

CITY OF PACIFIC
KING/PIERCE COUNTY WASHINGTON

Development Guidelines
for
Public Works Standards

ADOPTED BY ORDINANCE NO.: 1413 (REVISED PER ORDINANCE NO. 1416)
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SECTION 1

1. INTRODUCTION

These standards shall apply to all improvements within the public right-of-way and/or public easements, to all improvements required within the proposed public right-of-way of new subdivisions, for all improvements intended for ownership, operations on maintenance by the City and for all other improvements (on or offsite) for which the City Code requires approval from the City Administrator and/or City Planning Commission and/or the City Council. 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 sensitive areas to include, but not be limited to, steep embankments, creeks, ponds, lakes, certain wildlife habitat, unstable soils, etc.

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

Any improvements not specifically covered herein by these Standards must meet or exceed the 1998 Standard Specification for Road, Bridge & Municipal Construction, State of Washington, and current amendments thereto, revised as to form to make reference to Local Governments. Said specifications shall be referred to hereafter as the "Standard Specifications".

Where improvements are not covered by these details nor by the Standard Specifications nor by the standard details, the City will be the sole judge in establishing appropriate standards. 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 City Administrator.

Plans for major improvements in the public right-of-way or within public easements, or improvements to be "deeded" or "gifted" to the City, shall bear an approval signature from the City.

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

Definitions: As used herein:

- (a) "Developer": The party having an agreement with the City to cause the installation of certain improvements, to become a part of the City's utility and/or roadway system upon completion and acceptance. The

term shall also include the Developer's contractor employed to do the work or the Contractor's employees.

- (b)* "Development" shall mean the construction, reconstruction, conversion, structural alteration, relocation, enlargement, or change in use of any structure or property, or any project which will increase vehicle trips per day during peak hour traffic, or any project which negatively impacts the service level, safety, or operational efficiency of serving roads.

Exclusions:

- (1) A one time enlargement of less than 800 square feet of total footprint on any parcel of property, or, a one-time net increase of less than 25% of the total aggregate area of the existing footprint(s) of building(s) on the site, whichever is less.
- (2) An individual single family residence.

* (Revised per Ord. 1416)

- (c) "Plans" mean drawings, including reproductions thereof, of the work to be done as an extension to the City's water distribution system, prepared by an Engineer licensed in the State of Washington.
- (d) "Specifications" means the directions, provisions, and requirements designated by an Engineer licensed in the State of Washington for the performance of the work and for the quantity and quality of materials, as contained or referenced herein.
- (e) "Performance Bond" means a bond furnished by the Developer and written by a corporate body qualified to write surety in the State of Washington, guaranteeing that the work will be completed in accordance with the plans and specifications.
- (f) "Maintenance Bond" means a bond furnished by the Developer and written by a corporate body qualified to write surety in the State of Washington, guaranteeing that the Developer will repair any defects found in the work within the time period as further identified herein.
- (g) "Contract Documents": The contract documents shall consist of the following and in case of conflicting provisions, the first mention shall have precedence:
 - (1) Developers Agreement
 - (2) City Development Guidelines and Public Works Standards
 - (3) Other Applicable City Municipal Codes
 - (4) City Right-of-Way Use Permit
 - (5) Plans
 - (6) Standard Details (WSDOT Specifications)
 - (7) Specifications - Conditions and Standards of the Contract (As Approved by City)
 - (8) City Approved Addenda

(9) City Approved Change Orders

These documents shall form the Contract.

- (h) "Work": The labor or materials or both, superintendence, equipment, transportation, and other facilities necessary to complete the Contract.
 - (i) "City": City of Pacific, Washington, King/Pierce County, a municipal corporation, existing under and by virtue of the laws of the State of Washington. Actions designated as taken by the City are the acts of the Council acting through the Mayor.
 - (j) "Mayor" means mayor of the City of Pacific or his/her authorized representative.
 - (k) "Contractor" means the Developer's contractor or subcontractor.
 - (l) "Engineer" means the City's Engineer, whether a staff engineer or consultant.
 - (m) "City Administrator" means the City's duly appointed City Administrator, or in his absence, the City Mayor.
 - (n) "Operations and Maintenance Supervisor" means the City's utilities superintendent, or operations and maintenance supervisor, or public works director.
4. Developer to be Informed: The Developer is expected to be fully informed regarding the nature, quality, and the extent of the work to be done, and, if in doubt, to secure specific instructions from the City.
 5. Authority of Mayor: The Mayor or his authorized representative shall have the authority to stop work whenever, in his opinion, the same shall be necessary to insure compliance with the plans and specifications, and shall have authority to reject work and materials which do not so conform and to decide questions which may arise in the execution of the work.
 6. Authority of the City Administrator: The City Administrator or his authorized representative shall have the authority to determine the amount, quality, acceptability and fitness of the several kinds of work, material and equipment and to decide all questions relative to the classification of materials and the fulfillment of this Contract, and to reject or condemn all work or material which does not conform to the terms of this Contract. The City Administrator's decision in all matters is the decision of the City, and can only be changed by the City. Moreover, the City has not so delegated, and the City Administrator or his authorized representative(s) does (do) not purport to be a safety expert, is not so engaged in that capacity under this Contract, and has neither the authority nor the responsibility to enforce construction safety laws, rules, regulations or procedures, or to order the stoppage of work for claimed violations thereof. The furnishing by the City of resident project representation and/or inspection shall not be construed by the Contractor or Development that the City is responsible for the identification or enforcement

of such laws, rules or regulations.

Payment for City Services: The Developer shall be responsible for promptly reimbursing the City for all costs and expenses incurred by the City in the pursuit of project submittal, review, approval, and construction. These costs include, but are not limited to, the utilization of staff and "other" outside consultants as may be necessitated to adequately review and inspect construction of the project(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.

SECTION 2

2. PERMITS

2.01 Permit Process

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 any necessary permit(s) first having been obtained from the City.

Any party requesting such permit shall file written application therefore with the City at least ten (10) working days before construction is proposed to start. Such application shall be made on a standard City form provided for that purpose, and shall include:

- (1) The name and address of the applicant (name and address of property owner if different than applicant);
- (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 or roof overhangs (if significant) facilities being served or to be served by the new construction.

The City may require, at their discretion, the filing of any other information when in their opinion such information is necessary to properly enforce the provisions of this ordinance.

No permit shall be issued until the proposed work has been approved by the appropriate official. Adjudication of disagreements regarding approvals shall be made by the City Administrator and his decision shall be final.

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 Pacific, nor shall issuance of a permit be construed as a waiver of the Zoning Ordinance or other ordinance requirements concerning the plan.

A fee of an amount as designated by City code shall accompany all applications for permits.

2.02 Variances

A. General

The City Council shall have the authority to grant a variance from the requirements of this specification and from the requirements of this ordinance after considering the matter. The Public Works Director shall upon request of the proponent refer the variance request on to the City Council, and the Council shall sit, in judgment of same, at a public hearing duly called in accordance with the procedures specified in its Municipal Code. 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, 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;
- (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.

C. Effective Date of Variance

The decision of the Board of Adjustment (BOA) granting or denying a variance shall not become final until the expiration of ten days from the date of entry of such decision in the official records of the City

Council.

An aggrieved party may file an appeal of such decision to the King County Superior Court or with Pierce County Hearing Examiner (as applicable) within said ten-day period; if no such appeal is filed, the decision shall thereupon become final.

D. Procedure for Application of a Variance

Application for a variance shall be filed with the City Public Works Department in writing and shall be accompanied by an appropriate fee as stated in the City's Municipal Code, to pay for the cost of processing the application and the costs of publishing and posting the required public notices. All applications shall be accompanied by a current copy of the King/Pierce County assessor's record showing the legal owners of all property within three hundred feet (300') of the requested variance area. All applications shall contain a statement as to why the variance is necessary, and why it would meet the criteria of this chapter. The application shall also contain scaled drawings of the variance area, abutting roads, and all property within three hundred feet (300') thereof.

E. Public Notice and Hearing

Proper notice of a hearing on a variance application before the Board of Adjustments (BOA) Council shall be as follows:

- (1) One publication in the official newspaper for the City at least ten days prior to the date of hearing;
- (2) Posting of copies of the notice of hearing at least ten days prior to the hearing in;
 - (A) Pacific City Hall
 - (B) The United States Post Office in the City of Pacific, and
 - (C) In a conspicuous place on the property which is the subject matter of the application;
- (3) Written notice mailed to the owner or reputed owners of property within three hundred feet (300') of the property which is the subject matter of the application, which ownership is deemed to be that of the last owner of record in the current files of the King/Pierce County Assessor, said notice to be mailed at least ten calendar days prior to the date of the hearing.
- (4) The City Clerk shall be responsible for the mailing and publication of all required notices. The Clerk shall diligently observe the foregoing requirements, but minor inaccuracies in giving such notice shall not invalidate the proceedings of the Board of Adjustments.

SECTION 3**3. PUBLIC WORKS CONSIDERATIONS****3.01 Bonding**

Developers and contracts performing work within the public right-of-way or publicly owned easement(s) shall be prepared to satisfy the following two bonding requirements.

- (A) Furnishing a performance bond, approved as to surety by the City Administrator and as to form by the City Attorney, which bond shall be conditioned upon faithful completion of that portion of the work performed pursuant to the permit which will require completion by the City should the permittee or his contractor default. The amount of such bond shall be 150% of the approved value of the improvements. The City engineer shall review and provide approval, as may be applicable of the submitted amount.
- (B) Furnishing a Maintenance Bond. All work shall be guaranteed by the Contractor for a two-year period from the time of inspection and final approval of the construction by the City.

3.02 Hold Harmless Clause

The Developer shall indemnify and hold harmless the City and the City Engineer, and their agents and employees, from and against all claims damages, losses, and expenses, including attorney's fees, arising out of or resulting from the performance of the work, and shall, after reasonable notice, defend and pay the expense of defending any suit and will pay any judgment, provided that any such claim, damage, loss, or expense (1) is attributable to bodily injury, sickness, disease, or death, or to injury or destruction of tangible property (other than the work itself), including the loss of use resulting therefrom, and (2) is caused in whole or in part by any negligent act or omission or by any other action giving rise to strict liability of the Developer, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

In any and all claims against the City or City Engineer, or any of their agents or employees, by any employee of the Developer, any subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation under this article shall not be limited in any way by any limitation on the amount or type of damages, compensation, or under workman's compensation acts, disability benefit acts, or other employee's benefit acts.

The obligations of the Developer under this article shall not include the sole negligence of the City or the City Engineer.

3.03 Developer's Public Liability & Property Damage Insurance

The Developer shall not commence work until he has furnished evidence (in duplicate copy) of insurance required hereunder, and such insurance has been approved by the City Attorney; nor shall the Developer 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 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 Surplus Line 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. All insurance policies shall be endorsed to provide that the policy shall not be canceled or reduced in coverage until after ten (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.

The insurance coverages listed above shall protect the Developer from claims for damages for bodily injury, including death resulting therefrom, as well as claims for property damage, which may arise from operations under this contract, whether such operations be by himself or by any subcontractor or by anyone directly employed by either of them, it being understood that it is the Developer's obligation to enforce the requirements of this article as respects any contractor or subcontractor.

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 (\$1,000,000.00) for bodily injury, sickness or disease, including death

resulting therefrom, sustained by each person; and for limits of not less than One Million Dollars (\$1,000,000.00) for each occurrence.

Comprehensive General Property Damage Liability Insurance on an occurrence as is for limits of not less than One Million Dollars (\$1,000,000.00) for damage to or destruction of property, including loss of use thereof, arising from each occurrence, and in an amount of not less than One Million Dollars (\$1,000,000.00) in aggregate.

Comprehensive Automobile Property Damage Liability Insurance on an occurrence basis for limits of not less than One Million Dollars (\$1,000,000.00) 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 Insurance 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 damage for which liability exists in connection with such damage to or 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 of/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")
 1. 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
 2. Injury to or destruction of property at any time resulting therefrom.

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 his 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, he shall obtain, at his own 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.

3.04 Compensation & Employer's Liability Insurance

The Developer shall maintain Workmen's Compensation Insurance or, as may be applicable, Maritime Workmen's Insurance, as required by state or federal statute for all of his 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 or Maritime Workmen's 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.

In the event any class of employees engaged in work at the site of the Project is not covered under the Workmen's Compensation Insurance or Maritime Workmen's Insurance, as required by state and federal statute, the Developer shall maintain and shall cause each contractor or subcontractor to maintain Employer's Liability Insurance with a private insurance company for limits of at least One Hundred Thousand Dollars (\$100,000.00), each person, and Three Hundred Thousand Dollars (\$300,000.00), each accident, and furnish satisfactory evidence of same.

3.05 Non-interference

The permittee shall be responsible for minimum interference with:

- Traffic Routing
- Fire Facility Clearance
- Adjoining Property
- Utility Facilities
- Natural Surface Drainage

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

3.06 Work Standards

All work performed pursuant to a permit issued shall be done in accordance with standards published in the 1998 Standard Specifications for Road, Bridge & Municipal Construction, State of Washington, and current amendments thereto, revised as to form to make reference to Local Governments.

3.07 Inspection

A. General

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

B. Final Inspection

Prior to final approval of construction, a visual inspection of the job site will be made by the City. Restoration of the area shall be complete with all improvements being restored to substantially their original or superior condition. Final approval of construction shall not be given earlier than thirty (30) days after satisfactory completion of construction, as witnessed by the City.

3.08 Record Drawings

Permittees who install systems within, on, or below the City's public rights-of-way or public easements shall furnish the City with accurate drawings, plans and profiles, showing the location and curvature of all underground structures installed, including existing facilities where encountered and abandoned installations. Horizontal locations of utilities are to be referenced to street centerlines, as marked by survey monuments, and shall be accurate to a tolerance of plus or minus one half (1/2) foot. The depth of such structure may be referenced to the elevation of the finished street above said utility, with depths to the nearest one-tenth foot being shown at a minimum fifty-foot interval along the location of said utility.

Such record drawings shall be submitted to the City within thirty (30) calendar days after completion of the work. Record drawings shall be stamped, signed and dated by an engineer currently licensed in the State of Washington.

In the event that the permittee does not have qualified personnel to furnish the record drawings required by this section, he shall advise the City Administrator in order that necessary field measurement may be

taken during construction for the preparation of record drawings. All costs of such field inspection and measurement, to include the preparation of the record drawings, shall be at the sole expense of the permittee.

