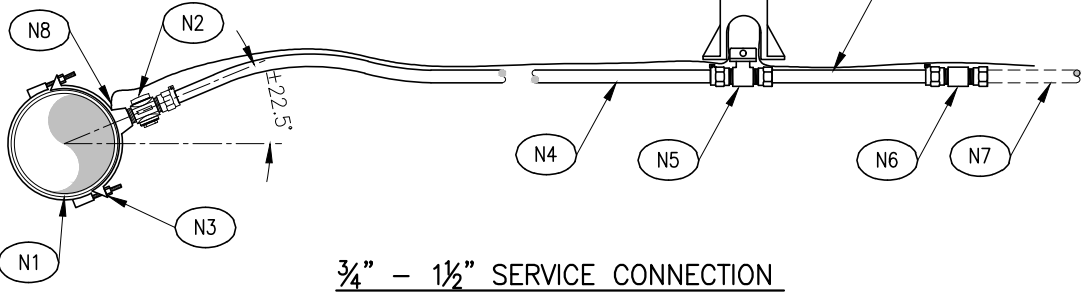




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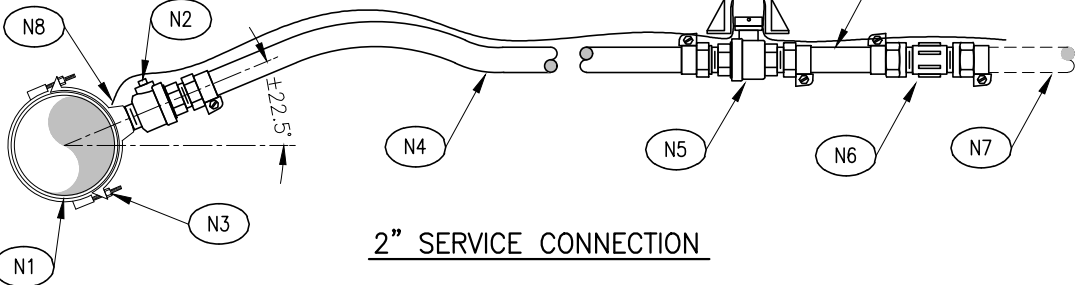
- (N1) WATER MAIN
- (N2) CORP STOP
- (N3) SERVICE SADDLE
- (N4) SERVICE PIPE (HDPE)
- (N5) IF SPECIFIED, INSTALL CURB STOP WITH TWO PIECE ADJUSTABLE C.I. CURB BOX
- (N6) COUPLINGS, ELS, AS REQUIRED
- (N7) EXISTING SERVICE PIPE, DEPTH SIZE AND MATERIAL VARIES
- (N8) LOCATING WIRE (12 AWG MIN.) PROVIDE METAL TO METAL CONNECTION FOR WIRE TO SADDLE USING STAINLESS STEEL OR BRAS CLAMP. COIL EXTRA 4' OF WIRE VAULT



3/4" - 1 1/2" SERVICE CONNECTION

NOTES

- (N1) WATER MAIN
- (N2) CORP STOP
- (N3) SERVICE SADDLE
- (N4) 2" SERVICE PIPE (HDPE)
- (N5) IF SPECIFIED, INSTALL CURB STOP WITH TWO PIECE ADJUSTABLE C.I. CURB BOX
- (N6) COUPLINGS, ELS, AS REQUIRED
- (N7) EXISTING SERVICE PIPE, DEPTH SIZE AND MATERIAL VARIES
- (N8) LOCATING WIRE (12 AWG MIN.) PROVIDE METAL TO METAL CONNECTION FOR WIRE TO SADDLE USING STAINLESS STEEL OR BRAS CLAMP. COIL EXTRA 4' OF WIRE VAULT



2" SERVICE CONNECTION

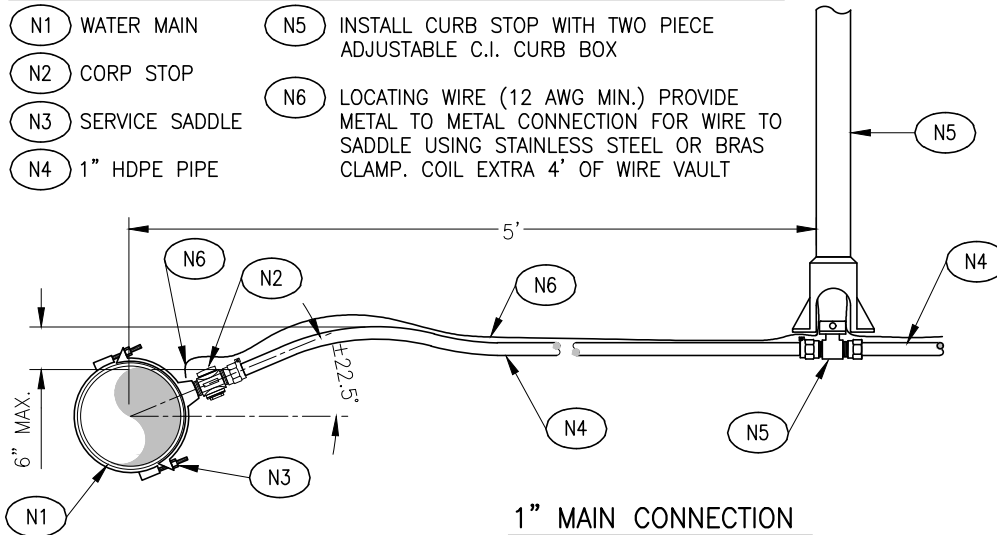
33 14 00-6 SERVICE CONNECTIONS

N.T.S.

<p>CITY OF PATEROS, WA STANDARD CONSTRUCTION DETAIL DRAWINGS</p>		
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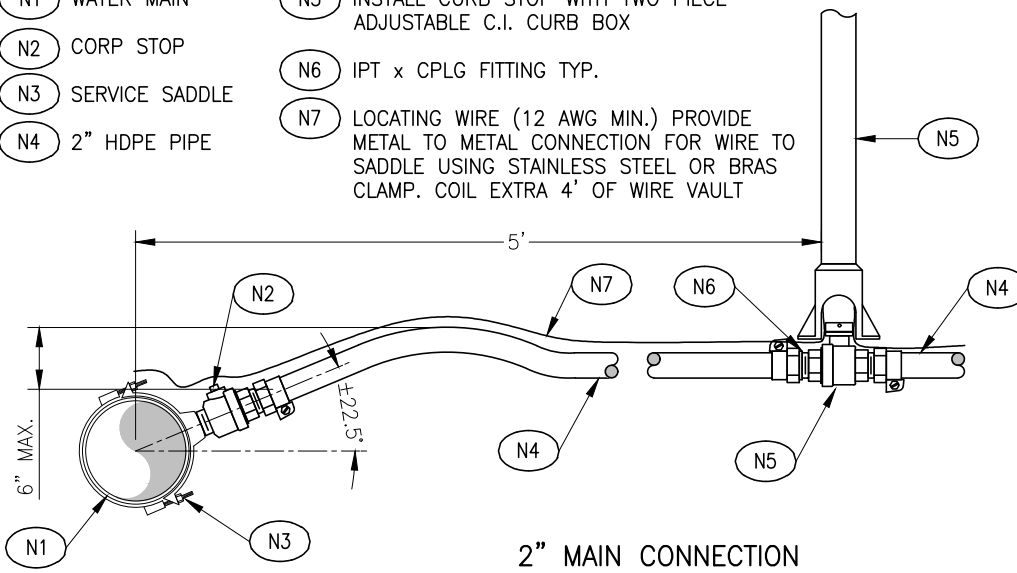
- (N1) WATER MAIN
- (N2) CORP STOP
- (N3) SERVICE SADDLE
- (N4) 1" HDPE PIPE
- (N5) INSTALL CURB STOP WITH TWO PIECE ADJUSTABLE C.I. CURB BOX
- (N6) LOCATING WIRE (12 AWG MIN.) PROVIDE METAL TO METAL CONNECTION FOR WIRE TO SADDLE USING STAINLESS STEEL OR BRAS CLAMP. COIL EXTRA 4' OF WIRE VAULT



1" MAIN CONNECTION

NOTES

- (N1) WATER MAIN
- (N2) CORP STOP
- (N3) SERVICE SADDLE
- (N4) 2" HDPE PIPE
- (N5) INSTALL CURB STOP WITH TWO PIECE ADJUSTABLE C.I. CURB BOX
- (N6) IPT x CPLG FITTING TYP.
- (N7) LOCATING WIRE (12 AWG MIN.) PROVIDE METAL TO METAL CONNECTION FOR WIRE TO SADDLE USING STAINLESS STEEL OR BRAS CLAMP. COIL EXTRA 4' OF WIRE VAULT



2" MAIN CONNECTION

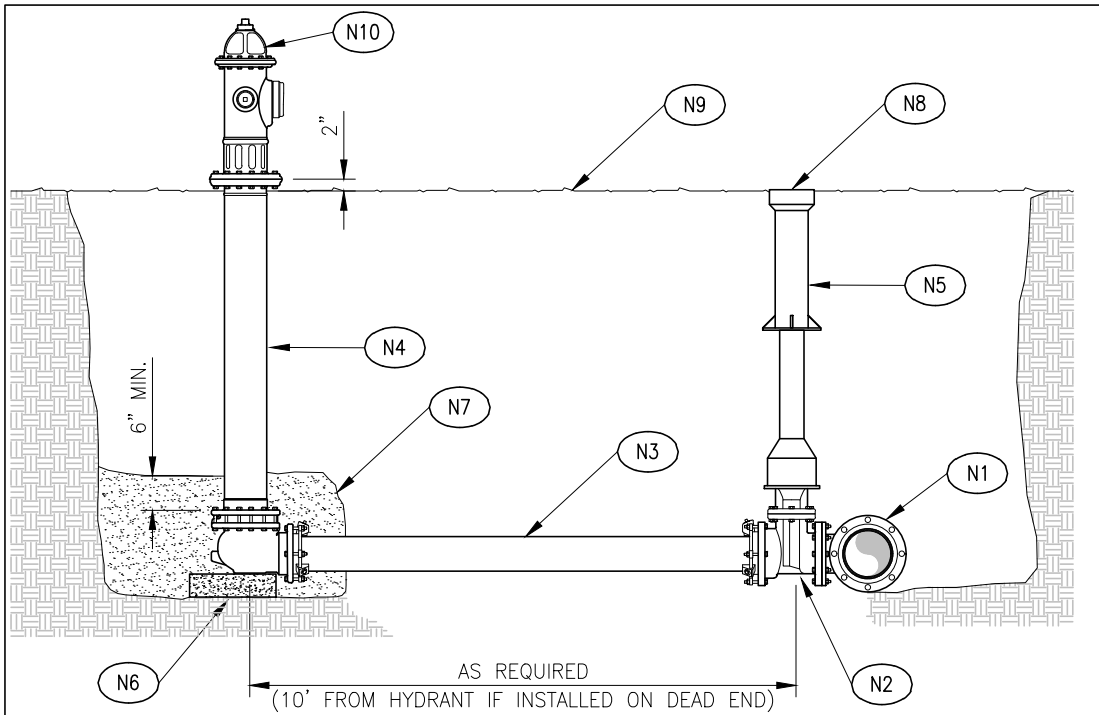
33 14 00-7 MAIN CONNECTIONS

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NOTES:

- (N1) C.I. OR D.I. TEE, MAIN SIZE x MAIN SIZE x 6" (FL OUTLET, ON RUN JOINT TYPE MAY VARY) NOT APPLICABLE IF INSTALLED ON DEAD END.