Drawing Standards:

Minimum scale - 1" = 50' horizontal; 1" = 5' vertical

Detail scale - Larger as necessary

As-built drawings shall be submitted on permanent, stable reproducible mylar with a signature and data which verifies the "as-built" condition of the project. All data as shown on the drawings shall be "fixed line" or ink. Sticky back (glue) reproductions or "sepia" mylars shall not be considered acceptable. Electronic files shall be also provided to the City.

SECTION 4**4. STREET AND ASPHALT CONCRETE PATHS AND/OR BIKEWAYS STANDARDS****4.01 General Considerations****A. General**

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

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

This chapter provides *minimum* street design standards as well as minimum design standards for “stand alone” pedestrian and/or bike trails/paths. Higher design and construction standards may be warranted due to localized design and construction parameters.

4.02 Streets**A. General**

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

B. Design Standards

The design of streets and roads shall depend upon their type and usage. The design elements of streets shall conform to City standards as set forth herein and current design practice as set forth in Section 3D.

The layout of streets shall provide for the continuation of existing arterial streets in adjoining subdivisions or of their proper projection when adjoining property is not subdivided. Local access streets, which serve primarily to provide access to abutting property, shall be designed to discourage through traffic. See the table of the Minimum Street Design Standards.

1. **Grade.** Street profile grade should conform closely to the natural contour of the land. In some cases, a different grade may be required by the City Engineer. Unless otherwise approved by the City, the minimum profile grade shall be 0.7 percent. Local conditions may, in

the opinion of the City's Engineer, require a lesser profile grade in which case (if specifically approved by the City Engineer), the minimum allowable profile grade shall be 0.5 percent. The maximum allowable grade shall be as further specified herein.

2. Width. The pavement and right-of-way width depend upon the street classification. The table of Minimum Street Design Standards show the minimum widths allowed.

Street widths shall be measured from face of vertical curb to face of vertical curb on streets with cement concrete curb and gutter, and from centerline of gutter to centerline of gutter or streets "approved" by the City without concrete vertical curb and gutter.

3. The developer is required to retain a licensed soils engineer to make soils tests and to provide engineering recommendations for design of the sub-base and roadway sections based on "in place" soils, depth of "free draining" structural materials, projected pavement loadings, roadway classification, average daily traffic volume, etc.
4. In special circumstances, as may be specifically approved/required by the City Planning Commission and/or City Council, due to local conditions and/or geometric restrictions, paving widths or improvement standards may be required which are different than those specifically listed herein.
5. There shall be no islands in the center of any cul-de-sac.
6. The location and alignment of streets shall generally conform to existing streets and to the City's official street naming policy or ordinance except where, in the opinion of the City Engineer, topography or some physical features eliminate the possibility of connecting these streets in the future. The City Council shall approve all street names.
7. Streets and lots shall be placed in relationship to natural topography so that grading and filling and/or other alternations of existing conditions is minimized. Reserve strips or street plugs controlling access to streets will not be approved unless, in the judgment of the City Engineer, such is necessary for the protection of the public welfare or substantial property rights, and in such cases they will be required. The control and disposal of the land comprising such strips or plugs shall be placed within the jurisdiction of the City.
8. The City intends to promote connectivity of roadways within plats. Therefore, if, in the opinion of the City, it is necessary to give access to, or permit future subdivision of adjoining land, streets shall be extended to the boundary of the subdivision and the resulting dead-end street shall be provided with a temporary cul-de-sac. The temporary cul-de-sac shall be appropriately signed as "temporary" and further paved, to include furnishing and installing concrete curbs, gutters and sidewalks and constructed to City standards.

9. Half streets shall be prohibited except when approved by the City and Fire Marshall's office.
10. The street system (in residential subdivisions and short subdivisions) shall be laid out with a minimum number of intersections with other arterial streets at intersections closer than one thousand three hundred twenty feet and no streets shall intersect at intervals closer than one hundred twenty five feet, unless, in the judgment of the City Engineer, an exception to this rule would be in the public interest and welfare.
11. Streets shall be laid out so as to intersect as nearly as possible at right angles, and in any event, no street shall intersect with any other street at an angle of less than sixty degrees, without specific written City approval.
12. Street jogs with centerline offsets less than one hundred twenty-five feet are prohibited.
13. Intersecting streets shall be laid out so that blocks between street lines are not more than one thousand three hundred twenty feet in length, except where in the opinion of the City Engineer, extraordinary conditions justify a departure from the maximum.
14. Streets shall conform to all requirements of the latest edition of the Uniform Fire Code adopted by the City.
15. All street construction plans shall be submitted to the City and shall include the following required information:
 - Plan and profile;
 - Street name;
 - Centerline bearings;
 - Centerline/baseline stationing;
 - Centerline elevations every fifty feet;
 - Gutterline elevations every fifty feet if not standard crown;
 - Slope shall be in percent;
 - Transverse slope: Two percent standard crown (to be used unless approved/required by City);
 - Longitudinal slope - see design standard table;
 - Horizontal and vertical curves shall be required when a change of centerline grade occurs greater than one percent:
 - a. Fifty feet minimum length;
 - b. Elevations required at twenty five feet stations and at the P.C., P.I., P.T. and low point or high point;
 - Longitudinal gutterline slope - see design standard table;
 - Pavement cross sections per City standard detail;
 - Accurate locations of monuments at all centerline intersections, cul-de-sacs, P.C.'s, P.T.'s, and P.R.C's;
 - Length and width of sidewalks and driveways;
 - The location of all existing fire hydrant within 300 feet of the project shall be indicated;
 - Curb and gutter;
 - Wheelchair ramps;

- Illumination. (Illumination not required to be shown on same street as on plan/profile, but approval at location of miscellaneous utilities (i.e., gas, power, CATV, cable) as required. Plan shall be submitted to City Engineer for approval prior to installation.)
 - a. Luminaries - location, material, height and wattage.
 - b. Service cabinet - location and material.
 - c. Conduits and wire - location, material size and depth.
 - d. Junction boxes - location and material;

Channelization and Signing:

- a. Lane markers - location and type.
- b. Pavement markings - location and type.
- c. Signs - location and type.

Dead end/cul-de-sacs (permanent) shall terminate in a circular turnaround having minimum pavement radius of fifty (50) feet, unless otherwise approved in writing by the City Fire Marshall.

Grades (slopes).

- a. Arterials, eight percent.
- b. Allow an average maximum grade on all other streets as follows: eight percent maximum with the following exceptions: A grade of up to twelve over a distance not to exceed three hundred feet and a maximum grade of fifteen percent for a distance not to exceed seventy-five feet.
- c. Grades of pedestrian ways or crosswalks shall not be more than eight percent (unless otherwise approached in writing by the City Engineer).
- d. All vertically aligned profile grade changes shall be connected with a vertical curve which shall have a minimum sight distance of one thousand feet on arterials, five hundred feet on collector streets and three hundred feet on all other streets.

At street intersections, property line corners shall be rounded by an arc, the minimum radii of which shall be twenty feet. In business districts, a chord may be substituted for such arc if specifically approved by the City Engineer.

Street intersections with centerline offsets of less than two hundred feet shall not be allowed.

Cul-de-sacs are required for roads longer than one hundred fifty feet but they cannot exceed four hundred (400) feet in length. Cul-de-sacs shall not have a right-of-way radius less than fifty feet.

All public streets, sidewalks and alleys shall conform as a minimum to one of the herein referenced construction standards and shall be adjusted as necessary to match existing facilities, service the proposed development, and meet the needs of anticipated future development;

All topsoil, organic, and structurally unsuitable soils shall be removed from beneath the proposed street section as located between the outside edge of sidewalks.

16. In addition to the above requirements, street design shall incorporate the following minimum requirements:
 - a. Bicycle lanes shall be installed with reflectorized striping and bike symbols.
 - b. Cul-de-sacs for residential and rural streets shall be four hundred (400) feet maximum in length, and constructed with a fifty (50) foot minimum radius of asphalt pavement at the bulb. Right-of-way at the cul-de-sac bulb shall be sixty (60) feet minimum in radius. All other requirements shall be in accordance with the applicable street standards. No island shall be allowed unless approved by City Engineer and fire chief;
 - c. All new utility systems such as power, gas, cable TV and telephone shall be buried, except where topography or site conditions prohibit reasonable installation. Design and installation of the system shall be done by the franchised utility company. Design shall be submitted to the City Engineer for review and approval prior to installation;
 - d. Street lighting shall be provided using sodium fixtures, mounted on poles. Poles designed specifically and exclusively for street lighting shall be break away type. System shall be designed to provide a minimum light intensive of 0.04 foot candles within street rights-of-way;
 - e. Any project of sixteen dwelling units or more, accessing off of an arterial road requires a center turn lane and right hand turn lanes;
 - f. Roads are to be saw cut before permanent patch is made or new AC pavement is installed abutting the existing road;
 - g. To facilitate future development within the city, streets and rights-of-way shall be planned to give access to or permit the future subdivision of adjoining land. Streets shall be extended to the plat boundary to accommodate extensions into future subdivisions or adjoining land and the resulting dead end street shall be either barricaded pursuant to WSDOT standards or provided with a temporary cul-de-sac per City direction or both. The cul-de-sac shall be paved. The inclusion of concrete curbs, gutters and sidewalks in the cul-de-sac shall be required even if it would be eliminated by future street extensions. In designing streets, existing development, proposed development and possible future development shall all be considered in the recommendation of right-of-way widths, street widths, paving sections, sidewalks and other applicable standards;

- h. If, in the opinion of the City Engineer, it is necessary to give access to, or permit future subdivision of adjoining land, streets shall be extended to the boundary of the subdivision and the resulting dead end street shall be provided with a temporary cul-de-sac. The cul-de-sac shall be paved, with curbs, gutter and sidewalks constructed to City standards;
 - i. The street system (in residential subdivisions and short subdivisions) shall be laid out with a minimum number of intersections with arterial streets. Arterial streets shall not intersect with other arterials streets at intervals closer than one thousand three hundred twenty feet and no streets shall intersect at intervals closer than one hundred twenty-five feet, unless, in the judgment of the City engineer, an exception to this rule would be in the public interest and welfare;
 - j. Streets shall be laid out so as to intersect as nearly as possible at right angles, and in any event, no street shall intersect with any other street at an angle of less than sixty degrees.
17. The General Notes numbered 1 through 6, as shown and further referenced herein, shall be included or referenced on any plans submitted to the City for construction approval dealing with street design.

GENERAL NOTES (STREET CONSTRUCTION)

1. All workmanship and materials shall be in accordance with current City of Pacific Standards and current amendments thereto and the 1998 State of Washington Standard Specifications for Road, Bridge, and Municipal Construction, and any current amendments thereto, amended as per City Standards.
2. The contractor shall be responsible for all traffic control in accordance with the MUTCD manual. Prior to disruption of any traffic, traffic control plans shall be prepared and submitted to the City for possible approval. No work shall commence until all approved traffic control is in place. Work shall cease when traffic control fails to meet minimum requirements.
3. All curb and gutter, street grades, sidewalk grades, and any other vertical and/or horizontal alignment shall be staked by an engineering or surveying firm capable of performing such work. Such firms shall be currently licensed in the State of Washington to perform such work.
4. Where new asphalt joins existing, the existing asphalt shall be cut to a neat vertical edge and tacked with Asphalt Emulsion type CSS-1 in accordance with the standard specifications. The new asphalt shall be feathered back over existing to provide for a seal at the saw cut location and the joint sealed with grade AR-4000W paving asphalt. A sand blanket shall be applied to the surface to minimize “tracking” of same.
5. Compaction of subgrade, rock, and asphalt shall be in accordance with the WSDOT Standard Specifications.

6. Form and subgrade inspection by the City is required before pouring concrete. A minimum forty-eight hours notice is required to be provided to the Public Works Director for form inspection.
7. See City of Pacific Standards for testing and sampling frequencies.

4.03 Functional Classification

City streets are divided into major (or principal) arterial, minor (or secondary) arterial, collector, local access, minor access, and half street in accordance with regional transportation needs and the functional use each serves. Function is the controlling element for classification and shall govern right-of-way, road width, and road geometrics. The proponent/developer shall request information on the functional classification of existing streets from the Public Works Director. New streets will be classified by the City.

Generally speaking, the functional classification of streets are defined as follows:

- Major arterials are defined as streets connecting two or more arterials together or serving industrial areas.
- Collector streets are defined as streets currently serving or anticipated to serve more than sixty four (64) dwelling units (or equivalent) or connecting to an arterial.
- Local access streets currently serving or anticipated to serve in the future up to sixteen (16) dwelling units (or equivalent).
- Minor access streets are residential only streets which will serve fifteen (15) dwelling units or less and/or terminate in non-extendible cul-de-sacs.
- Half streets are those streets with a high probability that development will be proposed for the opposite side of the street eventually resulting in a full street width.
- Alley is defined as a strip of land dedicated for public use which is less than twenty (20') feet in width between property lines and which is intended to provide driveway access to adjacent properties.

STREET AND ASPHALT CONCRETE PATHS AND/OR BIKEWAYS STANDARDS

MINIMUM STREET DESIGN STANDARDS

Design Standard	Major Arterial	Minor Arterial	Collector	Local Access	Minor Access	Half Streets
Minimum Right-of-Way	60 to 100 feet w/ 10' easements (both sides) for future widening on 60' widths	60 to 100 feet w/ 10' easements (both sides) for future widening on 60' widths	50' min. w/ 5' easements on both sides for future development	50' min. w/ 5' easements both sides for future development	50'	32'
Minimum Pavement Width	48'	40'	36'	32'	28'	24'
Parking Lane	None	Both sides	Both sides	One Side	One Side	None
Minimum/Maximum Grade	0.7%-8%	0.7%-8%	0.7%-15%	0.7%-15%	0.7%-15%	0.7%-15%
Curb	Cement Concrete Curb & Gutter Both Sides	Cement Concrete Curb & Gutter Both Sides	Cement Concrete Curb & Gutter Both Sides	Cement Concrete Curb & Gutter Both Sides	Cement Concrete Curb & Gutter Both Sides	Cement Concrete Curb & Gutter On One Side
Sidewalks	Both Sides: 5' wide (commercial areas may require up to 10' widths at discretion of planning commission)	Both Sides: 5' wide (commercial areas may require up to 10' widths at discretion of planning commission)	Both Sides: 5'	Both Sides: 5'	Both Sides: 5'	One Side 5'
Cul-De-Sac Radius (pavement width)	N/A	N/A	N/A	50' paved radius	N/A	N/A
Intersection Curb Radius	30'	30'	30'	30'	15'	25'
Design Speed (MPH)	Per City Direction	25	25	25	15	15
Minimum Centerline Radius for Normal Crown	460'	460'	460'	200'	As Approved	As Approved
Stopping Site Distance	250'	250'	250'	160' Approved	As Approved	As

4.04 Street Names

The developer must check with the Address Committee regarding the naming of streets. This should be done at the time the preliminary plat is submitted and again upon approval of the final plat. The Public Works Director will insure that the name assigned to a new street is consistent with policies of the City.