(N2) 6" RSGV, FL x MJ (RESTRAINED JOINT)

(N3) 6" DI PIPE, PE x PE, LENGTH AS REQUIRED (USED RESTRAINED JOINT IF MORE THAN 1 PIECE REQUIRED)

(N4) FIRE HYDRANT, MJ OUTLET (RESTRAINED JOINT)

(N5) C.I. VALVE BOX
- (N6) 15" X 4" CONCRETE BLOCK SET ON COMPACTED FOUNDATION

(N7) ½ C.Y. 3" TO ¾" CLEAN GRAVEL AROUND BASE

(N8) SET TOP FLUSH IN ROADWAYS, 2" ABOVE GRADE IN OTHER AREAS

(N9) FINISH GRADE

(N10) TYPE: MH 129 AS SPECIFIED BY CITY

NOTE: ALL JOINTS SHALL BE RESTRAINED

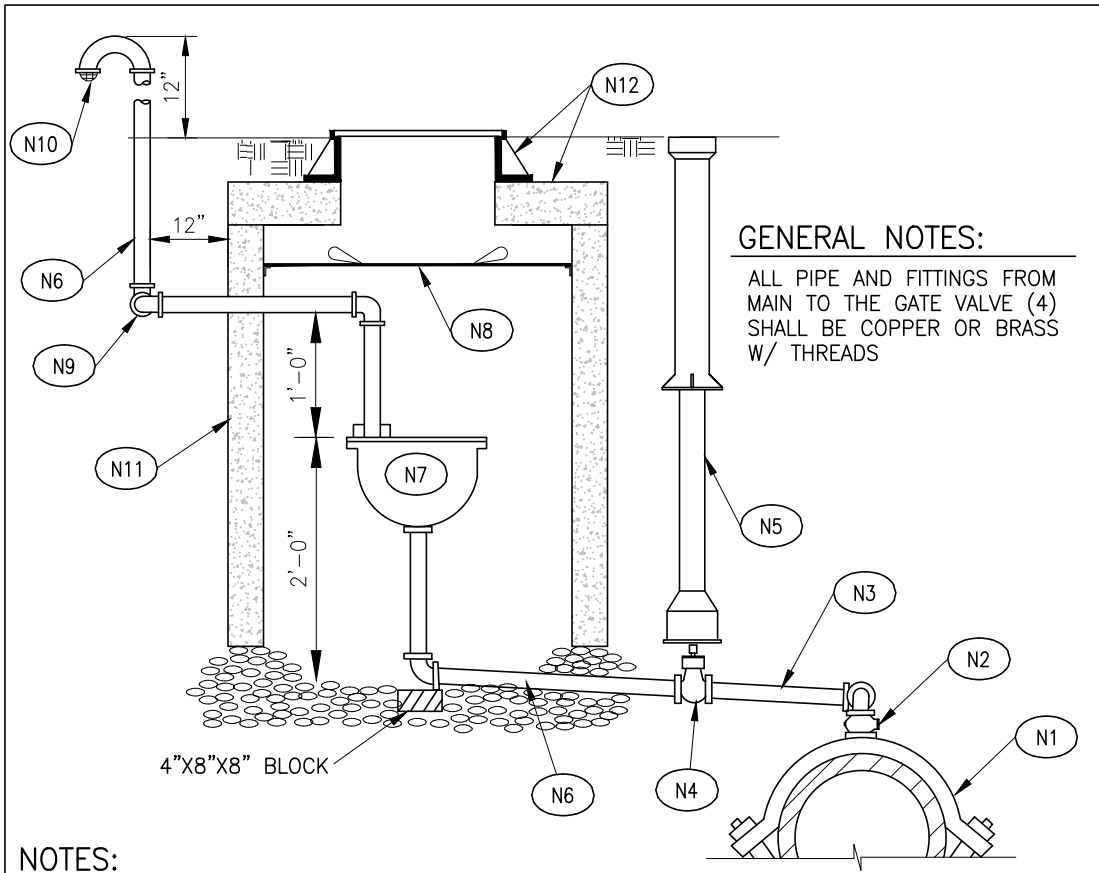
33 14 00-8 FIRE HYDRANT ASSEMBLY

N.T.S.

**CITY OF PATEROS, WA
STANDARD CONSTRUCTION
DETAIL DRAWINGS**

REVISIONS	DATE





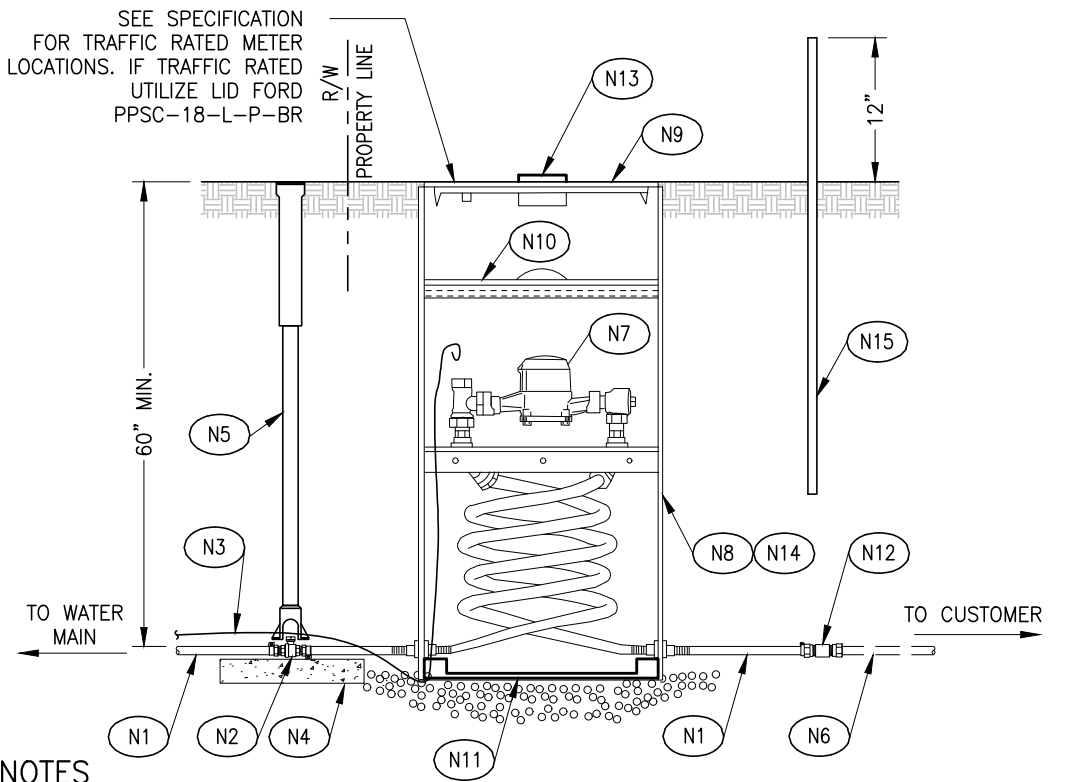
GENERAL NOTES:
 ALL PIPE AND FITTINGS FROM MAIN TO THE GATE VALVE (4) SHALL BE COPPER OR BRASS W/ THREADS

NOTES:

- (N1) DI SADDLE FOR WATER MAIN. (SEE DRAWING FOR MAIN SIZE)
- (N2) 2" BRONZE CORP STOP
- (N3) 2" TYPE K SOFT COPPER TUBING
- (N4) 2" R/S GATE VALVE, CAST IRON BODY, SCREWED, NON-RISING STEM, 2" SQUARE OPERATING NUT
- (N5) CAST IRON 2 PIECE VALVE BOX W/ LID & LIFTING HANDLE
- (N6) 2" GALV STEEL PIPE, ELS, NIPPLES, UNIONS AS REQUIRED
- (N7) 2" COMBINATION AIR/VACUUM VALVE, APCO 145C OR EQUAL
- (N8) INSULATE INTERIOR W/ 2" THICK HIGH DENSITY INSULATION PAD CUT TO FIT SNUG
- (N9) 2" 90° BEND, 2" CLOSE NIPPLE & 2" 90° BEND
- (N10) 2" BRONZE BEHIVE STRAINER, 2" RETURN BEND, PAINTED SAFETY YELLOW
- (N11) 48" PRECAST CONC MANHOLE - 4' SECTION
- (N12) 48" PRECAST CONC MANHOLE TOP REINFORCED FOR STANDARD HIGHWAY LOADING, 4"X24" CI RING AND COVER

33 14 00-9 COMBINATION AIR VACUUM RELIEF STATION 1"-3" (NON-TRAFFIC) N.T.S.

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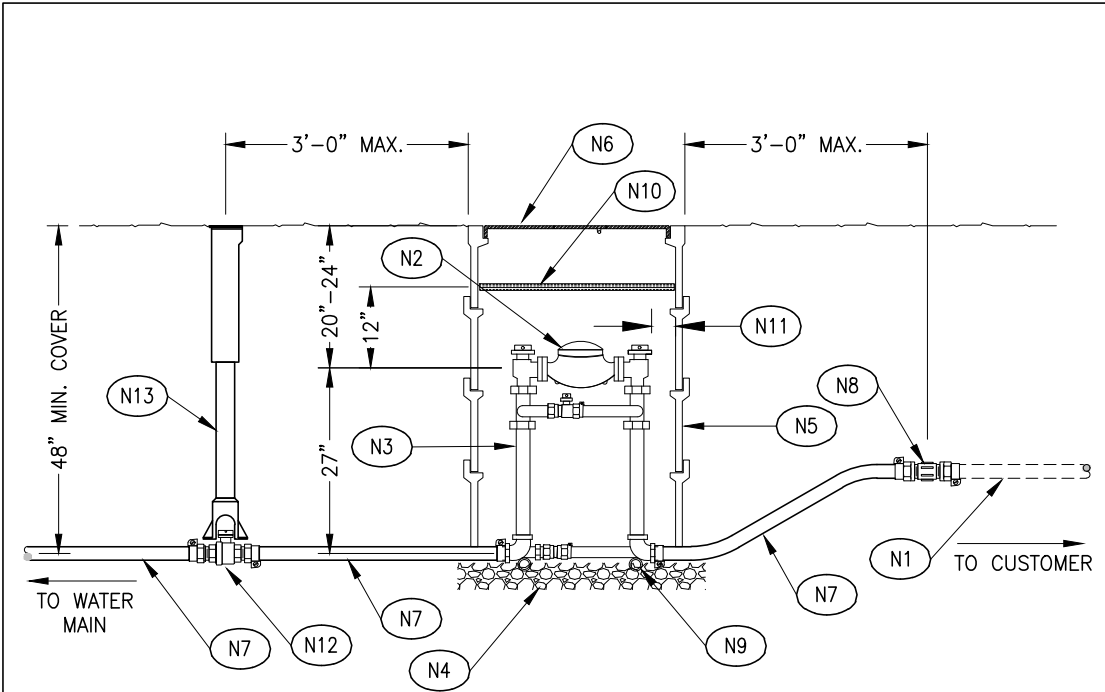


- (N1) 1" HDPE CTS SERVICE PIPE
- (N2) 1" CURB STOP, FORD B44-444QNL
- (N3) 10G COPPER TRACER WIRE CONNECTED TO LAST FITTING OUTSIDE BOX 1' ABOVE GROUND
- (N4) 12"x12"x2" CEMENT PAVER & 4" CSTC BASE
- (N5) ADJUSTABLE VALVE BOX WITH ROD, FORD EA2-55-40-48R
- (N6) EXISTING SERVICE PIPE TO CUSTOMER (DEPTH, SIZE AND MATERIAL VARIES)
- (N7) KAMSTRAP FLOW IQ 2250
- (N8) 3/4" SINGLE METER COIL PIT SETTER, FORD PTFCBB3881860AFP NL
- (N9) SINGLE METER LOCKING LID, FORD PPSC-18-L-T. WHERE DUAL METER COIL PIT SETTER UTILIZE FORD PPSC-18-L-TT.
- (N10) 2" INSULATION DISKS X2, FORD CCID-18-2
- (N11) PLASTIC BOTTOM PLATE
- (N12) 1" COUPLING X2, FORD C14-44TW-QNL
- (N13) EXTERNAL RADIO READ ANTENA NEPTUNE 12527-200 6FT
- (N14) 3/4" DUAL METER COIL PIT SETTER, FORD PDFCBB3881860AFP NL
- (N15) 2x4 TREATED MARKER PAINTED BLUE. WHEN NOT CONNECTING TO LIVE SERVICE

33 19 00-1 3/4" AND 1" METER DETAIL

N.T.S.

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NOTES:

- | | |
|---|---|
| (N1) EXISTING SERVICE PIPE TO CUSTOMER (DEPTH, SIZE AND MATERIAL VARIES) | (N7) SERVICE PIPE |
| (N2) WATER METER, KAMSTRAP FLOW IQ 3200 | (N8) COUPLING |
| (N3) COPPERSETTER WITH HIGH BYPASS, FORD (SHOWN) OR APPROVED EQUAL | (N9) PVC OR METAL BRACE PIPE (2) IN PIPE EYE, LENGTH AS REQUIRED (MIN. 18") |
| (N4) 4" THICK COMPACTED GRAVEL BASE FOR METER BOX (3/4" MINUS CRUSHED ROCK) | (N10) INSULATING PAD |
| (N5) METER BOX | (N11) MIN 2" CLEARANCE ALL AROUND |
| (N6) COVER WITH READING LID | (N12) CURB STOP |
| | (N13) TWO PIECE ADJUSTABLE C.I. CURB BOX |

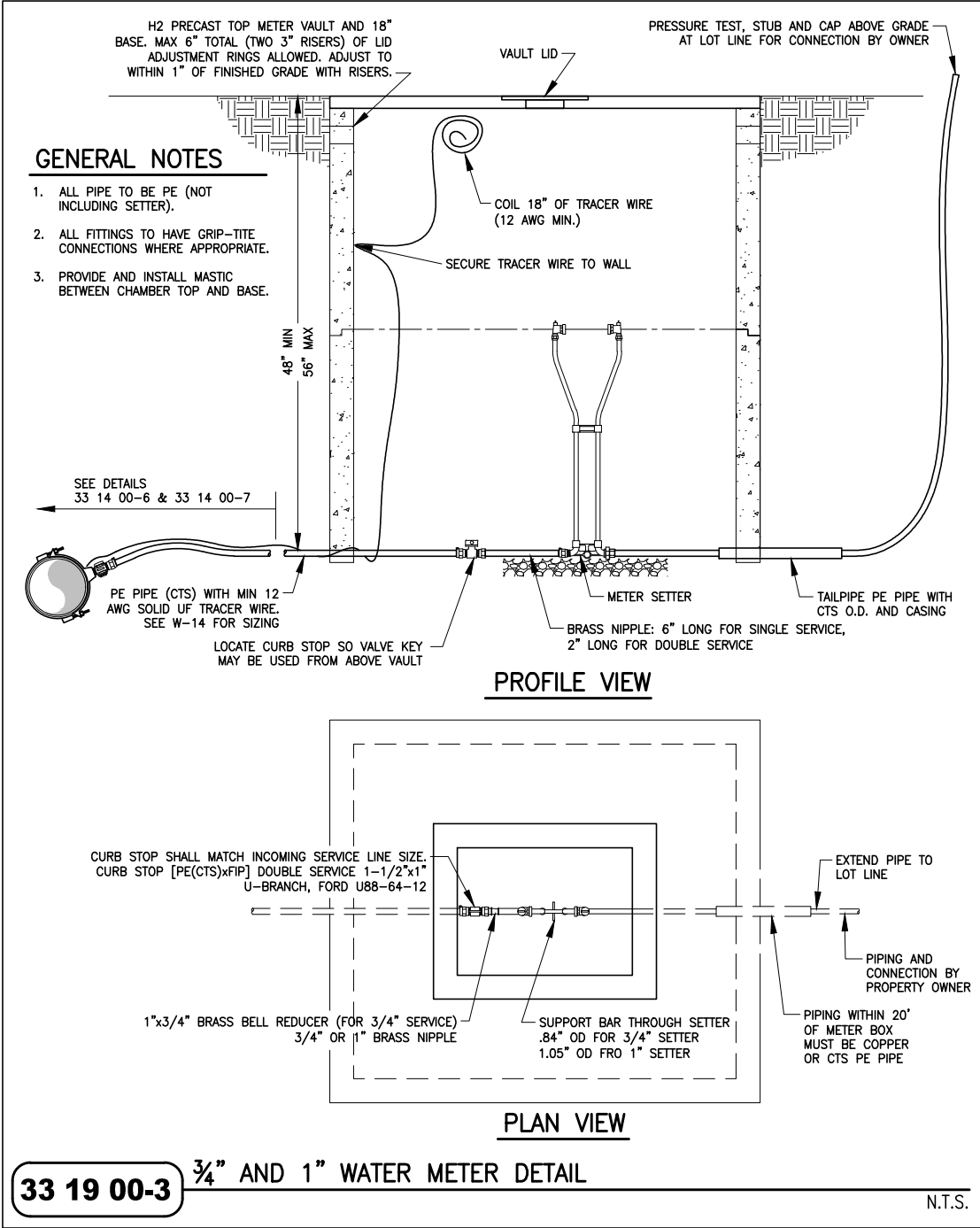
33 19 00-2 1-1/2" AND 2" METER DETAIL

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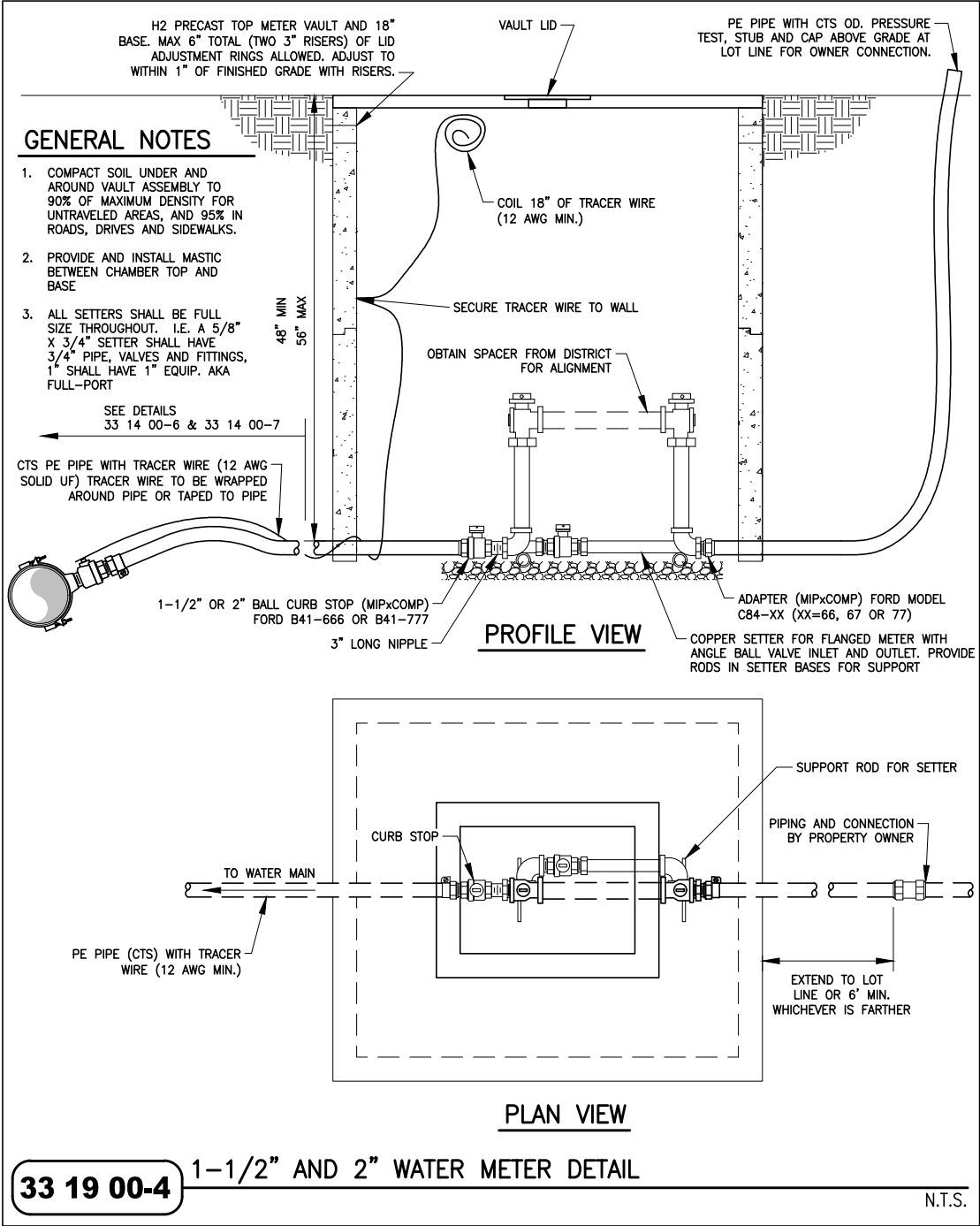