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

4.05 Signing

The developer is responsible for providing all traffic control signs. Traffic control signing shall comply with the provisions as established by the U.S. Department of Transportation Manual on Uniform Traffic Control devices (MUTCD).

Street designation signs, including poles and hardware, will be paid for by the developer. Street designation signs shall display street names or grid numbers as applicable.

4.06 Right-of-Way

Right-of-way is determined by the functional classification of a street. Arterials shall have a right-of-way width of not less than 60 feet. Collectors and local access streets shall have a right-of-way width of not less than 50 feet. Local access cul-de-sacs streets shall have a right-of-way width of not less than 50 feet. Minor access streets shall have a right-of-way width of not less than 50 feet. See Minimum Street Design Standards Table for specific additional information. See "Minimum Street Design Standard Table" for radius requirements at cul-de-sac "bulb".

Additional roadside easements will be required to facilitate future roadway widening at the discretion of the City.

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

Right-of-way shall be conveyed to the City on a recorded plat or by a right-of-way dedication deed. All costs of same to be borne by the property owner/developer.

4.07 Street Frontage Improvements

- A. All industrial, commercial, and residential development, as well as, long and short plats shall install street frontage improvements at the time of construction. Such improvements shall generally include concrete curb and gutter, concrete

sidewalk, street storm drainage, street lighting system, utility relocation, landscaping and irrigation, undergrounding aerial utilities and street pavement widening all per these Standards. Plans shall be prepared and signed by a licensed engineer currently registered in the State of Washington.

- B. All frontage improvements shall be made across the full frontage of the property.
- C. Exceptions: (i) When the proponent requests that the City Council evaluate if the required frontage improvements cannot be reasonably performed due to unique conditions, the city council will consider a request from the proponent that an “equal” and voluntary monetary amount be deposited with the City and retained by the City for such use per applicable RCW’s. The equivalent cost shall be approved by the city and include design, administration, and construction costs. (ii) When improvements cannot be reasonably accomplished in a timely manner a recorded agreement (performance bond or equal) on forms provided by the City shall be completed which provide for these improvements to be installed at a later date by the proponent.

4.08 Cul-de-sac

Streets designed to have one end permanently closed shall be no longer than 400 feet. At the closed end, there shall be a widened “bulb” having a minimum paved traveled radius as shown in the Minimum Street Design Standards Table.

4.09 Temporary Dead Ends

Where a street is *temporarily* dead ended, turn around provisions must be provided where the road serves more than one lot. Only if pre-approved by the local fire marshall and the City Council the turn around may be a hammerhead as shown in the Miscellaneous Detail Section of these Standards.

4.10 Intersections

- A. Traffic control will be as specified in the Manual on Uniform Traffic Control Devices (MUTCD) or as may be specifically modified by the City Public Works Director as a result of appropriate traffic engineering studies.
- B. Street intersections shall be laid out so as to intersect as nearly as possible at right angles. Sharp angled intersections shall be avoided. For reasons of traffic safety, a “T” intersection (three-legged) is preferable to the crossroad (four-legged) intersection for local access streets. For safe design, the following types of intersection features should be avoided:
 - 1. Intersections with more than four intersecting streets;

2. “Y” type intersections where streets meet at acute angles;
 3. Intersections adjacent to bridges and other sight obstructions.
- C. Spacing between adjacent intersecting streets, whether crossing or “T” should be as follows:

When highest classification involved is:	Minimum centerline offset should be:
Major Arterial	350 feet
Minor Arterial	300 feet
Collector	300 feet
Local Access	150 feet

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

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

4.11 Driveways

A. General

1. Driveway details are located at the end of these Standards.
2. All abandoned driveway areas on the same frontage shall be removed and the curbing and sidewalk or shoulder and ditch section shall be properly restored, at the Property Owner’s expense.
3. All driveways shall be constructed of Portland Concrete Cement, and shall be at least 6-inches thick, over a 4-inch crushed surfacing (5/8” minus) top course. Driveways shall be subject to the same testing and inspection requirements as curb, gutter, and sidewalk construction.
4. Joint-use driveways serving two adjacent parcels shall be encouraged and may be built on their common boundary upon formal written agreement by both property owners **and** approval of the City. The agreement shall be a recorded easement for both parcels of land specifying joint usage.
5. Grade breaks, including the tie to the roadway, shall be constructed as smooth vertical curves. The maximum change in driveway grade shall be 8 percent within any 10 feet of distance on a crest and 12 percent within any 10 feet of distance in a sag vertical curve. The grades of all driveway approaches are to be approved by the City.

6. No commercial or industrial type driveway shall be constructed, if reasonably possible, where backing onto the sidewalk or street is required.
7. No driveway aprons shall extend into the street further than the face of the curb.
8. The angle between any driveway and the street shall be not less than 45°.
9. Generally, the two edges of each driveway shall be parallel.
10. Every driveway must provide access to a garage, carport, parking area or other structure on private or public property requiring the entrance of vehicles. No public curb shall be cut unless a driveway is installed.
11. Maintenance of driveway approaches shall be the responsibility of the owners whose property they serve.
12. A driveway permit shall be required. No person shall begin work on the construction, alteration, repair or removal of any driveway or the paving of any parking strip on and/or adjacent to any street, alley or other public place in the City without first obtaining a permit from the City. Exceptions to permit acquisition requirements may be granted at the discretion of the Public Works Director and/or Building Official.
13. Driveway Location:

No driveway shall be located as to create a hazard to pedestrians, bicyclists or motorists or to invite or compel illegal or unsafe traffic movements.
14. No driveway shall be constructed in such a manner as to be a hazard to any existing street lighting standard, utility pole, traffic regulating device or fire hydrant. The cost of relocating any such street structure when necessary to do so shall be paid by the abutting property owner. The relocation of any street structure shall be allowed with the specific written approval of the Owner of the structure involved.
15. Driveway approach to City streets to be paved, unless otherwise approved by the City Engineer.
16. Driveway Size and Number:
 - a. Except as otherwise provided, the width of any residential driveway shall not exceed twenty-four feet (exclusive of the radii of the returns). The maximum width for any commercial driveway shall be sixty feet. The City Engineer may authorize additional residential driveway widths for three-car garages or for access

driveways necessary for off-street parking or recreational vehicles.

- b. The width of any driveway shall not be less than twelve feet, exclusive of the radii of the returns.
- c. The total width of all driveways for any one ownership on a street shall not exceed thirty percent of that ownership along the street. Any driveway which has become abandoned or unused through a change of the conditions for which it was originally intended or which for any other reason has become unnecessary, shall be closed and the owner shall replace any such driveway curb-cut with a standard curb according to the City's standards.
- d. The length of any driveway shall not exceed one hundred fifty feet, without approval of the City Engineer.
- e. There shall not be more than two driveways on one street for any one ownership except where a single ownership is developed into more than one unit of operation, each sufficient in itself to meet the requirements of off-street parking and loading as required by the zoning ordinance and where the necessity for separate access to the street is evident. In such cases, there shall not be more than two driveways on the street for any one unit of operation.

17. Driveway Slopes:

Driveway slopes or grades shall not exceed eight percent unless otherwise authorized/approved by the City Engineer in writing. The City Engineer will consider authorizing driveway slopes exceeding eight percent, up to a maximum of twelve percent, if it is determined that:

- a. The driveway is the only economically and environmentally reasonable alternative.
- b. The driveway will not present a traffic, pedestrian, bicycle or safety hazard.
- c. The police and fire chief concur in allowing the increased driveway slope.
- d. The public health, safety and general welfare will not be adversely affected.
- e. No driveway may access an arterial streets within 75 feet (measured along the arterial) of any other such arterial street access on either side of the street; provided, that such access may be located directly opposite another access.
- f. No driveway access shall be allowed onto an arterial street within 150 feet of the nearest right-of-way line of an intersecting street. No driveway shall be located within 20 feet of a crosswalk.
- g. Within the limitations set forth above, access to arterial streets within the City shall be limited to one driveway for each tract of property separately owned, except that

- automobile service stations may be allowed two driveways as further stated herein.
- h. Driveways giving direct access onto arterials may be denied if alternate access is available. Deviations of these standards may be permitted by the City Engineer.
 - i. In general, residential and commercial driveways, except automobile service stations, shall not exceed the following maximum widths:

**PRIVATE OR COMMERCIAL DRIVEWAYS
(EXCEPT AUTOMOBILE SERVICE STATIONS)**

<u>PROPERTY FRONTAGE</u>	<u>MAXIMUM DRIVEWAY WIDTH</u>
<16'	8'
16' to 30'	8' or 30% of frontage
>30' to 50'	12' or 30% of frontage
>50' to 75'	22'
>75' to 100'	24'

In general, service station driveways shall not exceed the following maximum widths.

AUTOMOBILE SERVICE STATIONS

<u>PROPERTY FRONTAGE</u>	<u>MAXIMUM NUMBER OF DRIVEWAYS</u>	<u>MAXIMUM DRIVEWAY WIDTH</u>
<16'	1	8'
16' to 30'	1	50% of frontage
>30' to 50'	1	22'
>50' to 75'	1	26'
>75' - 1,000'	or 2	18'
	1	30'
	or 2	22'

- j. A road approach or wider driveway width may be approved by the City Engineer where a substantial percentage of oversized vehicle traffic exists, where divisional islands are required/desired, or where multiple exit or entrance lanes are needed.
- k. Parking lot circulation and signing needs shall be met on site. The public right-of-way shall not be utilized as part of a parking lot flow.
- l. Road approaches and/or ingress and egress tapers may be required in industrial and commercially zoned areas as directed by the City Engineer.

4.12 Sight Obstruction

The following sight clearance requirements take into account the proportional relationship between speed and stopping distance.

The sight distance area is a clear-view triangle formed on all intersections by extending two lines of specified length (A) and (B) as shown below from the center of the intersecting streets along the centerlines of both streets and connecting those endpoints to form the hypotenuse of the triangle. See detail at the end of these Standards. The area within the triangle shall be subject to restrictions to maintain a clear view on the intersection approaches.

Sight Distance Triangle:

Stop or Yield Controlled Intersection:

<u>Speed Limit</u>	<u>Sight Distance (Ft.)</u>	
	(A)	(B)
	<u>Major Street</u>	<u>Minor Street</u>
20 mph	200	*
25 mph	250	*
30 mph	300	*
35 mph	350	*
40 mph	400	*

* Sight distance measured from a point on the minor road 15 feet from the edge (extended) of the major road pavement and measured from a height of eye at 3.50 feet on the minor road to height of object at 4.25 feet on the major road.

Uncontrolled Intersection:

<u>Speed Limit</u>	<u>Sight Distance (Ft.)</u>	
	(A)	(B)
	<u>Major Street</u>	<u>Minor Street</u>
20 mph	90	90
25 mph	110	110
30 mph	130	130
35 mph	155	155
40 mph	180	180

- C. The vertical clearance area within the sight distance triangle shall be free from obstructions to a motor vehicle operator’s view between a height of 3 feet and 10 feet above the existing surface of the street.
- D. Exclusions. Sight obstructions that may be excluded from these requirements include: fences in conformance with this chapter, utility poles, regulatory signs, trees trimmed from the base to a height of 10 feet above the street, places where the contour of the ground is such that there can be no cross visibility at the intersection, saplings or plant species of open growth habits and not in the form of a hedge which are so planted and trimmed as to leave at all seasons a clear and unobstructed cross view, buildings constructed in conformance with the provisions of appropriate zoning regulations and preexisting buildings.

4.13 Subgrade Preparation

The subgrade area of the street right-of-way shall be cleared of brush, weeds, vegetation, grass and debris, per Section 2-01 of the aforementioned Washington State Standard Specifications. All cleared and grubbed material shall be satisfactorily disposed of. All depressions, or ruts, which contain water will be drained.

The subgrade shall then be bladed and dragged to remove inequalities and secure a uniform surface. The existing subgrade will be compacted to a minimum density as defined in the Washington State Standard Specifications and as witnessed by the City Inspector. Compaction tests may be required to be conducted at the discretion of the City to verify same.

4.14 Crushed Surfacing (Base and Top Course)

Surfacing shall consist of the construction of two or more courses of crushed stone upon an existing roadway surface, or upon a subgrade properly prepared as outlined above. Crushed surfacing material shall be uniform in quality and substantially free from wood, roots, bark and other extraneous material. It will compact into a dense and unyielding mass which will be true to line, grade and cross-section. It shall meet the following test requirements:

Los Angeles Wear, 500 Rev. (ASTM Designation C 131) 35% Max.
Grading Requirement (% by weight)

<u>Percent Passing</u>	<u>Base Course</u>	<u>Top Course</u>
1-1/4" square sieve.....	100	
5/8" square sieve.....	50 to 80	100
1/4" square sieve.....	30 to 50	50 to 65
U.S. No. 40 sieve.....	3 to 18	8 to 23
U.S. No. 200 sieve.....	7.5 Max.	10 Max.
(wet sieving)		
Sand equivalent.....	40 Min.	40 Min.

Base courses and top courses shall be placed in accordance with the approved cross-section. Compaction shall be a minimum of 95% of standard density as determined by the compaction control test for granular materials. Base course rock may be composed of larger fractured rock if recommended by the developer's engineer and approved by the City Engineer.

4.15 Surfacing Requirements

All streets in the City of Pacific will be paved with either Asphalt Concrete or Cement Concrete, in strict compliance with these standards.

The pavement design shall meet the requirements in the latest publication of the AASHTO Guide for Design of Pavement Structures. The pavement section shall be designed and stamped by an engineer currently licensed in the State of Washington.

One soil sample per each 500 LF of centerline with 3 minimum per project representative of the roadway subgrade shall be taken by the Developer and delivered to a City approved soils lab in order to determine a statistical representation of the existing soil conditions.

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

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

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

Cement concrete streets will be constructed as specified in Section 5-05 of the Standard Specifications.