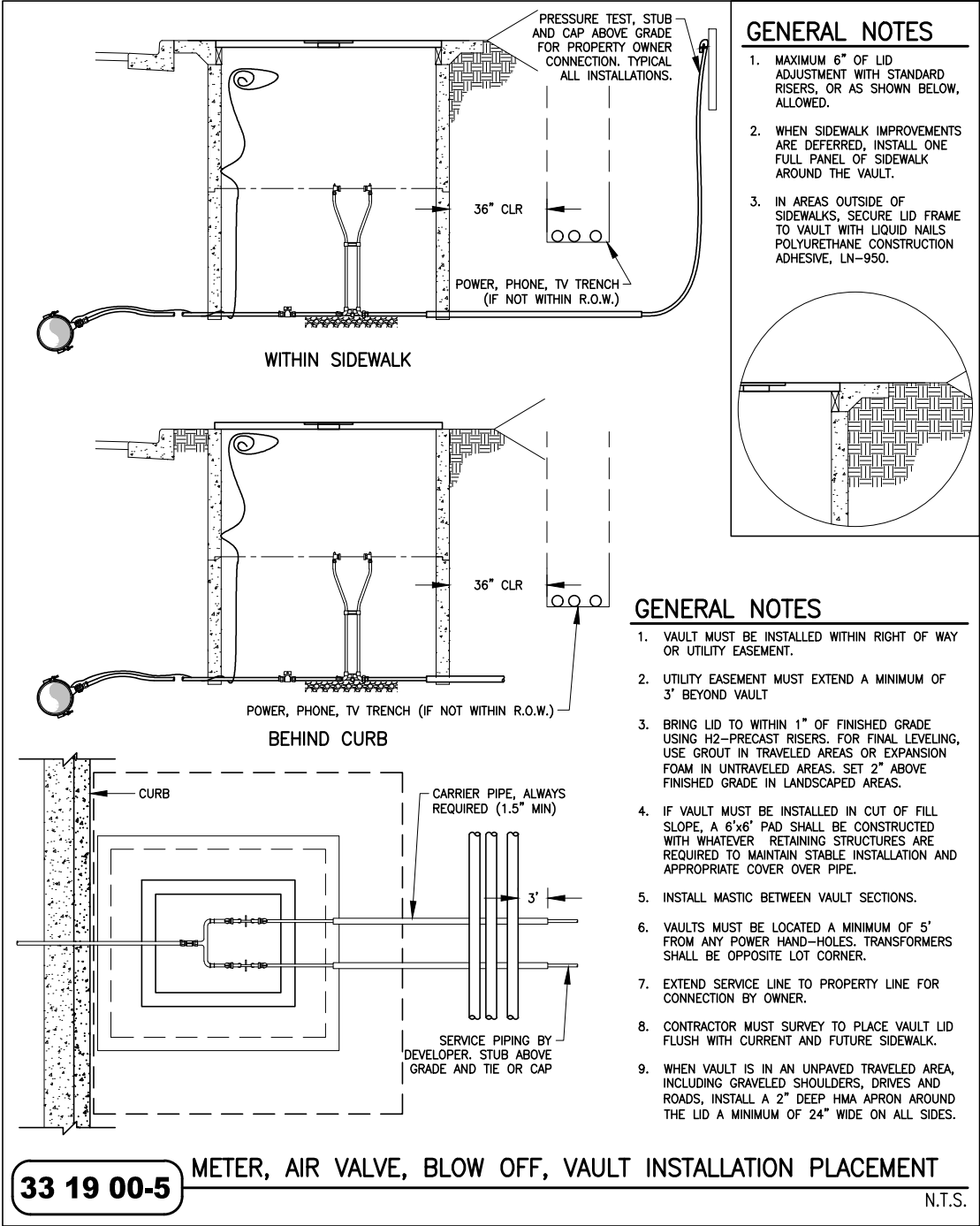
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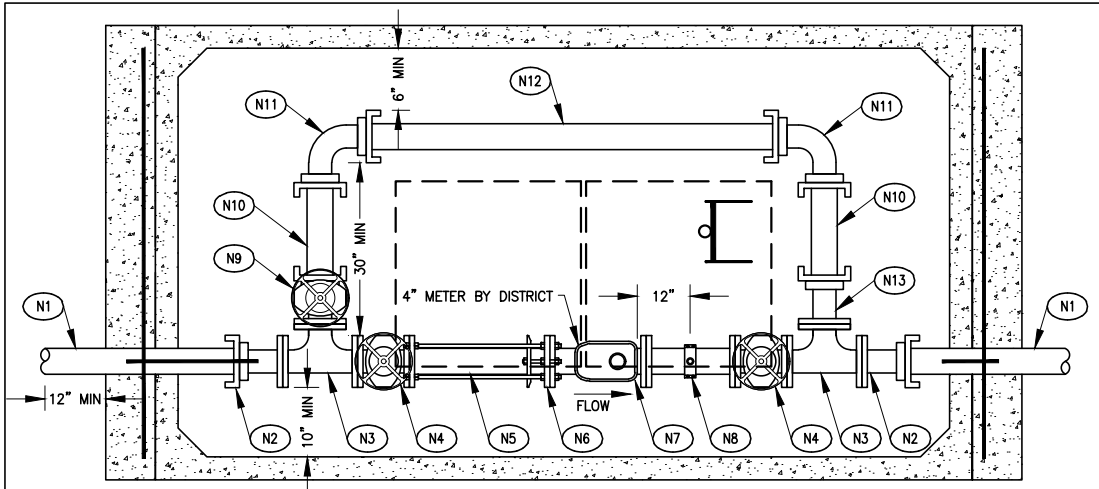




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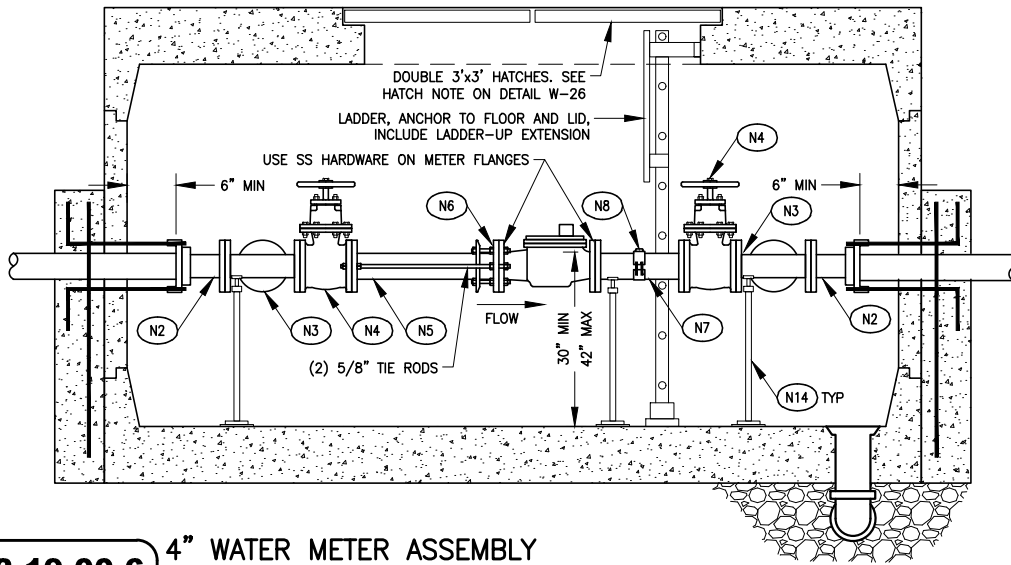


GENERAL NOTES

1. SENSUS OMNI C2 METER LAY LENGTH = 20"
2. ALL MECHANICAL JOINTS SHALL BE RESTRAINED
3. USE ONE FULL LENGTH OF 4" PIPE THROUGH THE VAULT TO INSURE ALIGNMENT. CUT OUT FOR INSTALLATION OF ASSEMBLY.
4. VAULT MINIMUM INSIDE DIMENSIONS OF 12'Lx6'Wx6.5'H, UTILITY VAULT 612LA OR APPROVED EQUAL.
5. 4" METER CAPACITY = 1000 GPM X 80% = 800 GPM

NOTES

- | | |
|--------------------------------------|--|
| (N1) 4" DI PIPE | (N8) 2"x4" SADDLE w/2" PLUG |
| (N2) 4" FLxMJ ADAPTER OR FCA | (N9) 4" RSGV (FLxMJ) w/HANDWHEEL |
| (N3) 4" TEE (FL) | (N10) 4" DI PIPE, 20" LENGTH |
| (N4) 4" RSGV w/HANDWHEEL (FL) | (N11) 4" 90° BEND (MJ) |
| (N5) 4" DI PIPE FLxPE, 26" LENGTH | (N12) 4" DI PIPE, 84" LENGTH |
| (N6) 4" FCA, DO NOT "PUSH HOME" PIPE | (N13) 4" FLxMJ ADAPTER |
| (N7) 4" DI PIPE FLxFL, 20" LENGTH | (N14) STANDON OR GRINNELL PIPE SUPPORT (5 TOTAL) |



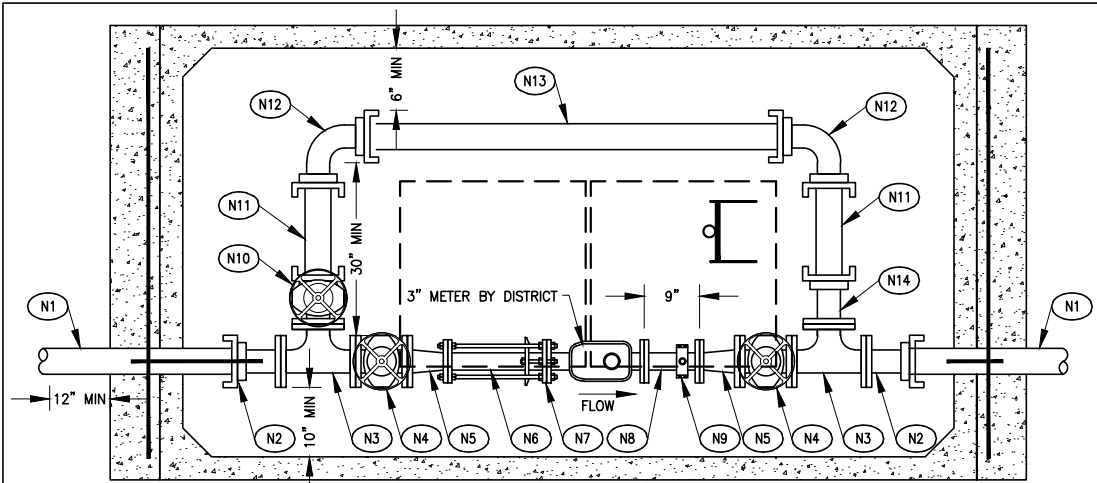
33 19 00-6 4" WATER METER ASSEMBLY

N.T.S.