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

4.16 Temporary Street Patching

Temporary restoration of trenches shall be accomplished by using 2" Class B Asphalt Concrete Pavement when available or 4" medium-curing (MC-250) liquid asphalt (cold mix), 3" Asphalt Treated Base (ATB), or steel plates suitable for H-20 traffic loading conditions. Steel plates shall be provided with a cold mix "lip" to accommodate a smooth transition from pavement to steel plate.

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

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

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

4.17 Trench Backfill and Restoration

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

- A. All trench and pavement cuts shall be made by sawcuts. The cuts shall be a minimum of 1 foot outside the trench width.
- B. All trenching shall be backfilled with gravel base, Class B, or crushed surfacing materials conforming to Section 4 of the WSDOT Standard Specifications. The trench shall be compacted to 95 percent maximum density, as described in Section 2-03 of the WSDOT Standard Specifications. The City will be the sole judge of approving materials to be utilized for backfill. Typically, crushed rock (5/8-inch minus) or control density fill (CDF) shall be placed and compacted in the trench sections for all right angle (\pm) street crossings.

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

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

Replacement of the asphalt concrete or Portland concrete cement shall match existing asphalt concrete or Portland concrete cement depth, except asphalt shall be a minimum compacted thickness of 2 inches and concrete cement shall be a minimum compacted thickness of 6 inches.

- C. Tack shall be applied to the existing pavement and edge of cut and shall be emulsified asphalt grade CSS-1 as specified in Section 9-02.1(6) of the WSDOT Standard Specifications. Tack coat shall be applied as specified in Section 5-04 of the WSDOT Standard Specifications.
- D. Asphalt concrete Class B shall be placed on the prepared surface by an approved paving machine and shall be in accordance with the applicable requirements of Section 5-04 of the WSDOT Standard Specifications, except that longitudinal joints between successive

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

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

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

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

4.18 Survey Staking

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

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

The minimum staking of streets shall be as follows:

- A. Stake centerline alignment every 25 feet (50 feet in tangent sections) with cuts and/or fills to subgrade.
- B. Stake top of ballast and top of crushed surfacing at centerline and edge of pavement every 25 feet.

- C. Stake top back of curb at a consistent offset for vertical and horizontal alignment.

4.19 Material and Construction Testing

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

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

**CITY OF PACIFIC
TESTING AND SAMPLING FREQUENCY GUIDE**

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

ASPHALT MATERIALS	CERTIFICATION	1	1-JOB
RUBBERIZED ASPHALT:	CERTIFICATION	1	1-JOB
COMPACTION TESTING:			
EMBANKMENT	COMPACTION	1 EACH	1-500 LF
CUT SECTION	COMPACTION	1 EACH	1-500 LF
CSTC	COMPACTION	1 EACH	1-500 LF
CSBC	COMPACTION	1 EACH	1-500 LF
BALLAST	COMPACTION	1 EACH	1-500 LF
TRENCH BACKFILL	COMPACTION	1 EACH	1-500 LF

SE = Sand Equivalency

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

4.20 Sidewalks, Curbs And Gutters

A. General

All properties within commercial zones of the City, properties abutting arterial streets, collectors or local access streets shall, in conjunction with new construction on such properties or alterations, reconstruction, or improvements, where the total cost of construction, reconstruction or remodeling in the opinion of the City warrants frontage improvements, shall be required to provide sidewalks, curbs and gutters along abutting streets. See Details provided herein. Single-family residences, not associated with short plats or long plats, shall be exempt from this requirement.

B. Design Standards

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

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

C. Sidewalks

Sidewalks shall be constructed of Portland Cement Concrete, 4 inches thick (6-inch thick at driveway sections) per Section 8-14 of the WSDOT Standard Specifications. When the sidewalk, curb and gutter are contiguous, the width of the sidewalk shall be measured from back of curb to back of sidewalk.

Sidewalks will be constructed on a compacted gravel base, (Class B), or 5/8-inch minus crushed rock of suitable thickness to provide a firm and unyielding base. Sidewalks will be constructed of Portland

Cement Concrete as described in Section 8-14 of the Standard Specifications and be designed and constructed in compliance with those Details as shown herein. Typically, in commercially zoned areas the sidewalks shall abut the curb. The Planning Commission and/or City Council shall be at liberty to vary sidewalk dimensional characteristics and location to meet localized or existing conditions.

The sidewalk thickness shall be as follows:

<u>SIDEWALK LOCATION</u>	<u>SIDEWALK THICKNESS</u>
Typical sidewalk	4" thick
Driveway sections	6" thick

The sidewalks will be divided into five foot lengths by contraction joints and expansion joints will be at intervals of no more than 15 feet. Joints shall be filled with an asphalt mastic material.

1. Arterial and Collector Streets. Sidewalks, curbs and gutters shall be required on both sides of all major and minor arterial streets and collector streets interior to the development. Sidewalks, curbs and gutters shall also be required on the development side of streets abutting the exterior of said development.

The sidewalks shall vary from five (5) feet (minimum) to ten (10) feet (maximum) in width, at the discretion of the City Council, in commercial corridors, or, match existing widths if greater than ten (10) feet wide. See Detail.

2. Local Access Streets. Sidewalks shall be required on both sides of local access streets interior to the development and on the development side of local access streets abutting the exterior of said development including cul-de-sacs.

The sidewalks on Local Access Streets shall be five (5) feet wide. See Detail.

3. The design and construction of all sidewalks, curbs, gutters and walkways shall meet the following minimum standards:

The width of sidewalks shall be as further shown herein. The design of all sidewalks shall provide for a gradual taper rather than an abrupt transition between sidewalks of different widths or alignments.

4. Form and subgrade inspection by the City, are required before sidewalk is poured.
5. Monolithic pour of curb, gutter and sidewalk will not be allowed.
6. For driveway requirements, see Section 4B.10 herein.

D. Curb and Gutter

Cement concrete curb and gutter shall be used for all street edges unless otherwise approved by the Public Works Director. All curbs and gutters shall be constructed of Class "B" Cement Concrete in accordance with Section 6-02 of the Standard Specifications. Curbs shall be of the vertical face type. No rolled curb and gutter profile will be allowed without specific approval of the Public Works Director. When rolled curbs are approved, all sidewalks within the Plat shall be a minimum 5 inches thick.

Extruded curb and gutter per WSDOT Standard Specifications is allowed only with the specific approval of the City Engineer.

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

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

Sufficient support shall be given to the form to prevent movement in any direction, resulting from the weight of the concrete or the concrete placement. Forms shall not be set until the subgrade has been compacted within one inch of the established grade. Forms shall be clean and well oiled prior to setting in place. When set, the top of the form shall not depart from grade more than one-eighth (1/8) inch when checked with a ten-foot straightedge. The alignment shall not vary more than one-fourth (1/4) inch in ten (10) feet. Immediately prior to placing the concrete, forms shall be carefully inspected for proper grading, alignment and rigid construction. Adjustments and repairs as needed shall be completed before placing concrete.

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

The face form of the curb shall be stripped at such time in the early curing as will enable inspection and correction of all irregularities that appear thereon.

Forms shall not be removed until the concrete has set sufficiently to retain its true shape. The face of the curb shall be trowled with a tool cut to the exact section of the curb and at the same time maintain the shape, grade and alignment of the curb. The exposed surface of the curb shall be brushed with a fiber hair brush.

White pigmented or transparent curing compounds shall be applied to all exposed surfaces immediately after finishing. Transparent curing compounds shall contain a color dye of sufficient strength to render the

film distinctly visible on the concrete for a minimum period of four (4) hours after application.

When the curb section is to be placed separately, the surface of the gutter directly underneath the curb section shall be covered with a protective cover to protect that area from the curing agent when the gutter is sprayed. This cover must remain in place until the curb is placed. Care shall be taken in the placing of this cover to prevent the steel dowels from puncturing the cover.

If, at any time during the curing period any of the forms are removed, a coat of curing compound shall be applied immediately to the exposed surface. The curing compound shall be applied in sufficient quantity to obscure the natural color of the concrete. Additional coats shall be applied if the City Inspector determines that the coverage is not adequate. The concrete shall be cured for the minimum period of 72 hours time set forth in Section 8-04 of the Standard Specifications.

Joints shall be constructed in the manner and at the locations shown in Details SW-1 and SW-2. They shall be cleaned and edged as shown on the drawings. All expansion and contraction joints shall extend entirely through the curb section above the pavement surface. Joint filler in the curb shall be normal to the pavement and in full but contact with pavement joint filler.

E. Handicap Ramps

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

Handicap Ramps shall be constructed of Portland Cement Concrete. Form and subgrade inspection by the City are required before handicap ramp is poured.

F. Survey Staking

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

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

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

Stake top back of curb at a consistent offset for vertical and horizontal alignment every 25 feet (50 feet in tangent sections).

G. Testing

Testing shall be required at the developer's or contractor's expense on all materials and construction as specified in the WSDOT Standard Specifications.

At a minimum, one slump test and 2 test cylinders shall be taken once per day. All other testing frequencies shall be as specified in the Testing and Sampling Table in Section 4B.18.

In addition, the City shall be notified before each phase of sidewalk, curb and gutter construction commences.

4.21 Illumination

A. General

Illumination shall be required unless otherwise directed by the City Council.

4.22 Signals

A. General

Signalization will be required if warranted as determined by an existing study and/or transportation study performed by the Developer at the request of the City. The developer shall pay the entire cost of signalization if signalization is warranted, or wait until the City has procured sufficient monies to cause signalization improvements at the intersection(s).

4.23 Roadside Features

A. General

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

B. Design Standards

The design and placement of roadside features included herein shall adhere to the specific requirements as listed for each feature.

C. Survey Staking

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

A preconstruction meeting shall be held with the City prior to commencing staking. All staking shall be inspected by the City prior to construction, and subject to the City's approval.

D. Testing

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

E. Survey Monuments

1. All existing (or new) survey control monuments and/or markers which are disturbed, lost, or destroyed during surveying or building shall be replaced with the proper monument as outlined in B or C below by a land surveyor currently registered (licensed) in the State of Washington at the expense of the responsible contractor, builder or developer.

2. Street type: Major Arterial or Minor Arterial; Collector Street;

A pre-cast concrete monument with cast iron monument case and cover installed per City of Pacific Standards is required.

If the monument case and cover are placed in cement concrete pavement, the pre-cast base will not be necessary.

3. Street type: Local Access;

A cast-in-place concrete surface monument with sufficient ferrous metal embedded to allow for detection by a magnetic detection device per City of Pacific standards is required.

4. Monument Locations

Appropriate monuments shall be placed:

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

F. Mailboxes

1. During construction, existing mailboxes shall be accessible for the delivery of mail or, if necessary, moved to a temporary location. Temporary relocation shall be coordinated with the local U.S. Postal Service. The mailboxes shall be reinstalled at the original location or to a new location as may be required by the local Postmaster, as further outlined below and approved by the U.S. Postal Service.
2. Location
 - a. Bottom or base of box shall be 36” to 42” above the road surface.
 - b. Front of mailbox 18 inches behind vertical curb face or outside edge of shoulder.
 - c. New developments. Clustered mailboxes will, in all likelihood, be required. Contact the City not the U.S. Postal Service for details. Sidewalks shall be constructed to facilitate same.
 - d. Buck-outs in sidewalks and sidewalk re-alignment may be required per the City Engineer.
3. Mailboxes shall be set on posts strong enough to give firm support but not to exceed 4 x 4 inch wood or one 1-1/2 inch diameter pipe, or material and design with comparable breakaway characteristics. Deviations may be allowed only with the written approval of the City.

G. Guard Rails

For purposes of design and location, all guard rails along roadways shall conform to the criteria of the “Washington State Department of Transportation Design Manual” as may be amended or revised.

H. Rock Walls

1. Rock walls may be used for erosion protection of cut or fill embankments up to a maximum height of 6 feet in stable soil conditions which will result in no significant foundation settlement or outward thrust upon the walls. For heights over 6 feet or when soil is unstable, structural wall of acceptable design stamped by a structural engineer currently licensed in the State of Washington shall be used. Design and construction shall be per the Association of Rockery Contractors (ARC) Specifications and/or applicable geotechnical recommendations. Rock walls over 6 feet high shall be subject to inspection by a geotechnical engineer as outlined in the following paragraph.

Any rock wall over 30 inches high in a fill section shall require an engineered design by a geotechnical engineer. The geotechnical engineer shall continuously inspect the installation of the wall as it progresses and shall submit inspection reports, including compaction

test results and photographs taken during the construction, documenting the techniques used and the degree of conformance to the geotechnical engineer's design.

In the absence of such a rock wall design, walls having heights over 6 feet or walls to be constructed in conditions when soil is unstable require a structural wall having a design approved by the City of Pacific. The design of structural walls shall be by a professional engineer currently licensed in the State of Washington qualified in retaining wall design.

2. The rock material shall be as nearly rectangular as possible. No stone shall be used which does not extend through the wall. The rock material shall be hard, sound, durable and free from weathered portions, seams, cracks and other defects. The rock density shall be a minimum of 160 pounds per cubic foot.
3. The rock wall shall be started by excavating a trench having a depth below subgrade of one half the base course or one foot (whichever is greater).
4. Rock selection and placement shall be such that there will be minimum voids and, in the exposed face, no open voids over 6 inches across in any direction. The final course shall have a continuous appearance and shall be placed to minimize erosion of the backfill material. The larger rocks shall be placed at the base of the rockery so that the wall will be stable and have a stable appearance. The rocks shall be placed in a manner such that the longitudinal axis of the rock shall be at right angles or perpendicular to the rockery face. The rocks shall have all inclining faces sloping to the back of the rockery. Each course of rocks shall be seated as tightly and evenly as possible on the course beneath. After setting each course of rock, all voids between the rocks shall be chinked on the back with quarry rock to eliminate any void sufficient to pass a 2 inch square probe.
5. The wall backfill shall consist of quarry spalls with a maximum size of 6 inches and a minimum size of 4 inches or as specified by a licensed engineer. This material shall be placed to a 12-inch minimum thickness between the entire wall and the cut or fill material. The backfill material shall be placed in lifts to an elevation approximately 6 inches below the top of each course of rocks as they are placed, until the uppermost course is placed. Any backfill material on the bearing surface of one rock course shall be removed before setting the next course.
6. Perforated drainage pipe and filter fabric shall be installed as required by the City.
- I. Street Trees and Landscaping Items

Street trees and/or landscaping items (including irrigation if appropriate) shall be furnished and installed as may be specifically required by the City's Planner. If such is required, landscaping shall be of one of the referenced types as specified herein and/or as

otherwise may be approved by the City Planner. These landscaping items, including trees and irrigation, shall be furnished and installed at the City's sole discretion, direction, and approval. Exact size, spacing, type, location, and quantity to be as specified by the City's Planner.

4.24 Parking Lots

A building permit is required prior to surfacing any unsurfaced designated parking area.

Storm water detention shall be provided and shall follow the criteria as set forth in Chapter 5 of these standards.

Four sets of plans and specifications shall be required to be submitted for review and approval by the City with respect to storm drainage discharge and on site retention or detention, matching street and/or sidewalk grades, access locations, parking layout, and to check for future street improvement conformity and City zoning regulations.

Parking lot surfacing materials shall satisfy the requirement for a permanent all-weather surface. Asphalt concrete pavement and cement concrete pavement satisfy this requirement and are approved materials. Gravel surfaces are not acceptable or approved surface material types. Combination grass/paving systems are approved surface material types, however, their use requires submittal of an overall parking lot paving plan showing the limits of the grass/paving systems and a description of how the systems will be irrigated and maintained. If the City Engineer determines the grass/paving system is not appropriate for the specific application, alternate approved surfacing materials shall be utilized.

4.25 Utilities

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

A. Water Lines

Water lines shall be located as follows:

1. Shoulder-and-Ditch Section (on existing “standard” street sections):
If practical: Outside of ditch line.
Otherwise: In shoulder 3 feet minimum from edge of travel lane.
2. Curb and Gutter Section: 5 feet from centerline. Mains and service connections to all lots should be completed prior to placing of surface materials. A location outside of existing roadway improvements will be considered by the City Engineer based on local conditions. This location, however, must be approved by the City Engineer.
3. Designated side of centerline: North and East.
4. Depth: Per City standards.

B. Sanitary Sewers

Sanitary sewers shall be located 5 feet south and west of centerline; depth approximately 8 feet minimum from finished grade, unless otherwise approved by the City Engineer. Greater depths may be required to serve adjacent properties and tributary properties. Easements shall be provided to facilitate same.

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

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

C. Other Utilities

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

Preferable: Underground, either side of road, at plan location and depth compatible with other utilities and storm drains.

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

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

D. Utility Crossings in Existing Streets

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

4.26 Asphalt Concrete Pedestrian Paths and/or Bikeways

- a. Minimum Easement or Right-of-Way Width: Fifteen feet minimum. Twenty feet preferred. Unless otherwise approved by City Engineer.
- b. Construction Width. Five feet *minimum*. Greater widths may be required by City up to 12 feet maximum.
- c. Subgrade. Prepared per Section 2.06 of APWA.
- d. Bankrun Gravel, Class A. As required.
- e. Crushed Rock Base Course one and one-half inch minus. One and one-half inch minimum depth. Greater depths may be required by City Engineer based on use and local ground conditions.
- f. Crushed Rock Top Course five-eighths inch minus. One and one-half inch minimum depth. Greater depths may be required by City Engineer based on use and local ground conditions.
- g. Paving Course. One and one-half inch asphalt concrete. Class "B" depth. Greater depths may be required by City Engineer based on use and local ground conditions.

SECTION 5**5. STORM DRAINAGE STANDARDS****5.01 General**

The standards established by this chapter are intended to represent the **minimum** standards for the design and construction of storm drainage facilities. Greater or lesser requirements may be mandated by the City due to localized conditions. Storm drainage revisions, additions, modification, or changes shall be made in compliance with City standards, ordinances, and Best Management Practices as identified by the State Department of Ecology. Adequate provisions shall be made for storm drainage, storm sewers, and associated appurtenances sufficient to transmit maximum seasonal flows and one hundred year flood waters characterized by the area.

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

5.02 Design Standards

On-site detention systems shall be provided to ensure that stormwater flow rates following development do not exceed the pre-development ratio. The design of storm drainage and detention system shall depend on their type and local site conditions. The design elements of storm drainage systems shall conform to City Standards as set forth herein. The following design considerations shall apply:

- A. The use of commercial parking lots for detention of stormwater will be reviewed by the City Engineer and approved or denied based on the design, location and general parameters of the project. The detention area shall be situated away from areas of pedestrian movement unless means for rapid closing of the areas is incorporated in the design. The maximum depth of water in parking lot storage shall be limited to 6 inches. Curbs cannot be used for retaining storage.
- B. Maximum catch basin spacing shall be 200 feet on road grades up to 3%, 300 feet when the road grade is 3% or greater and 500 feet maximum on main storm drains between access structures, whether catch basins or manholes. No surface water (unless otherwise approved in writing by the City Engineer) shall cross any roadway. In addition, catch basins shall be placed whenever the length of surface drainage exceeds 300 feet on road grade, extending either direction from crest or sag on vertical curves. Vaned grates shall be employed on street grades exceeding 6% slope.
- C. Plans for storm drainage shall indicate where the stormwater will be discharged. If the proposed development will increase the amount of storm runoff, it must be shown that the pipes and channels downstream

from the discharge point (a minimum of 1/4 mile) can carry the increased runoff without damage to the adjoining properties or surcharging of the system. Wherever possible, provisions should be made for detainage and/or retainage of stormwater in order to decrease the amount of storm runoff and, more importantly, to decrease the peak runoff volume.

- D. Where storm drains run outside an existing public right-of-way, permanent easements will be required for public or private maintenance as may be required and warranted. Such easement shall be a minimum of 15 feet in width unless otherwise approved or required by the City. Where the City is to maintain the storm drain, a permanent easement will be required having a minimum width of 15 feet. A construction (temporary) easement of suitable width shall also be provided.
- E. Storm Drain Detention Systems shall be, at a minimum, designed and constructed in strict compliance with the currently adopted King/Pierce County or Surface Water Review Manual, and any amendments thereto. Local prevailing conditions may warrant higher standards as determined by the City Engineer. The Developer and/or Homeowners Association shall enter into a formal, legally binding agreement, as approved by the City Attorney, regarding the landowner's duties and obligations regarding their ownership, operation and maintenance of the system.
- F. The General Notes, numbered 1 thru 10, as shown and further referenced herein shall be included or referenced on any plans submitted to the City for construction approval dealing with storm system design.

GENERAL NOTES (STORM DRAIN CONSTRUCTION)

1. All workmanship and materials shall be in accordance with City of Pacific Standards and the most current copy of the State of Washington Standard Specifications for Road, Bridge and Municipal Construction (WSDOT).
2. Temporary erosion/water pollution measures shall be required in accordance with Section 1-07.15 of the Standard Specifications.
3. Comply with all other permits and other requirements by the City of Pacific or other governing authority or agency as may be applicable.
4. A preconstruction meeting shall be held with the City prior to the start of construction.
5. All storm mains and retention/detention areas shall be staked for grade and alignment by an engineering or surveying firm capable of performing such work, and currently licensed in the State of Washington to do so.
6. Storm drain pipe shall meet the following requirements:

- A. Plain concrete pipe conforming to the requirements of AASHTO M 86, Class 2.
 - B. Reinforced concrete pipe conforming to the requirements of AASHTO M 170.
 - C. PVC pipe shall conform to ASTM D 3034-73 SDR 35 for 4" thru 15" diameter PVC pipe, and shall conform to ASTM F 679 for 18" thru 27" diameter PVC pipe, with joints and gaskets conforming to ASTM D 3212 and ASTM F 477.
 - D. Ductile iron pipe conforming to the requirements of ANSI A21.51, and AWWA C 151, thickness class as approved by City Engineer.
 - E. Polyethylene smooth wall pipe per Advanced Drainage Systems (ADS) N-12, bell and spigot, constructed per WSDOT Standard Specifications 7-04. Note: This type of pipe will only be approved with the City's specific written approval. Approval shall be based on site specific conditions and if additional on-site inspection time for witnessing proper pipe installation can be scheduled by the City.
- 7. Special structures, oil/water separators and outlet controls shall be installed per plans and manufacturers recommendations.
 - 8. Provide traffic control plan(s) as required in accordance with MUTCD.
 - 9. Call underground locate line 1-800-424-5555 minimum 48 hours prior to any excavations.
 - 10. Where connections require "field verifications", connection points will be exposed by contractor and fittings verified 48 hours prior to distributing shut-down notices.
 - 11. Storm drain pipelines shall be installed to the far property line(s) to serve adjacent tributary areas a may be warranted. They shall be appropriately sized to accommodate flows as further identified herein. Pipes shall be designed to facilitate a minimum 3 feet/second flow unless otherwise approved by the City Engineer.

5.03 Conveyance

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

The minimum pipe size shall be 12 inches diameter. Runoff shall be computed and, if the flow requires it, a larger pipe shall be used. Nothing shall preclude the City from requiring the installation of a larger sized main if the City determines a larger size is needed to serve adjacent areas or for future service.

Storm drain gradients shall be such as to assure minimum flow

velocity of three feet per second when flowing full.

All pipe for storm mains shall be "pre-approved" by the City's Engineer based on localized conditions and comply with one of the following types:

Polyvinyl Chloride: PVC pipe shall conform to ASTM D 3034, SDR 35 or ASTM F 789 with joints and rubber gaskets conforming to ASTM D3212 and ASTM F477.

Plain Concrete: Plain concrete pipe per WSDOT Standard Specifications as set forth in Section 7-04.

Reinforced Concrete: Reinforced concrete pipe per WSDOT Standard Specifications as set forth in Section 7-04.

Ductile Iron: Ductile iron pipe shall conform to AWWA C151 Class 50 and have a cement mortar lining conforming to AWWA C 104. All pipes shall be joined using non-restrained joints which shall be rubber gaskets, push on type or mechanical joint, conforming to AWWA C 111.

Polyethylene: PE smooth wall pipe per Advanced Drainage Systems (ADS) N-12 (bell and spigot), or City approved equal, constructed per WSDOT Standard Specifications 7-04. See Note above.

Corrugated Metal: Zinc-coated (galvanized) corrugated iron or steel pipe shall be coated uniformly with asphalt.

5.04 Connections

Connections of storm drain pipe leading from an existing street inlet location may be made into an existing main storm drain only with a new structure, subject to case-by-case review and approval of the City Engineer or Public Works Field Inspector/Superintendent and subject to the following additional requirements:

1. The inletting structure shall be a catch basin and not a simple inlet lacking a catch or drop section.
2. Length of inlet connection shall be as approved by the City Engineer.

5.05 Survey Staking

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

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

the City prior to construction.

The minimum staking of storm sewer systems shall be as follows:

- A. Stake centerline alignment every 25 feet with cuts and/or fills to bottom of trench.
- B. Stake location of all catch basins/manholes and other fixtures for grade and alignment.
- C. Stake location, size and depth of retention/detention facility.
- D. Stake finished grade of catch basin/manhole rim elevation and invert elevations of all pipes in catch basins, manholes, and those that daylight.

5.06 Trench Excavation

- A. Clearing and grubbing where required shall be performed within the easement or public right-of-way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the owner or contractor in accordance with the terms of all applicable permits.
- B. Trenches shall be excavated to the line and depth designated by the City to provide a minimum of 24 inches of cover over the pipe. Except for unusual circumstances where approved by the City, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency and in compliance with all safety requirements of the prevailing agencies. See Detail. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench. The Contractor shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.
- C. The contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below storm line grade. Where materials are removed from below the pipeline grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted.
- D. Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without specific written approval of the City, and shall be in conformance with Washington Industrial Safety and Health Administration (WISHA) and Office of Safety and Health Administration (OSHA) Safety Standard.

- E. The bedding course shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to facilitate the construction of pipe joints.

5.07 Bedding

Gravel backfill for pipe bedding shall be installed in conformance with Section 2-09 of the Standard Specifications (WSDOT). See Detail.

Bedding for Rigid Pipe (Concrete or Ductile Iron Pipe):

Gravel backfill for rigid pipe bedding shall consist of crushed, processed, or naturally occurring granular material. It shall be essentially free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and shape that it will compact readily and shall meet the following specifications for grading and quality:

<u>Sieve Size</u>	<u>Percent Passing*</u>
3/4" Square	100
3/8" Square	95-100
U.S. No. 8	0-10
U.S. No. 200	0-3
Sand Equivalent	35 MIN.

*All percentages are by weight.

Bedding for Flexible Pipe (P.V.C. pipe):

Gravel backfill for flexible pipe (P.V.C. pipe) bedding shall consist of crushed, processed, or naturally occurring granular material. It shall be essentially free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and shape that it will compact readily and shall meet the following specifications for grading and quality:

<u>Sieve Size</u>	<u>Percent Passing*</u>
3/4" Square	100
3/8" Square	95-100
U.S. No. 8	0-10
U.S. No. 200	0-3
Sand Equivalent	35 MIN.

*All percentages are by weight.

Native Material shall not be used for bedding, unless approved by the Engineer.

Bedding for Flexible Pipe (H.D.P.E. pipe):

Bedding material for flexible pipe shall be a clean gravel mixture free from organic matter and conforming to the following gradation:

<u>Sieve Size</u>	<u>Percent Passing*</u>
3/4" Square	100
3/8" Square	70-100
U.S. No. 4	55-100
U.S. No. 10	35-95
U.S. No. 20	20-80
U.S. No. 40	10-55
U.S. No. 100	0-10
U.S. No. 200	0-3

*All percentages are by weight.

5.08 Backfilling

Backfilling and surface restoration shall closely follow installation of pipe so that not more than 100 feet is left exposed during construction hours without approval of the City. Selected material shall be placed and compacted around and under the storm drain by hand tools. Special precautions should be provided to protect the pipe to a point 12 inches above the crown of the pipe. The remaining backfill shall be compacted to 95 percent of the maximum density in traveled areas, 90 percent outside driveway, roadways, road prism, shoulders, parking or other traveled areas. Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction. Typically, trench sections crossing existing roadways, in roadway "prisms" or beneath traffic bearing areas shall be backfilled and compacted with 5/8-inch minus crushed rock. Due to localized conditions, the City may allow/permit the backfill of the trench section with suitable excavated material, as determined by the City, or if this material is not available from trenching operations, the City may order the placing and compaction of gravel base conforming with Section 9-03.10 of the Standard Specifications (WSDOT) for backfilling the trench. All excess material shall be loaded and hauled to waste.

5.09 Street Patching and Restoration

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

SECTION 6**6. SANITARY SEWER STANDARDS****6.01 General**

The standards established by this chapter are intended to represent the **minimum** standards for the design and construction of sanitary sewer facilities. Greater or lesser requirements may be mandated by the City due to localized conditions. Washington State Department of Ecology's Design Standards shall also be employed by the City in its review and approval of system connections, extensions, and/or modifications.