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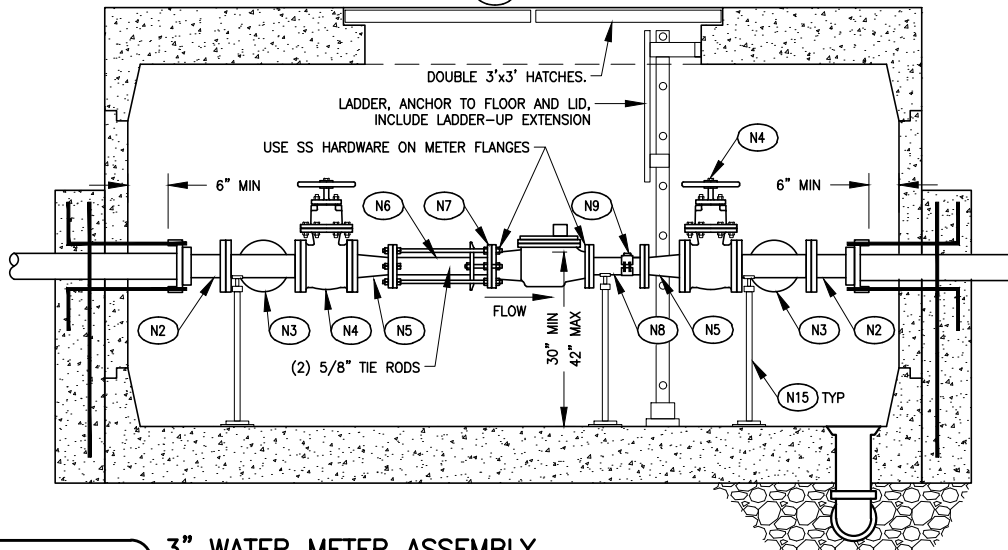


GENERAL NOTES

1. SENSUS OMNI C2 METER LAY LENGTH = 17"
2. ALL MECHANICAL JOINTS SHALL BE RESTRAINED
3. USE ONE FULL LENGTH OF 4" PIPE THROUGH THE VAULT TO INSURE ALIGNMENT. CUT OUT FOR INSTALLATION OF ASSEMBLY.
4. VAULT MINIMUM INSIDE DIMENSIONS OF 12'Lx6'Wx6.5'H, UTILITY VAULT 612LA OR APPROVED EQUAL.
5. 3" OMNI C2 METER CAPACITY = 500 GPM X 80% = 400 GPM

NOTES

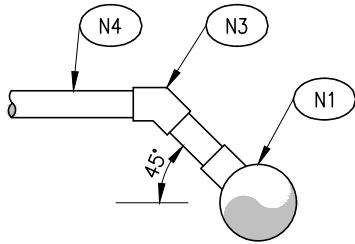
- (N1) 4" DI PIPE
- (N2) 4" FLxMJ ADAPTER
- (N3) 4"x3" TEE (FL)
- (N4) 4" RSGV w/HANDWHEEL (FL)
- (N5) 4"x3" REDUCER (FL)
- (N6) 3" DI PIPE FLxPE, 20" LENGTH
- (N7) 3" FCA, DO NOT "PUSH HOME" PIPE
- (N8) 3" DI PIPE (FL), 15' LENGTH
- (N9) 2"x3" SADDLE w/2" PLUG
- (N10) 3" RSGV (FLxMJ) w/HANDWHEEL
- (N11) 3" DI PIPE, 24" LENGTH
- (N12) 3" 90° BEND (MJ)
- (N13) 3" DI PIPE, 90° LENGTH
- (N14) 3" FLxMJ ADAPTER
- (N15) STANDON OR GRINNELL PIPE SUPPORT (5 TOTAL)



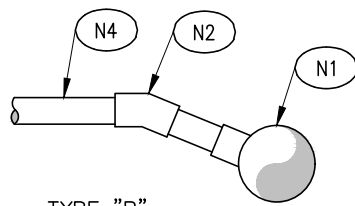
33 19 00-7 3" WATER METER ASSEMBLY

N.T.S.

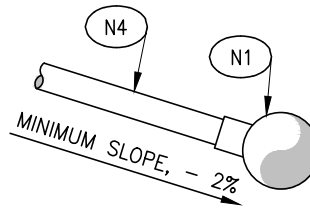
<p>CITY OF PATEROS, WA STANDARD CONSTRUCTION DETAIL DRAWINGS</p>			
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TYPE "A"



TYPE "B"



TYPE "C"

GERANL NOTES:

1. EXTEND SIDE SEWER 10' BEYOND SIDE WALKS OR CURBS WHERE EASEMENTS ARE AVAILABLE OR TO THE PROPERTY LINE.
2. INSTALL BEDDING MATERIAL PER SPECIFICATIONS.

NOTES:

- (N1) SERVICE TEE
- (N2) 22 1/2° ELBOW
- (N3) 45° ELBOW
- (N4) PVC SIDE SEWER PIPE AND FITTING (TYP.)

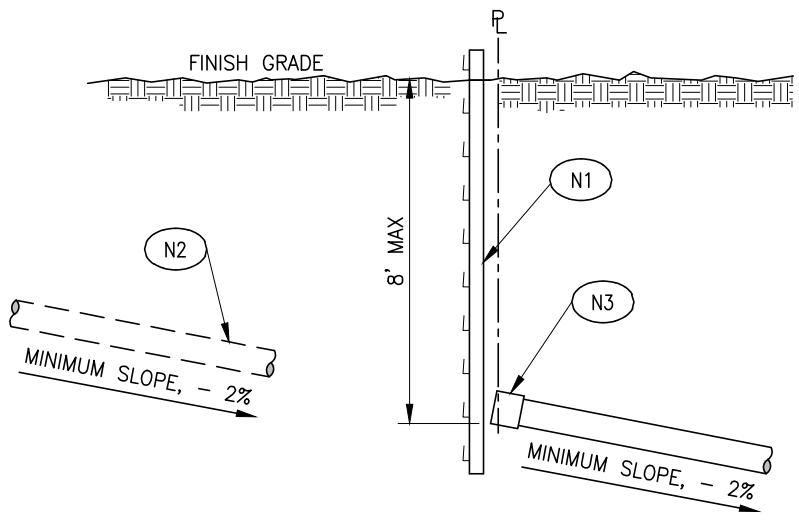
33 31 00-1 SIDE SEWER CONNECTION TO MAIN

N.T.S.

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NOTES:

- (N1) METAL "T" POST. LENGTH AS REQUIRED. T POST SHALL BE SET AT INVERT OF STUB WITH NUBS AWAY FROM STUB. TOP OF POST SHALL BE 2" ABOVE FINISH GRADE
- (N2) FUTURE OWNER INSTALLED SIDE SEWER
- (N3) PLUG PER SPECIFICATIONS. STUB I.E. SHOWN ON PLANS

GENERAL NOTES:

1. THE MINIMUM SLOPE MAY BE REDUCED TO 1% IF A SURVEYORS LEVEL IS USED.
2. FIELD CONDITIONS MAY NECESSITATE AN INVERT DEPTH AT THE PROPERTY LINE OF LESS THAN 8'. CONFIRM WITH THE ENGINEER IN THE FIELD.
3. STUB INVERT SHALL BE LOCATED ON AS-BUILT DRAWINGS AND SUBMITTED TO THE CITY.

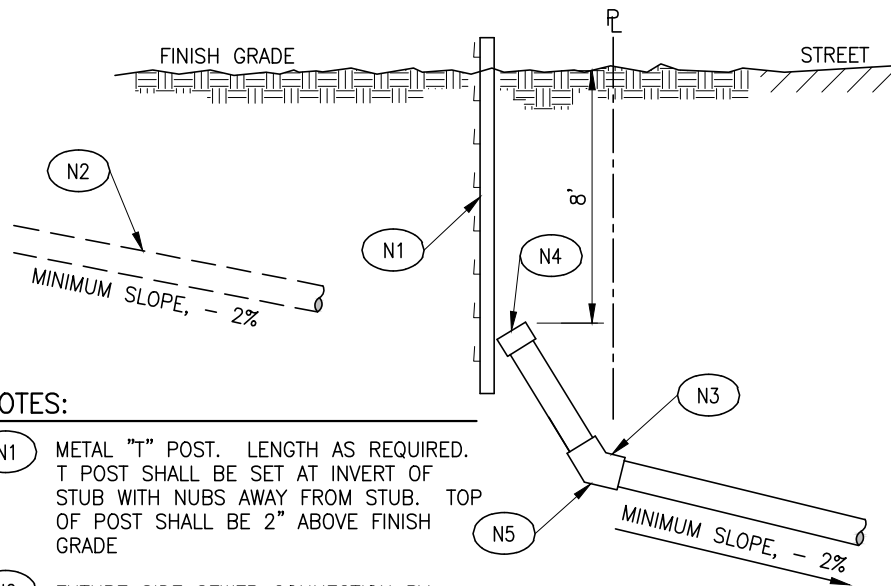
33 31 00-2 SIDE SEWER STUB TO PROPERTY
STUB I.E. DEPTHS LESS THAN 8'

N.T.S.

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NOTES:

- (N1) METAL "T" POST. LENGTH AS REQUIRED. T POST SHALL BE SET AT INVERT OF STUB WITH NUBS AWAY FROM STUB. TOP OF POST SHALL BE 2" ABOVE FINISH GRADE
- (N2) FUTURE SIDE SEWER CONNECTION BY PROPERTY OWNER
- (N3) 45" ELBOW
- (N4) PLUG PER SPECIFICATIONS
- (N5) STUB I.E. SHOWN ON PLAN

NOTES:

1. UNLESS NOTED OTHER WISE ON THE DRAWINGS EXTEND THE SIDE SEWER 10' BEYOND SIDEWALKS OR CURBS WHERE EASEMENTS ARE AVAILABLE OR TO THE PROPERTY LINE.
2. INSTALL BEDDING MATERIAL PER SPECIFICATIONS.

GENERAL NOTES:

1. THE MINIMUM SLOPE MAY BE REDUCED TO 1% IF A SURVEYORS LEVEL IS USED.
2. STUB INVERT SHALL BE LOCATED ON AS-BUILT DRAWINGS AND SUBMITTED TO THE CITY.