"Off-site" improvements may be warranted based on (1) the existing condition and capacity of the existing sanitary infrastructure and, (2) impacts caused by the proposed development. These off-site improvements (in addition to "on-site" improvements as may be warranted) will be as determined by the City Engineer so as to reasonably mitigate impacts caused by development.

The following design and construction considerations shall apply:

6.02 Design Standards

The design of sanitary sewer systems shall be dependent on local site conditions. The design elements of sanitary sewer systems shall conform to minimum City Standards set forth herein and follow current design practice as further set forth in Section 6.01 through 6.17.

- A. 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. These plans shall be separate from water plans.
- B. Project plans should have a horizontal scale of not more than 50 feet to the inch and a vertical scale of not more than 5 feet to the inch. Plan views shall be drawn to a corresponding horizontal scale. Plans and profiles shall show:

Locations of streets, right-of-ways, existing utilities, and sewers.

Ground surface, pipe type, class and size, manhole stationing, invert and surface elevation at each manhole, and grade of sewer between adjacent manholes. All manholes shall be numbered on the plans and correspondingly numbered on the profile. Where there is any question of the sewer being sufficiently deep to serve any residence, the elevation and location of the basement floor, if basements are served, shall be plotted on the profile of the sewer which is to serve the house in question. The Developer shall state that all sewers are sufficiently deep to serve adjacent basements, except where

otherwise noted on the plans.

All known existing structures, both above and below ground, which might interfere with the proposed construction, particularly water mains, gas mains, storm drains, overhead and underground power lines, telephones lines, and television cables.

All utility easements, including County recording numbers.

Details in scale drawings which clearly show special sewer joints 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.

- C. Construction of new sewer systems or extensions of existing systems will be allowed only if the existing receiving system is capable of supporting the added hydraulic load. Sewers shall be extended to the far property line(s) to facilitate future extensions of same.
- D. Collection and interceptor sewers shall be designed and constructed for the ultimate development of the tributary areas.
- E. Sewer systems shall be designed and constructed to achieve total containment of sanitary wastes and maximum exclusion of infiltration and inflow.
- F. Computations and other data used for design of the sewer system shall be submitted to the City for approval.
- G. The sewage facilities shall be constructed in conformance with the 1998, Standard Specifications for Road, Bridge, & Municipal Construction, and current amendments thereto, State of Washington, revised as to form to make reference to Local Governments, and as modified by any special City requirements and standards.
- H. Material and installation specifications shall contain appropriate requirements that have been established by the industry in its technical publications, such as ASTM, AWWA, WPCF, UPC and APWA standards. Requirements shall be set forth in the specifications for the pipe and methods of bedding and backfilling so as not to damage the pipe or its joints, impede cleaning operations and future tapping, nor create excessive side fill pressure or ovalation of the pipe, nor seriously impair flow capacity.
- I. All sewers shall be designed to prevent damage from superimposed loads. Proper allowance for loads on the sewer because of the width and depth of trench should be made. When standard-strength sewer pipe is not sufficient, extra-strength pipe shall be used.

- J. All pipe shall be laid in straight lines and at uniform rate of grade between manholes. Variance from established line and grade shall not be greater than one-half inch (1/2"), provided that such variation does not result in a level of reverse sloping invert; provided, also, that variation in the invert elevation between adjoining ends of pipe, due to non-concentricity of joining surface and pipe interior surfaces, does not exceed one-sixty-fourth inch (1/64") per inch of pipe diameter, or one-half inch (1/2") maximum. Any corrections required in line and grade shall be reviewed with the City and/or the City Engineer and shall be made at the expense of the Developer and/or Contractor.
- K. Deflection tests shall be performed on all PVC sewer mains and the deflection test limit shall be 5.0 percent of the base inside diameter of the pipe.
- L. Prior to final inspection, all pipelines shall be tested, flushed and cleaned and all debris removed. A pipeline "cleaning ball" of the proper diameter for each size of pipe shall be flushed through all pipelines prior to final inspection. Hydrant meters shall be acquired (deposit required) from the City and utilized by the Contractor for all water withdrawn from the City of Pacific's system for flushing purposes.
- M. Before sewer lines are accepted, the Contractor/Developer shall perform a complete televised inspection of the sewer pipe and appurtenances and shall provide to the City an audio-visual tape recording of these inspections. All equipment and materials shall be compatible with existing City equipment. It shall be the Contractor/Developer's responsibility to confirm equipment compatibility with the City prior to inspection.
- N. At all times during the televised inspection process, the City's Utility Superintendent and/or his designated representative shall be present. The City's Utility Superintendent shall be notified forty-eight (48) hours prior to any televised inspection.
- O. After all other work is completed and before final acceptance, the entire roadway, including the roadbed, planting, sidewalk areas, shoulders, driveways, alley and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades and cross sections for a new roadway consistent with the original section.
- P. 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 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.

6.03 General Requirements

1. Prior to construction, the sewer plans shall be reviewed and approved by the Department of Ecology and an affidavit stating such be on file at the City’s Public Works Department.
2. Prior to construction, the Contractor shall notify the City for a pre-construction meeting.
3. Work shall be performed only by licensed and bonded contractors with a demonstrated experienced in laying public sewer mains of the type being proposed for construction.
4. Prior to any work being performed, the Contractor shall contact the Public Works Director or City Engineer to set forth his proposed schedule.
5. Contractor shall obtain approval of materials to be used from the City prior to ordering or delivery of materials.
6. Sewer main shall be laid only in dedicated streets or in easements which have been exclusively granted to the City. A street is normally not officially recognized until the plat which created it has been filed (recorded) with the County Auditor.
7. The sewer main shall run parallel to and 5 feet southerly or westerly of street centerline where possible. The sewer main shall maintain a minimum 10 foot horizontal separation from proposed or existing water mains.
8. The maximum distance between manholes shall be 400 feet unless specifically approved otherwise by the City Engineer.
9. PVC pipe shall be a minimum Class S.D.R. 35 and be manufactured in accordance with ASTM D3034. Ductile iron pipe shall be Class 52 conforming to AWWA C151 and C104.
10. The allowable cover (finished grade) for the various types of pipe are:

PVC Pipe:	3’ to 25’
D.I. Pipe (CL 52):	<3’ (if allowed)
	25’ & above
	Slopes of 18 percent or greater

All pipe shall have a minimum of thirty six (36) inches of cover (18” in the case of a side sewer on private property). The City reserves the right to require a minimum of three feet of cover unless topography, existing facilities or other future improvements prohibit this minimum cover for installation.

11. The minimum slope for 8" gravity mains shall be 0.5% (except the minimum slope for dead end runs shall be 1.0% for 8" gravity mains) and the minimum slope for 6" side sewer laterals shall be 2.0%.
12. All side sewer laterals shall be of the same material as the main line.
13. Each side sewer lateral shall be equipped with a 6" x 6" tee, with an approved water-tight cap, located adjacent to, but within, the public right-of-way, to be utilized as a clean-out. When required by the City's Inspector and/or City Engineer, a watertight six-inch capped stub shall be installed which extends vertically from the 6" x 6" tee to within 18 inches of finished grade.
14. 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.
15. Each side sewer lateral shall have a twelve (12) foot long 2" x 4" wood "marker" at the termination of the stub. The "marker" shall extend from the bottom of the trench to 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" high.
16. Front lot corners shall be staked by a surveyor prior to construction for side sewer tee location(s).
17. Side sewers shall generally be located at the lowest property corner and located a minimum of 10 feet from the side lot line and extend a minimum of 10 feet past the street right-of-way line (or property line).
18. Side sewer connections if allowed directly into manholes shall be constructed to match the sewer main crown (outlet) and the manhole channeled accordingly.
19. Manholes, where sewer extension may occur, shall be provided with knock-outs and channeled accordingly.
20. Manholes shall be provided with a 0.10 foot drop across the channel. Pre-channeled manholes are not allowed.
21. 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. See Standard Detail.
22. Concrete collars shall be placed around all frames per the Standard Detail for manholes located in non-paved areas.
23. Pipe connections to manholes shall be as follows:

PVC Pipe: Cast or grout a watertight manhole coupling (see detail) into manhole wall.

D.I. Pipe: Bell and spigot joint or flexible coupling, either shall be 12" maximum distance from manhole wall.

PVC and D.I. pipe, optional: Core the manhole and connect sewer pipe with a water-tight flexible rubber boot in manhole wall, Kor-N-Seal boot or equal.

- 24. Provide the City’s Engineer and City Inspector a copy of the cut sheets prior to construction.
- 25. Pipe trenches shall not be backfilled until pipe and bedding installation have been inspected and approved by the City’s Inspector.
- 26. Final air testing shall not be accepted until after the finished paving is accomplished, all other underground utilities have been installed, and the lines have been flushed, cleaned, and deflection tested.
- 27. Manhole rim and invert elevations shall be field verified after construction by the Developer’s engineer(s) and the “record” drawings individually stamped by a Washington State licensed professional engineer or surveyor who shall attest to the fact that the information is correct.

6.04 Materials and Testing

A. Sewer Mains, Laterals And Force Mains

Sewer mains to be installed shall be of material noted below:

Gravity Sewer and Laterals:

PVC Pipe:	3’-25’ Cover
DI Pipe (Class 52):	<3’ Cover (if allowed)
	25’ and Over
	Slopes of 18 percent or greater

Force Main:

DI Pipe Class 52

Gravity PVC pipe (15” diameter and smaller) shall be a minimum Class SDR 35 and be manufactured in accordance with ASTM D3034. The pipe and fittings shall be furnished with bells and spigots which are integral with the pipe wall. Pipe joints shall use flexible elastomeric gaskets conforming to ASTM D3212. Nominal laying lengths shall be 20 feet and 13 feet.

The ductile iron pipe shall conform to ANSI/AWWA C151/A21.51-91 Standards, and current amendments thereto, except the ductile iron pipe shall be thickness Class 52 for gravity sewers and Class 52 for force mains. Grade of iron shall be a minimum of 60-42-10. The pipe shall be cement lined to a minimum thickness of 1/16”, and the exterior shall be coated with an asphaltic coating. Each length shall be plainly marked with the manufacturer’s identification, year case, thickness, class of pipe and weight.

Type of joint shall be mechanical joint or push-on type, employing a single gasket, such as “Tyton”, except where otherwise calling for flanged ends.

Bolts furnished for mechanical joint pipe and fittings shall be high strength ductile iron, with a minimum tensile strength of 50,000 psi.

Restrained joint pipe, where required shall be push-on joint pipe with "Fast Tight" gaskets as furnished by U.S. Pipe or equal for 12" diameter and smaller pipe and "TR FLEX" as furnished by U.S. Pipe or equal for 16" and 24" diameter pipes. Mechanical joint pipe with retainer glands (grip rings) as manufactured by "Romac" may also be required at the discretion of the City. The restrained joint pipe shall meet all other requirements of the non-restrained pipe.

All pipe shall be jointed by the manufacturer's standard coupling, be all of one manufacturer, be carefully installed in complete compliance with the manufacturer's recommendations.

All fittings shall be short-bodied, ductile iron complying with applicable ANSI/AWWA C110 or C153 Standards for 350 psi pressure rating for mechanical joint fittings and 250 psi pressure rating for flanged fittings. All fittings shall be cement lined and either mechanical joint or flanged, as indicated on the Plans.

Fittings in areas shown on the Plans for restrained joints shall be mechanical joint fittings with a mechanical joint restraint device. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1 and shall be EBAA Iron, Inc., MEGALUG, or ROMAC "Grip Ring", as required and approved by the City Engineer.

All couplings shall be ductile iron mechanical joint sleeves.

The sewer pipe, unless otherwise approved by the Public Works Director and/or City Engineer, shall be laid upgrade from point of connection on the existing sewer or from a designated starting point. The sewer pipe shall be installed with the bell end forward or upgrade. When pipe laying is not in progress, the forward end of the pipe shall be kept tightly closed with an approved temporary plug. Wherever movable shoring (steel box) is used in the ditch, pipe shall be restrained by use of a winch mounted in the downstream manhole and a line of sufficient strength threaded through the pipe and set tight before each move. Any indication that joints are not being held shall be sufficient reason for the City to require restraints, whether or not movable shoring is being used.

All pipe shall be laid in straight lines and at uniform rate of grade between manholes. Variance from established line and grade shall not be greater than one-half inch (1/2"), provided that such variation does not result in a level of reverse sloping invert; provided, also, that variation in the invert elevation between adjoining ends of pipe, due to non-concentricity of joining surface and pipe interior surfaces, does not exceed one-sixty-fourth inch (1/64") per inch of pipe diameter, or one-half inch (1/2") maximum. Any corrections required in line and grade shall be reviewed with the City Utilities Superintendent and/or City Engineer and shall be made at the expense of the Developer.

All extensions, additions and revisions to the sewer system, unless otherwise indicated, shall be made with sewer pipe jointed by means of a flexible gasket which shall be fabricated and installed in accordance with the manufacturer's specifications.

All joints shall be made up in strict compliance with the manufacturer's recommendations and all sewer pipe manufacture and handling shall meet or exceed the ASTM and CPAW recommended specifications, current revisions.

Pipe handling after the gasket has been affixed shall be carefully controlled to avoid disturbing the gasket and knocking it out of position, or loading it with dirt or other foreign material. Any gaskets so disturbed shall be removed, cleaned, relubricated if required, and replaced before the rejoining is attempted. Care shall be taken to properly align the pipe before joints are entirely forced home. During insertion of the tongue or spigot, the pipe shall be partially supported by hand, sling or crane to minimize unequal lateral pressure on the gasket and to maintain concentricity until the gasket is properly positioned. Since most flexible gasketed joints tend to creep apart when the end pipe is deflected and straightened, such movement shall be held to a minimum once the joint is home.

Sufficient pressure shall be applied in making the joint to assure that it is home, as described in the installation instructions provided by the pipe manufacturer. Sufficient restraint shall be applied to the line to assure that joints once home are held so, until fill material under and alongside the pipe has been sufficiently compacted. At the end of the work day, the last pipe laid shall be blocked in an effective way to prevent creep during "down time."

For the joining of dissimilar pipes suitable adapter couplings shall be used which have been approved by the City Inspector and/or the Engineer.