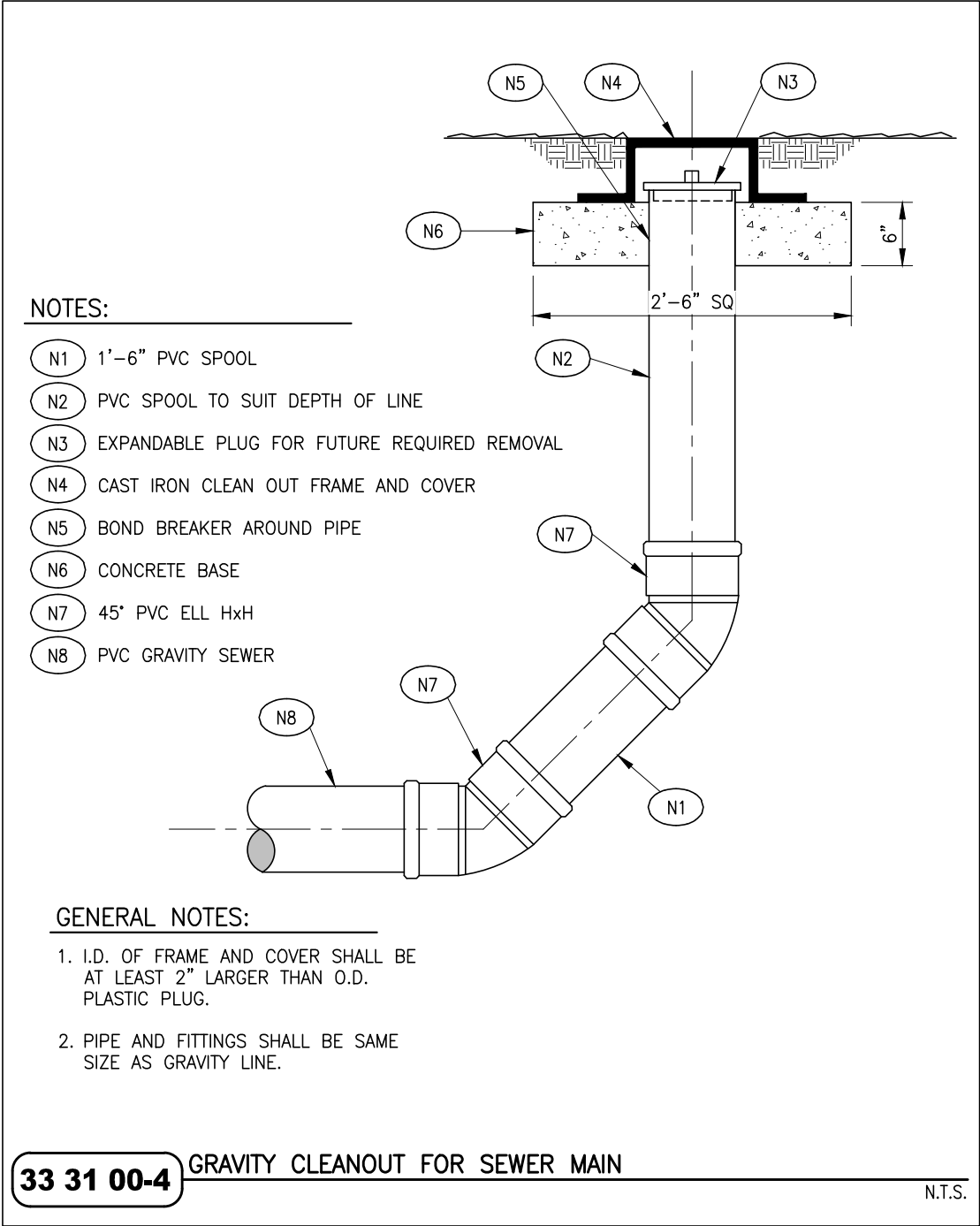
33 31 00-3 SIDE SEWER STUB TO PROPERTY
STUB I.E. DEPTHS GREATER THAN 8'

N.T.S.

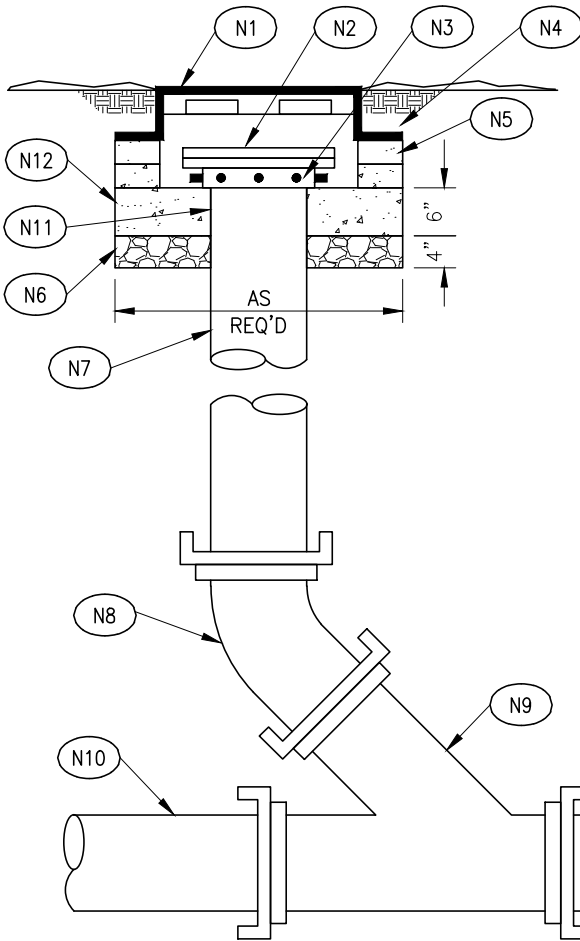
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NOTES:

- (N1) C.I. MH FRAME & COVER
- (N2) BLIND FLANGE
- (N3) FIELD FLANGE
- (N4) SURFACING AS APPLICABLE
- (N5) MAX. 2 COURSES GROUTED CONC. GRADE RINGS HEIGHT AS REQ'D
- (N6) CRUSHED ROCK BASE COURSE (COMPACTED)
- (N7) D.I. SPOOL, TO SUIT DEPTH OF LINE
- (N8) D.I. 45° ELBOW MJ x PE
- (N9) D.I. WYE ALL MJ
- (N10) D.I. FORCE MAIN
- (N11) BOND BREAKER AROUND PIPE
- (N12) SQUARE CONCRETE BASE

GENERAL NOTES:

1. ALL MECHANICAL JOINTS SHALL BE RESTRAINED.
2. I.D. OF FRAME AND COVER SHALL BE AT LEAST 8" LARGER THAN THE O.D. OF THE FLANGE.
3. PIPE AND FITTINGS SHALL BE SAME SIZE AS FORCE MAIN.

33 31 00-5 PRESSURE CLEAN OUT

N.T.S.

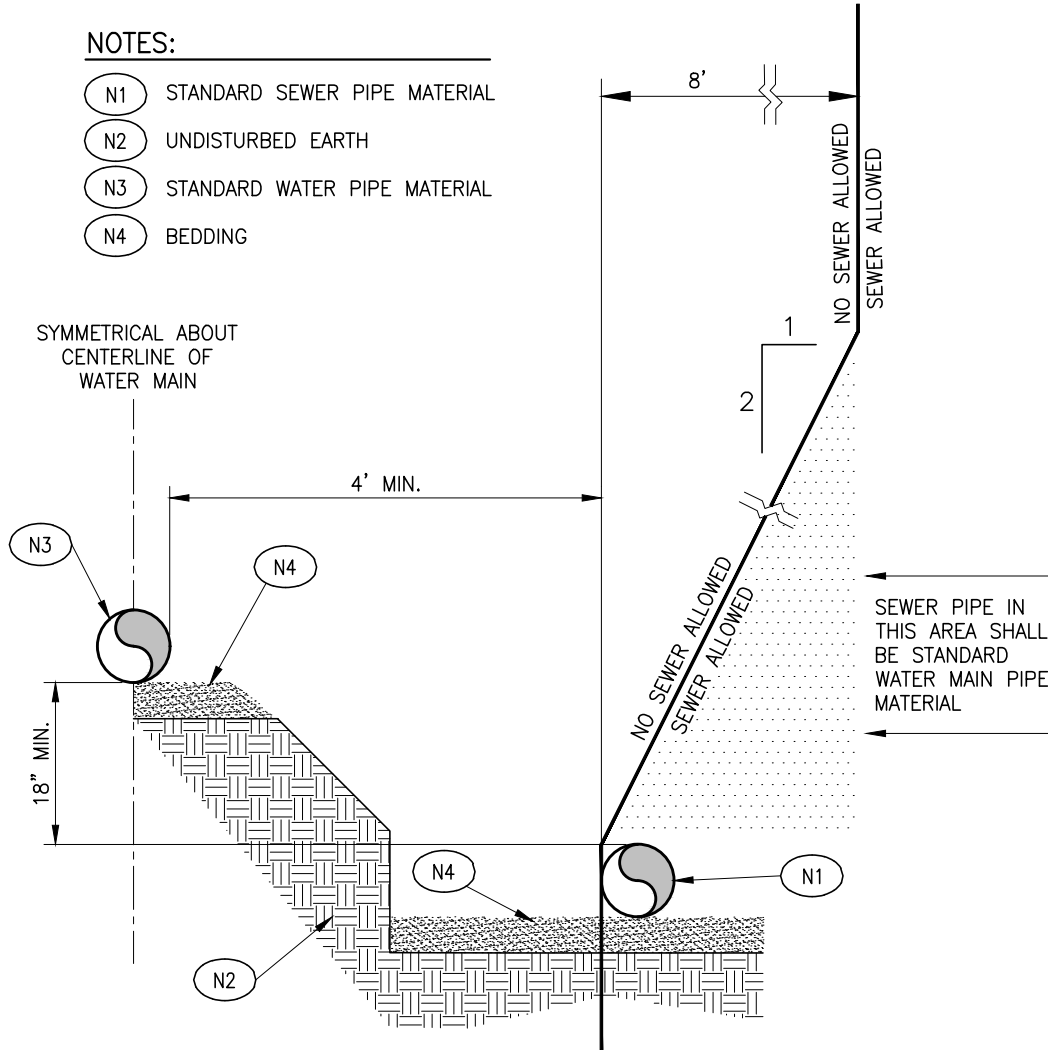
**CITY OF PATEROS, WA
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NOTES:

- (N1) STANDARD SEWER PIPE MATERIAL
- (N2) UNDISTURBED EARTH
- (N3) STANDARD WATER PIPE MATERIAL
- (N4) BEDDING



33 31 00-6 PARALLEL CONSTRUCTION WITH LESS THAN 10' SEPARATION N.T.S.

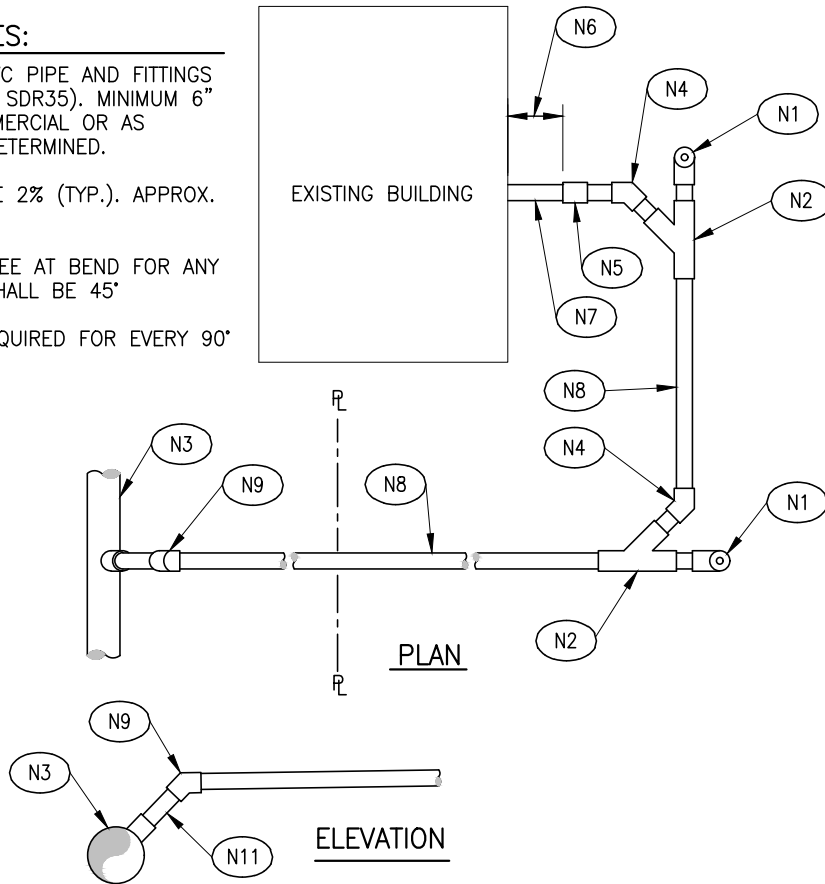
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GENERAL NOTES:

1. MINIMUM 4" PVC PIPE AND FITTINGS (ASTM D 3034 SDR35). MINIMUM 6" PVC FOR COMMERCIAL OR AS INDIVIDUALLY DETERMINED.
2. MINIMUM SLOPE 2% (TYP.). APPROX. ¼" PER FOOT.
3. MAXIMUM DEGREE AT BEND FOR ANY ONE FITTING SHALL BE 45°
4. CLEAN OUT REQUIRED FOR EVERY 90° OF BEND.



NOTES:

- | | |
|-------------------------|--|
| (N1) CLEAN OUT | (N7) EXISTING BUILDING SEWER DRAIN (LOCATION VARIES) |
| (N2) 45° WYE | (N8) LENGTH, DEPTH AND ACTUAL ALIGNMENT VARIES |
| (N3) SEWER MAIN | (N9) INSERT PNEUMATIC TEST PLUG BELOW LOWEST ELBOW. SEE SECTION 33 31 00 |
| (N4) 45° ELBOW | (N10) SEE DETAIL DWG 33 31 00-1 |
| (N5) COUPLING | |
| (N6) SEE SPECIFICATIONS | |

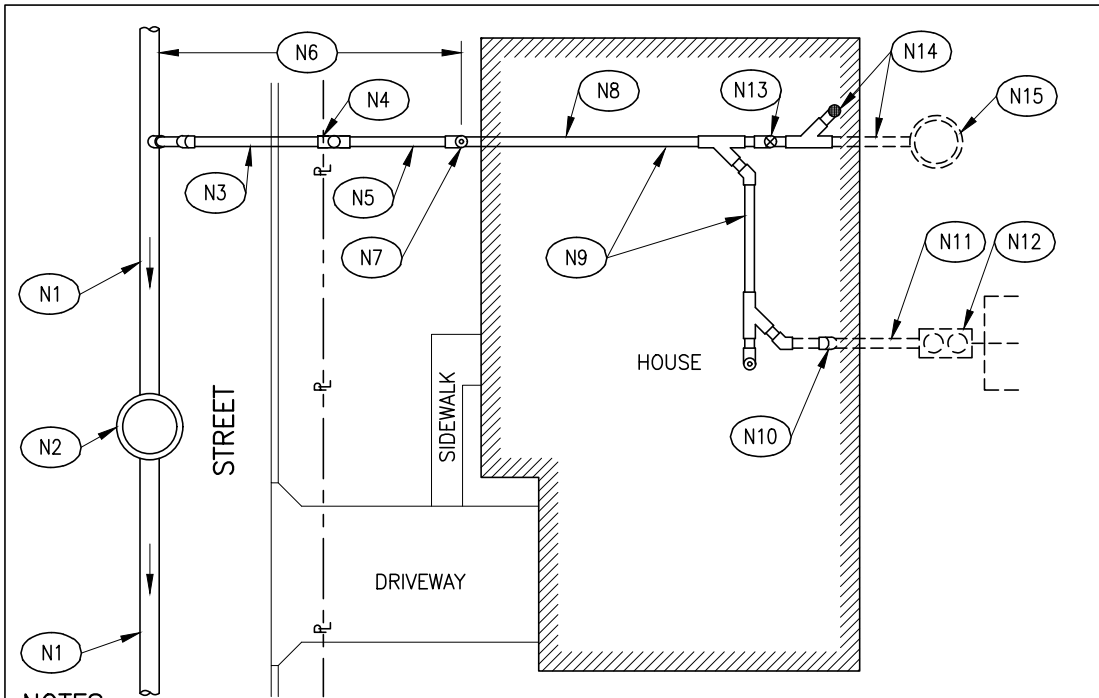
33 31 00-7 SIDE SEWER REPLACEMENT

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NOTES:

- (N1) SEWER MAIN
- (N2) MANHOLE
- (N3) 4" PVC STUB
- (N4) POINT OF CONNECTION TO SS STUB END (INSTALL TEE OR WYE HERE FOR INSERTION OF TEST PLUG)
- (N5) NEW BUILDING SEWER
- (N6) ADDITIONAL CLEAN OUT REQUIRED IF DISTANCE TO SEWER MAIN EXCEED 100'
- (N7) EXTERNAL 4" PVC CLEAN OUT AT POINT OF CONNECTION TO BUILDING DRAIN
- (N8) NEW BUILDING DRAIN
- (N9) NEW PIPE PLUMBED ACROSS BASEMENT UNDER FLOOR
- (N10) EXISTING UPPER LEVEL PIPE RUN DOWN & OVER TO MEET LOWER LEVEL FACILITIES DRAIN
- (N11) EXISTING BUILDING DRAIN
- (N12) EXISTING SEPTIC TANK & DRAINFIELD TO BE DECOMMISSIONED
- (N13) BACKWATER VALVE (REQUIRED) LOWER LEVEL (ACCESS REQUIRED)
- (N14) EXISTING FLOOR DRAIN & LAUNDRY FACILITIES PLUMBED OUT TO FRONT (LOWER LEVEL)
- (N15) EXISTING DRYWELL (GREYWATER) TO BE ABANDONED

GENERAL NOTE:

1. ANY PLUMBING MODIFICATION OF EXISTING INTERIOR FACILITIES REQUIRES A PLUMBING PERMIT AND MUST MEET CODE.
2. ONSITE SYSTEM DECOMMISSION SHALL INCLUDE REMOVAL AND DISPOSAL OF SEPTIC TANK CONTENTS, PUNCTURING BOTTOM OF SEPTIC TANK AND EITHER BACKFILL TANK CONTENTS OR REMOVE OF TANK

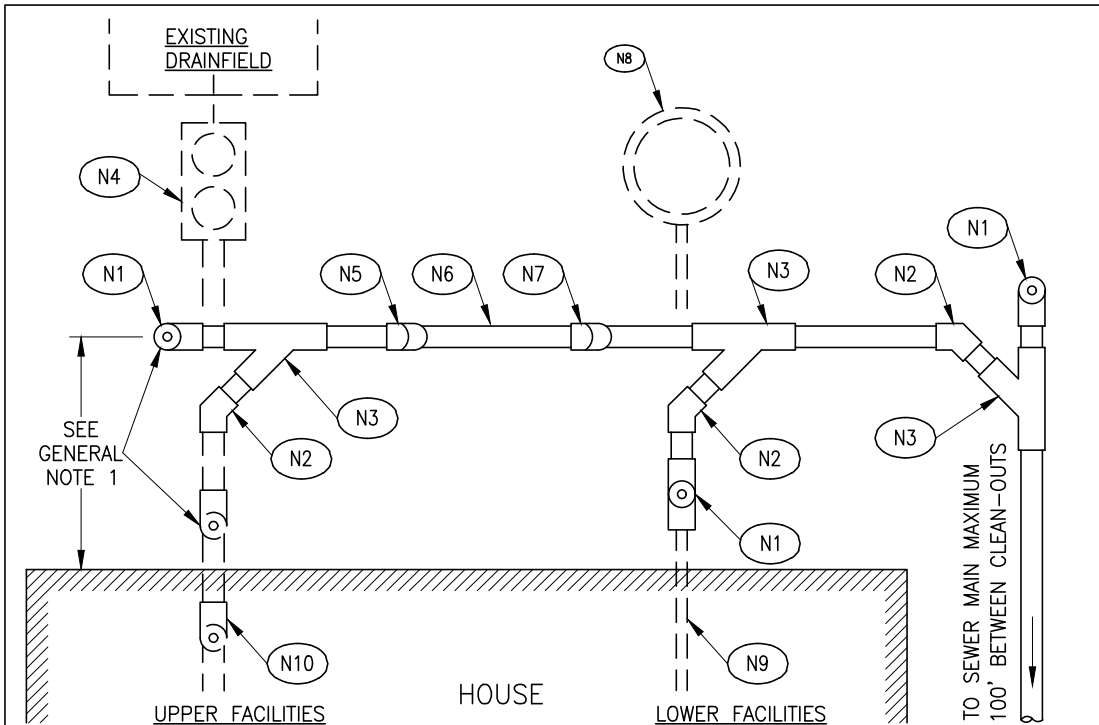
33 31 00-8 SANITARY SEWER
INTERNAL PLUMBING MODIFICATION

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NOTES:

- (N1) CLEAN OUT
- (N2) 45° ELBOW
- (N3) 45° WYE
- (N4) (BLACKWATER) EXISTING SEPTIC TANK TO BE DECOMMISSIONED
- (N5) UPPER 45° ELBOW ±3" DEEP DROPPING DOWN
- (N6) CONNECTING PIPE DROPS DOWN TO LOWER ELEVATION
- (N7) LOWER 45° ELBOW ±7' DEEP TO MEET LOWER FACILITIES
- (N8) (GREYWATER) EXISTING DRYWELL OR CESSPOOL TO BE ABANDONED
- (N9) EXISTING 2" GREYWATER (OR 4") PIPE/INSTALL 4" PVC CLEAN OUT AT POINT OF CONNECTION (NORMALLY ±7' DEEP)
- (N10) EXISTING 4" BUILDING DRAIN w/CLEAN OUT ON INSIDE OF BUILDING (NORMALLY ±2' DEEP)

GENERAL NOTE:

1. CLEAN OUT WILL BE REQUIRED AT POINT OF CONNECTION IN ALL CASES REGARDLESS OF THE FACT THAT THERE IS A CLEAN OUT JUST INSIDE OF WALL UNLESS CHANGE OF DIRECTION AS SHOWN CAN BE ACCOMPLISHED WITHIN 3' OF BUILDING WALL
2. ONSITE SYSTEM DECOMMISSION SHALL INCLUDE REMOVAL AND DISPOSAL OF SEPTIC TANK CONTENTS, PUNCTURING BOTTOM OF SEPTIC TANK AND EITHER BACKFILL TANK CONTENTS OR REMOVE OF TANK