All gravity sewer pipe shall be bedded with pea gravel. The PVC pipe shall be bedded from a depth of four (4) inches below the pipe to eight (8) inches above the pipe and ductile iron gravity sewer pipe shall be bedded from a depth of four (4) inches below the pipe to the springline of the pipe. The bedding material shall extend across the full width of the trench and shall be compacted under the haunches of the pipe.

Special concrete bedding shall consist of a pipe cradle constructed of Portland cement concrete containing not less than four (4) sacks of cement per cubic yard. Sand, gravel and water proportions are subject to approval by the Engineer. Maximum aggregate size shall be 1-1/2". Maximum slump shall be 4". The bottom of the trench shall be fully compacted before the placement of pipe cradle. The Contractor shall protect pipe against flotation and disturbing the horizontal alignment of the pipe during the pouring of the concrete. (Washington State Department of Transportation Standard Specifications for "Class A" concrete bedding will be acceptable.)

Clay or Bentonite dams shall be installed across the trench and to the full depth of the granular material in all areas of steep slopes, stream crossings and wetland to prevent migration of water along the pipeline.

All backfill shall be placed and compacted in accordance with City, County, or State requirements as may be applicable and copies of the compaction results shall be provided to the City Engineer.

B. Manholes

Manholes shall be of the offset type and shall be precast concrete sections with either a cast in place base, or a precast base made from a 3,000 psi structural concrete. Joints between precast wall sections shall be confined O-ring or as otherwise specified.

For connections to existing systems, a concrete coring machine, suitable for this type of work, shall be utilized in making the connection. The existing manhole shall be rechanneled as required. The new pipe connection shall be plugged (water tight) until the new pipe system has been installed and approved. The Contractor shall be responsible for any existing defects in the existing manhole unless these defects are witnessed by a representative of the City prior to any work being performed to make the connection. The Contractor shall be required to remove any and all deleterious material in the existing manhole and downstream reaches as a result of his/her work.

1) Manhole Sections

Manhole sections shall be placed and aligned so as to provide vertical sides and vertical alignment of the ladder steps. The completed manhole shall be rigid, true to dimension, and be water tight. Rough, uneven surfaces will not be permitted.

The mortar used between the joints in the precast sections and for laying manhole adjusting bricks shall be composed of one part cement to two parts of plaster sand. All joints shall be thoroughly wetted and completely filled with mortar, smoothed both inside and outside to insure water tightness.

Masonry units (manhole adjusting brick) shall conform to the ASTM C-32, Grade MA. The outside and inside of manhole adjusting bricks and the joints of precast concrete sections shall be plastered and troweled smooth with 1/2" (minimum) of mortar in order to attain a watertight surface.

2) Manhole Steps

Manhole steps shall be polypropylene, Lane International Corp. No. P13938 or equal. Ladders (maximum 3 foot length) shall be polypropylene Lane International Corp. or equal, and shall be compatible with steps.

3) Grade Adjustment

Where work is located in public right of way, not less than 18" or more than 26" shall be provided between the top of the cone or slab and the top of the manhole frame.

4) Channels

Channels shall be field poured and made to conform accurately to the sewer grade and shall be brought together smoothly with well rounded junctions, satisfactory to the City Inspector. The channels shall be field poured after the inlet and outlet pipes have been laid and firmly grouted into place at the proper elevation. Allowances shall be made for a one-tenth foot (0.1') drop in elevation across the manhole in the direction of flow. Channel sides shall be carried up vertically from the invert to three-quarters of the diameter of the various pipes. The concrete shelf shall be warped evenly and sloped 3/8" per foot to drain. Rough, uneven surfaces will not be permitted. Channels shall be constructed to allow the installation and use of a mechanical plug or flow meter of the appropriate size.

5) Drop Manholes

Drop manholes shall, in all respects, be constructed as a standard manhole with the exception of the drop connection as further detailed herein.

6) Lift Holes and Steel Loops

All lift holes shall be completely filled with expanding mortar, smoothed both inside and outside, to insure water tightness. All steel loops shall be removed, flush with the manhole wall. The stubs shall be covered with mortar and smoothed. Rough, uneven surfaces will not be permitted.

7) Frames and Covers:

Frames and covers shall be ductile iron. Castings shall be free of porosity, shrink cavities, cold shuts or cracks, or any surface defects which would impair serviceability. Repair of defects by welding, or by the use of "smooth-on" or similar material, will not be permitted. Frames and covers shall be machine finished or ground on seating surfaces so as to assure non-rocking fit in any position and interchangeability of covers. Frames and covers shall be provided with three bolt locking lids. Rings and covers shall be positioned so one of the three locking bolts is located over the manhole steps and shall be adjusted to conform to the final finished surface grade of the street or easement to the satisfaction of the City or agent for the City. Manhole frames and covers shall be as manufactured by "Sather" Manufacturing Company, Model No. 6024-R, or City approved equal.

C. Side Sewer Lateral

A side sewer lateral is considered to be that portion of a sewer line that will be constructed between a main sewer line and a property line or easement limit line.

All applicable specifications given herein for sewer construction shall be held to apply to side sewer laterals.

Side sewers shall be for a single connection only and be a minimum six inch (6") diameter pipe. Side sewers shall be connected to the tee, provided in the sewer main where such is available, utilizing approved fittings or adapters. The side sewer shall rise at a maximum of 45° and a minimum of 2%, from the sewer main.

Where there are no basements, the minimum side sewer depth shall be six (6) feet below existing curb line and five (5) feet below ground at the property line, except where existing improvements, proposed improvements or topography may dictate additional depth. The elevations of the side sewer connections shall be of sufficient depth to serve all existing and potential future basements.

The Contractor shall provide for each 6 inch side sewer service a twelve (12) foot long 2 inch x 4 inch wooden post which extends from the invert of the end of the 6 inch pipe to above the existing ground. The exposed area of this post shall be painted white and shall have selected thereon in two inch letters (black paint) "S/S" and shall also indicate the depth of the sewer service stub from finished grade.

Where no tee or wye is provided or available, connection shall be made by machine-made tap and saddle, only with specific written authorization of the City. The City shall review the exact location and material, list in its evaluation.

The maximum bend permissible at any one fitting shall not exceed forty-five degrees (45°). The maximum bend of any combination of two adjacent fittings shall not exceed 45° unless straight pipe of not less than three (3) feet in length is installed between such adjacent fittings, or unless one of the fittings is a wye branch with a cleanout provided on the straight leg.

D. Private Side Sewers

Private side sewers are the extension of side sewer laterals located outside of the public rights-of-way or easements granted to the City of Pacific.

1. Side sewer pipe located on private property shall be 4" (larger if specifically approved by the City), ductile iron or PVC ASTM D3034 pipe, and shall be installed at a 2% minimum grade (1/4 inch fall per foot). Construction on private property may be performed by owner, but requires a permit and approval by the City.
2. Pipe shall be bedded with pea gravel or clean free draining sand.
3. Six inch sewer pipe is required in the street right-of-way and shall have a 2% minimum grade. Construction in street rights-of-way shall be performed by a licensed side sewer contractor and requires a permit.
4. Side sewer shall be inspected by the City's Representative / Inspector prior to backfilling. Side sewer shall be plugged and tested in the presence of the City Inspector by filling with

water. Leakage rate shall not exceed 0.31 gal./hr. for 4 inch pipe and 0.47 gal./hr. for 6 inch pipe, per 100 feet of pipe.

5. On private property, minimum cover shall be 18" over top of pipe from the point which is 30" out from house and continuing to the connection with the City's sewer system.
6. Parallel water and sewer lines shall be 10 feet apart horizontally wherever possible and have a vertical separation of 18" if a vertical crossing is necessary.
7. No more than 100 feet is allowed between cleanouts. Cleanouts are required for bends equal to or greater than 45°. Cleanout shall be a watertight plugged gasketed tee or wye lateral.
8. All pipe joints shall be rubber gasket type.
9. Provide "grease trap" of a size and type approved by the City at all such locations as may be deemed necessary by the City.

E. Testing Gravity Sewers For Acceptance

The Contractor and/or Developer shall furnish all facilities and personnel for conducting tests under the observation of the City Engineer or City Inspector. Methods other than Part "B" shall be subject to the approval of the Public Works Director and/or City Engineer.

1. Preparation for Testing for Leakage

The Contractor and/or Developer shall be required, prior to testing, to clean and flush all gravity sewer lines with an approved cleaning ball and clean water. The completed gravity sewer, including side sewer stubs, after completion of backfill and cleaning shall be televised inspected. This will be permitted prior to paving. The sewer shall then be tested by the low pressure air test method and/or an infiltration test but only after all utilities are installed and the project paved. Except, however, that in certain conditions an exfiltration test may be required by the City Utilities Superintendent and/or City Engineer.

The first section of pipe not less than 300' in length installed by each crew shall be tested, in order to qualify the crew and/or the material. A successful installation of this first section shall be a prerequisite to further pipe installation by the crew. At the Contractor's option, crew and/or material qualification testing may be performed at any time during the construction process after at least two (2) feet of backfill has been placed over the pipe.

Before the test is performed, the pipe installation shall be cleaned. The Contractor shall furnish an inflatable diagonally ribbed rubber ball of a size that will inflate to fit snugly into the pipe to be tested. The ball may, at the option of the Contractor, be used without a tag line, or a rope or cord may be fastened to the ball to enable the Contractor to know and control its position at all times. The ball shall be placed in

the last cleanout, or manhole on the pipe to be cleaned, and water shall be introduced behind it.

The ball shall pass through the pipe with only the pressure of the water impelling it. All debris flushed out ahead of the ball shall be removed at the first manhole where its presence is noted. In the event cemented or wedged debris, or a damaged pipe shall stop the ball, the Contractor and/or Developer shall remove the obstruction, and/or repair any damaged pipe. All visible leaks showing flowing water in pipelines or manholes shall be stopped even if the test results fall within the allowable leakage. The cleaning shall be carried out in such a manner to not infiltrate existing facilities. Precautions shall be taken to prevent any damage caused by cleaning and testing. Any damage resulting shall be repaired by the Contractor and/or Developer at his own expense. The manner and time of testing shall be subject to approval of the City Utilities Superintendent and/or the City Engineer.

2. Low Pressure Air Test

The sewer pipe shall be tested for leaks through the use of air (unless method “C” and “D” are approved) in the following manner:

Immediately following the pipe cleaning and televised inspection, the pipe installation shall be tested with low pressure air. Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any ground water that may submerge the pipe. At least two minutes shall be allowed for temperature stabilization before proceeding further.

The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease from 3.5 to 2.5 pounds per square inch greater than the pipe section’s average adjacent groundwater back pressure.

The pipeline shall be considered acceptable, when tested at an average pressure of 3.0 pounds per square inch greater than the pipe section’s adjacent groundwater back pressure if the total rate of air loss from any section tested in its entirety between manholes, cleanouts or pipe ends does not exceed the following table:

		Length of 6” Pipe (ft)								
		0	50	100	150	200	250	300	350	400
0	0	0	0:40	1:20	1:58	2:38	3:18	3:58	4:38	5:16
50	1:10	1:50	2:30	3:10	3:48	4:28	5:08	5:48	5:56	
100	2:20	3:00	3:40	4:20	5:00	5:38	6:14	6:12	6:08	
150	3:32	4:10	4:50	5:30	6:10	6:30	6:26	6:22	6:18	
200	4:42	5:22	6:00	6:40	6:44	6:38	6:34	6:30	6:26	
250	5:52	6:32	6:48	6:58	6:50	6:44	6:40	6:36	6:32	
300	7:02	7:20	7:10	7:02	6:56	6:50	6:44	6:40	6:36	
350	7:34	7:22	7:14	7:06	7:00	6:54	6:50	6:44	6:42	
400	7:34	7:24	7:16	7:08	7:02	6:58	6:52	6:48	6:44	

Test time in minutes and seconds

Test times will be provided by the City Engineer upon request for combinations other than 8-inch mains and 6-inch laterals.

If the pipe installation fails to meet these requirements, the Developer and/or Contractor shall determine at his own expense the source or sources of leakage, and he shall repair (if the extent and type of repairs proposed by the Developer and/or Contractor appear reasonable to the City Engineer) or replace all defective materials or workmanship. The completed pipe installation shall meet the requirements of this low pressure air test or the alternative water exfiltration test before being considered for acceptance.

Plugs used to close the sewer pipe for the air test shall be securely braced to prevent the unintentional release of a plug which can become a high velocity projectile. Gauges, air piping manifolds and valves shall be located at the top of the ground. No one shall be permitted to enter a manhole where a plugged pipe is under pressure. Air testing apparatus shall be equipped with a pressure release device such as a rupture disk or a pressure relief valve designed to relieve pressure on the pipe under test at 6 psi.

3. Exfiltration Test (if approved by City)

All pipe shall be cleaned before the exfiltration test. Prior to making exfiltration leakage tests, the Developer and/or Contractor may fill the pipe with clear water to permit normal absorption into the pipe walls; provided however, that after so filling the pipe he shall complete the leakage test within twenty-four (24) hours after filling. When under test, the leakage allowable shall comply with the provisions that follow:

Leakage shall be no more than 0.15 gallons per hour per inch of diameter per one hundred (100) feet of sewer pipe, with a minimum test pressure of six (6) feet of water column above the crown at the upper end of the pipe or above the active groundwater table, whichever is higher as determined by the City. The length of pipe tested shall be limited so that the pressure on the invert of the lower end of the section tested shall not exceed sixteen (16) feet of water column. For each increase in pressure of two (2) feet above a basic six (6) feet measured above the crown at the lower end of the test station, the allowable leakage shall be increased by 10 percent.

The Developer and/or Contractor shall furnish all equipment, materials, and labor necessary for making test. The equipment shall be to the approval of the City Sewer Superintendent and/or City Engineer. The manner and time of testing shall be subject to approval of the City Engineer. It shall be the Developer's and/or Contractor's responsibility to determine the level of the water table at each manhole. If leakage exceeds the allowable amount, corrective measures shall be taken and the line then be retested to the satisfaction of the City's designated inspector.

4. Infiltration Test (if approved by City)

Infiltration testing shall take place during jetting of backfill, except when the natural groundwater table is above the crown of the higher end of the test section. The maximum allowable limit for infiltration shall be 0.15 gallon per hour per inch of internal diameter per 100 feet of length with no allowance for external hydrostatic head.

5. Deflection Test

Deflection tests shall be performed on all PVC gravity sewer mains by pulling a mandrel through the pipe and the deflection test limit shall be 5.0 percent of the base inside diameter or for example 7.28 inches for 8-inch diameter pipe. The sewer lines shall be thoroughly cleaned prior to the deflection test.