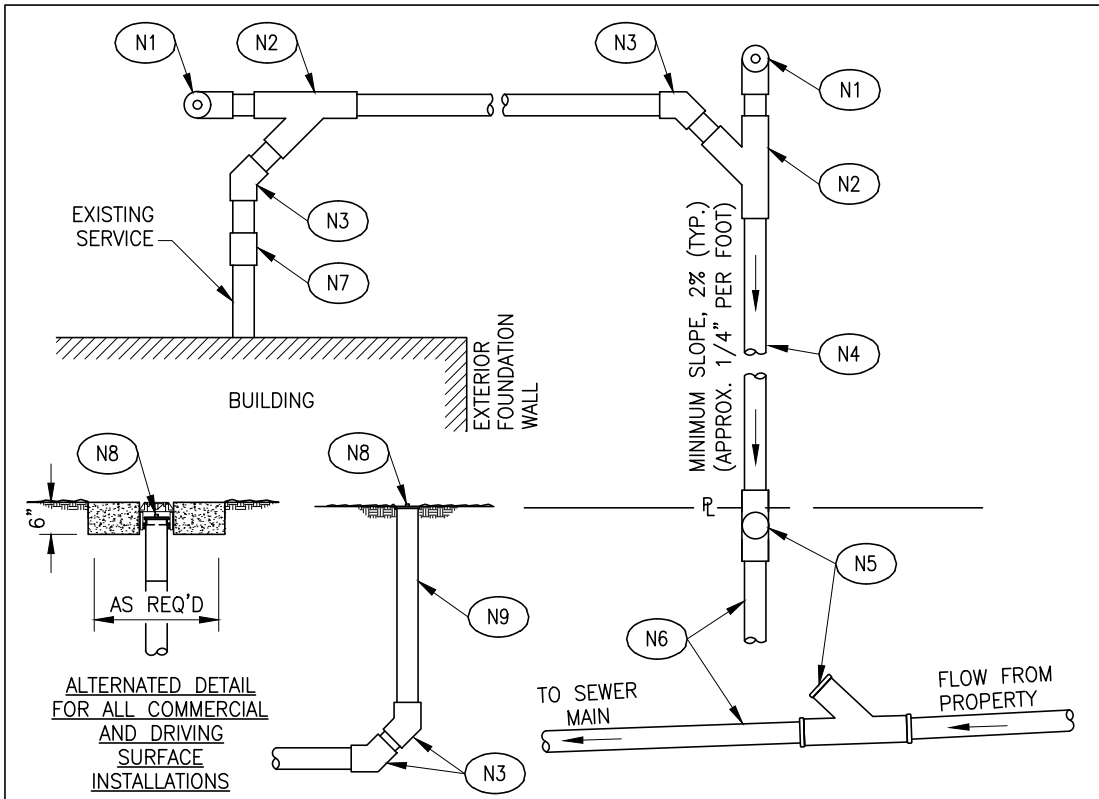
33 31 00-9 ACCEPTABLE METHOD OF CONNECTING UPPER (4") AND LOWER (2" OR 4") FACILITIES OF A HOUSE

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CLEAN OUT DETAIL

NOTES:

- (N1) CLEAN OUT
- (N2) 45° WYE
- (N3) 45° ELBOW
- (N4) MINIMUM 4" PVC PIPE & FITTINGS (ASTM D3034 SDR35) MINIMUM 6" PVC FOR COMMERCIAL, OR AS INDIVIDUALLY DETERMINED)
- (N5) WYE OR SANITARY TEE FOR INSERTION OF TEST PLUG (BEVEL PIPE STUB.) NOTE DIRECTION OF WYE. INSERT PNEUMATIC TEST PLUG THRU TOP OF WYE FOR TEST, PLUG AFTER TEST.
- (N6) SIDE SEWER STUB
- (N7) FERNCO COUPLING
- (N8) GRIPPER PLUG (MAXIMUM 6" BELOW GRADE IN LAWN, GRAVEL, OR UNIMPROVED SURFACES ONLY)
- (N9) SAME DIAMETER AS SIDE SEWER PIPE (TYP.)

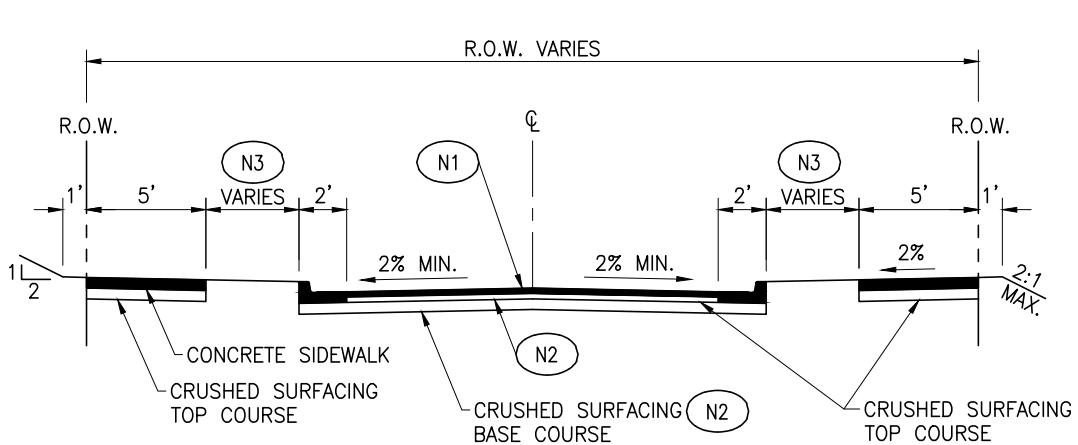
GENERAL NOTE:
SEE INSTALLATION REQUIREMENTS AND OTHER EXHIBITS

33 31 00-10

SIDE SEWER TYPICAL INSTALLATION

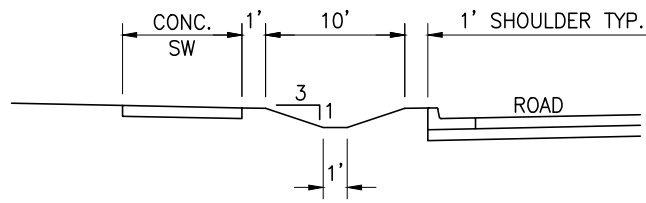
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NOTES:

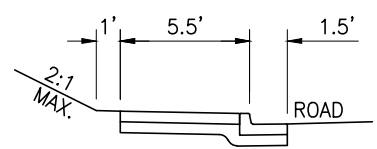
- (N1) HMA SHALL BE PG 70-28, UNLESS SPECIFICALLY APPROVED BY THE CITY ENGINEER
- (N2) HMA CRUSHED SURFACING TOP COURSE AND CRUSHED SURFACING BASE COURSE THICKNESS SHALL BE DETERMINED BY A PLACEMENT DESIGN MINIMUM REQUIREMENT PER RIMC
- (N3) SPECIAL ATTENTION SHALL BE GIVEN TO ROADSIDE SAFETY AND LOCATION OF RIGID STRUCTURES



BIOFILTRATION SWALE

GENERAL NOTES:

1. SURVEY MONUMENTS SHALL BE INSTALLED PER ~~DOUGLAS~~ OKANOGAN COUNTY STANDARDS
2. STEEL SIGN SUPPORT SHALL BE TYPE PL PER WSDOT STANDARD DETAIL G-24.30-01
3. REFER TO SECTION 6 (TECHNICAL SPECIFICATIONS) FOR COMPACTION REQUIREMENTS.

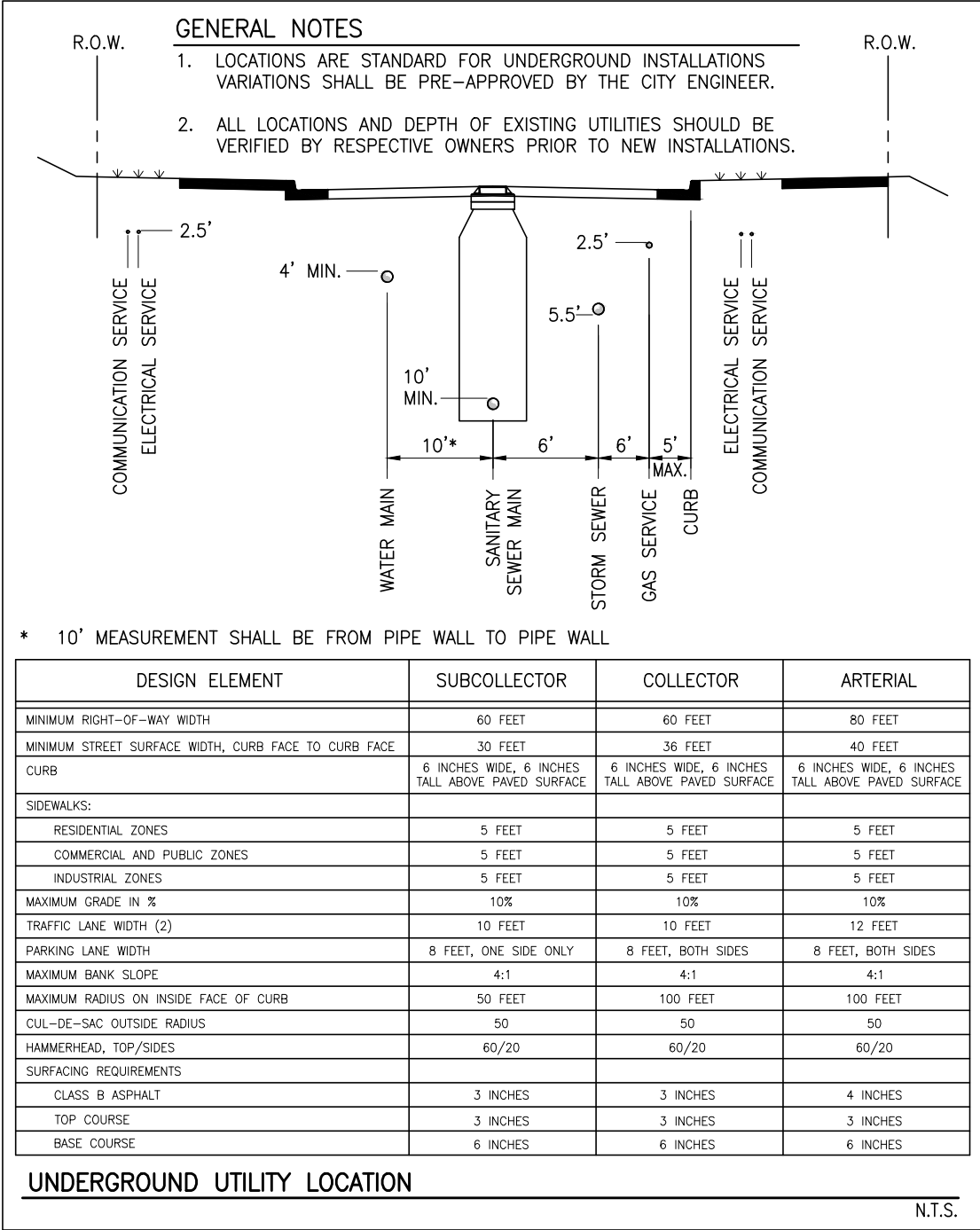



CONTINUOUS SIDEWALK

ROADWAY SECTION

N.T.S.

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