F. Testing Force Main

1. Test Specifications

All force mains shall be tested prior to acceptance of work. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished, installed and operated by the Contractor. Feed for the pump shall be from a barrel or other container within the actual amount of “makeup” water, so that it can be measured periodically during the test period.

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

The pipeline shall be subjected to a pressure and leakage test of a minimum of 150 pounds per square inch for a period of not less than one (1) hour. The test pressure shall be applied at the low end of the section tested.

The quantity of water lost from the main shall not exceed the number of gallons per hour determined by the formula:

$$L = \frac{ND(P)^{0.5}}{7,400}$$

in which

- L = Allowable leakage, gallons/hour
- N = Number of joints in the length of pipeline tested
- D = Nominal diameter of the pipe in inches
- P = Average test pressure during the leakage test, psi

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

2. Preliminary Tests

Developer and/or Contractor shall conduct preliminary tests and assure himself that the section to be tested is in an acceptable condition before requesting the City Inspector and/or City Engineer to witness the test.

3. Thrust Blocks & Anchor Blocks

All fittings shall be blocked with concrete in order to prevent movement and separation of pipe joints. Timber will not be permitted as permanent blocking. Sufficient time shall be allowed for concrete to set before commencement of pressure tests. The type and size of blocks and anchors shall be as detailed herein and further designed by the Developer's engineer. They shall be constructed to the minimum dimensional configuration as shown in the construction Details. A visqueen barrier shall be provided to protect glands, bolts, and other miscellaneous materials required for this type of connection from the concrete.

6.05 Video Taping

Upon completion, the sewer lines shall be internally televised by a qualified firm providing said services. A 1/2 inch VHS audio-visual tape together with a written log of the television inspection shall be submitted to the City for their review and approval, and if accepted, be retained in their files. This work can be performed prior to paving. The City's inspector shall be notified of the date of TV inspection to insure his availability and on-site witnessing of the event during this time.

6.06 State Highway Crossings

All state highway and stream crossings shall be encased with a steel casing or ductile iron or PVC sleeve, as approved by the City and prevailing regulatory agencies. The welded steel casing or sleeve shall be of sufficient diameter, size and strength to enclose the sewer pipe and to withstand maximum highway or railroad loading. Sizing and wall thickness of casing is subject to approval by the City Engineer. Sand backfill or grout fill between the casing and the sewer pipe shall be required. In order to prevent the sand from being washed from the casing the ends of the casing shall be bricked and cemented after installation, backfill and testing of the pipe are completed.

6.07 Staking

All surveying and staking shall be performed by an engineering or

surveying firm employed by the Developer and capable of performing such work. The engineer or surveyor directing or performing such work shall be currently licensed by the State of Washington to perform said tasks.

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

The minimum staking of sanitary sewer systems shall be as follows:

- A. Stake centerline alignment at a minimum of fifty foot intervals unless otherwise approved by the City.
- B. Stake location of all manholes and side sewer laterals for grade and alignment.
- C. Provide a copy of “cut sheets” to City inspector.
- D. Stake finished manhole rim elevation and invert elevations of all pipes in manholes.

6.08 Trench Excavation

- A. Clearing and grubbing where required shall be performed within the easement or public right-of-way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the owner or contractor in accordance with the terms of all applicable permits.
- B. Trenches shall be excavated to the line and depth as shown on the City approved Drawings, or as otherwise designated in the field by the City Inspector so as to provide a City approved minimum depth of cover over the pipe. See construction Details as applicable. Except for unusual circumstances, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space as mandated by the regulatory agency and in compliance with all safety requirements of the prevailing agencies. See Detail. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench. The owner shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.
- C. The contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below sewer line grade. Where materials are removed from below pipe grade,

the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted.

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

6.09 Bedding

Gravel backfill for pipe bedding shall be installed in conformance with Section 2-09 of the Standard Specifications (WSDOT). See Detail.

Bedding for Rigid Pipe (Ductile Iron Pipe):

Gravel backfill for rigid pipe bedding shall consist of crushed, processed, or naturally occurring granular material. It shall be essentially free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and shape that it will compact readily and shall meet the following specifications for grading and quality:

<u>Sieve Size</u>	<u>Percent Passing*</u>
3/4" Square	100
3/8" Square	95-100
U.S. No. 8	0-10
U.S. No. 200	0-3
Sand Equivalent	35 MIN.

*All percentages are by weight.

Bedding for Flexible Pipe (P.V.C. pipe):

Gravel backfill for flexible pipe (P.V.C. pipe) bedding shall consist of crushed, processed, or naturally occurring granular material. It shall be essentially free from various types of wood waste or other extraneous or objectionable materials. It shall have such characteristics of size and shape that it will compact readily and shall meet the following specifications for grading and quality:

<u>Sieve Size</u>	<u>Percent Passing*</u>
3/4" Square	100
3/8" Square	95-100
U.S. No. 8	0-10

U.S. No. 200
Sand Equivalent

0-3
35 MIN.

*All percentages are by weight.

Native Material shall not be used for bedding, unless approved by the Engineer.

6.10 Backfilling

Backfilling and surface restoration shall closely follow installation of pipe so that not more than 100 feet is left exposed during construction hours without approval of the City. Selected backfill material shall be placed and compacted around and under the sewer pipe by hand tools. Special precautions shall be provided to protect the pipe to a point 12 inches above the crown of the pipe. The remaining backfill shall be compacted to 95 percent of the maximum density in traveled areas and road "prisms", 90 percent outside driveway, roadways, road prism, shoulders, parking or other traveled areas. Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction. Typically, all utility trenches located in roadway sections, roadway "prisms", or beneath traffic bearing areas shall be backfilled with 5/8-inch minus crushed rock, or other City approved structural material. Due to localized conditions, the City may allow/permit the backfill of the trench section with suitable excavated material, as determined by the City Inspector, or if suitable native material is not available from trenching operations, the City may order the placing and compaction of gravel base conforming with Section 9-03.10 of the Standard Specifications (WSDOT) for backfilling the trench. All excess material shall be loaded and hauled to waste.

6.11 Street Patching and Restoration

See Chapter 4B.16 and 4B.17 for requirements regarding street patching and trench restoration.

6.12 Erosion Control

The detrimental effects of erosion and sedimentation shall be minimized by conforming with the following general principles:

- A. Soil shall be exposed for the shortest possible time.
- B. Reducing the velocity and controlling the flow of runoff.
- C. Detaining runoff on the site to trap sediment.
- D. Releasing runoff safely to downstream areas.

In applying these principles, the Developer and/or Contractor shall provide for erosion control by conducting work in workable units; minimizing the disturbance to cover crop materials; providing mulch and/or temporary cover crops, sedimentation basins, and/or diversions in critical areas during construction; controlling and conveying runoff; and establishing permanent vegetation and installing erosion control structures as soon as possible.

1. Trench Mulching

Where there is danger of backfill material being washed away due to steepness of the slope along the direction of the trench, backfill material shall be compacted and held in place by covering the disturbed area with straw and held with a covering of jute matting or wire mesh anchored in place.

2. Cover-Crop Seeding

A cover crop shall be sown in all areas excavated or disturbed during construction that were not paved, landscaped and/or seeded prior to construction. Areas landscaped and/or seeded prior to construction shall be restored to their original or superior condition. Cover-crop seeding shall follow backfilling operations.

The Developer and/or Contractor shall be responsible for protecting all areas from erosion until the cover crop affords such protection. The cover crop shall be re-seeded if required and additional measures taken to provide protection from erosion until the cover crop is capable of providing protection.

During winter months, the Contractor may postpone seeding, if conditions are such that the seed will not germinate and grow. The Developer and/or Contractor will not, however, be relieved of the responsibility of protecting all areas until the cover crop has been sown and affords protection from erosion.

The cover crop shall be sown at a rate of 10 to 15 pounds of seed per acre using a hand or power operated mechanical seeder capable of providing a uniform distribution of seed.

6.13 Adjustment Of New And Existing Utility Structures To Grade

This work consists of constructing and/or adjusting all new and existing utility structures encountered on the project to finished grade.

1. Asphalt Concrete Paving Projects

On asphalt concrete paving projects, the manholes shall not be adjusted until the pavement is completed, at which time the center of each manhole lid shall be relocated from references previously established by the Developer and/or Contractor. The pavement shall be cut as further described and base material removed to permit removal of the cover. The manhole shall then be brought to proper grade.

Prior to commencing adjustment, a plywood and visqueen cover as approved by the City Inspector shall be placed over the manhole base and channel to protect them from debris.

The asphalt concrete pavement shall be cut and removed to a neat circle, the diameter of which shall not exceed 48" or 14" from the

outside diameter of the ductile iron frame, whichever is smaller. The ductile iron frame shall be brought up to desired grade, which shall conform to surrounding road surface.

Adjustment to desired grade shall be made with the use of concrete or bricks. No cast or ductile iron adjustment rings will be allowed. An approved class or mortar (one part cement to two parts of plaster sand) shall be placed between manhole sections; adjustment rings or bricks and ductile iron frame to completely fill all voids and to provide a watertight seal. No rough or uneven surfaces will be permitted inside or out. Adjustment rings or brick shall be placed and aligned so as to provide vertical sides and vertical alignment of manhole steps and ladder.

Check manhole specifications for minimum and maximum manhole adjustment and step requirements. Special care shall be exercised in all operations in order not to damage the manhole, frames and lids or other existing facilities.

As soon as the street is paved past each manhole, the asphalt concrete mat shall be scored around the location of the manhole, catch basin, meter boxes or valve box. After rolling has been completed and the mat has cooled, it shall be cut along the scored lines. The manholes, catch basins, meter boxes and valve boxes shall then be raised to finished pavement grade and the annular spaces filled with cement concrete to within 1-1/2 inches of the finished grade. The remaining 1-1/2 inches shall be filled with asphalt concrete Class B to give a smooth finished appearance. See detail in Project Plans.

After pavement is in place, all joints shall be sealed with hot asphalt cement (AR 4000W). A sand blanket shall be applied to the surface of the AR 4000W hot asphalt cement binder to help alleviate "tracking".

Asphalt concrete patching shall not be carried out during wet ground conditions or when the ambient air temperature is below 50°F. Asphalt concrete mix shall be at required temperature when placed. Before making the asphalt concrete repair, the edges of the existing asphalt concrete pavement and the outer edge of the casting shall be tack coated with hot asphalt cement. The remaining 2" shall then be filled with Class B asphalt concrete and compacted with hand tampers and a patching roller.

The completed patch shall match the existing paved surface for texture, density and uniformity of grade. The joint between the patch and the existing pavement shall then be carefully painted with hot asphalt cement or asphalt emulsion and shall be immediately covered with dry paving sand before asphalt cement solidifies. All debris such as asphalt pavement, cement bags, etc., shall be removed and disposed of by the Developer and/or his Contractor.

Prior to acceptance of a project, manholes shall be cleaned of all debris and foreign material. All manhole steps and ladders shall be cleaned free of grout. Any damage occurring to the existing facilities due to

the Developer's and/or Contractor's operations shall be repaired at his/her own expense.

2. Adjustment of Manholes in Easements

Manholes in easement areas shall be adjusted to insure drainage away from the manhole frame and cover. The manhole frame and cover shall be set approximately 0.1 foot above finished grade. Concrete collars shall be set about the structure, as detailed herein, in all non-paved areas.

3. Adjustment of Valve Box Castings

Adjustment of valve box castings (force main valving) shall be made in the same manner as for manholes.

6.14 Finishing And Cleanup

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

On sewer construction where all or portions of the construction is in undeveloped areas, the entire area which has been disturbed by the construction shall be shaped so that upon completion the area will present a uniform appearance, blending into the contour of the adjacent properties. All other requirements outlined previously shall be met.

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

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

All rocks in excess of one (1) inch diameter shall be removed from the entire construction area and shall be disposed of the same as required for other waste material. In no instance shall the rock be thrown onto private property. Overhang on slopes shall be removed and slopes dressed neatly so as to present a uniform, natural, well-sloped surface.

All excavated material at the outer lateral limits of the project shall be

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

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

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

Castings for manholes, valves, lamp holes, vaults and other similar installations which have been covered with the asphalt material shall be cleaned to the satisfaction of the City.

6.15 Final Acceptance

Prior to final inspection, all pipelines shall be flushed and cleaned and all debris removed. A pipeline "cleaning ball" of the proper diameter for each size of pipe shall be flushed through all pipelines prior to final inspection.

Before sewer lines are accepted, all lines shall be inspected for line and grade by checking each section between manholes for alignment. A full circle of light shall be seen by looking through the pipe at a light held in the manhole at the opposite end of the section of sewer line being inspected. Any corrections required in line and grade shall be made at the expense of the Developer and/or Contractor.

6.16 General Guarantee And Warranty

The Developer shall be required, upon completion of the work, and acceptance by the City, to furnish the City a written guarantee covering all material and workmanship for a period of two years after the date of final acceptance and he 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.

Easement documents, if applicable, shall be filed and recorded with the King/Pierce County Auditor's office and the documents reviewed by the City's Engineer and/or Attorney prior to project acceptance.

6.17 Sanitary Sewer Lift Stations

A. Objective

Section 6.17 is intended to present information and provide an outline of the

minimum general standards to be accomplished in planning a sewage lift station installation within the City's service area. Other types of stations may be proposed for consideration, and/or mandated by local conditions as determined by the City Engineer. Stations and ancillary equipment shall not be constructed in City rights-of-way, unless otherwise approved by the City. The station site shall be paved and fenced.

The Developer shall submit to the City for review and approval, complete sewage lift station plans and design which provide for the lift station, electrical service/controls and telemetry system, and auxiliary generator/transfer switch together with all accessories for a complete, automatically operating installation. Odor control and/or corrosion control facilities may also be required.

Design material and drawings shall provide all civil, mechanical and electrical details and align with all applicable codes and regulations, and good engineering practice. The Developer shall be required to acquire all permits and approvals for the installation/construction of this facility as required from regulatory agencies.

The principle components of a sewage lift station installation will be addressed in the remainder of this section.

2. Lift Station
3. Electrical Service/Controls & Telemetry System
4. Auxiliary Power/Transfer Switch

B. Lift Station

1. Type

The type of sewage lift station to be furnished, supplied, and installed shall be at the City's sole discretion and option. Generally, the station shall be a submersible station or a buried, dry-pit-type, with an above-ground entrance hatch having a steel cover, lockable to City Standards, with anode protection. Other such stations shall be reviewed and approved by the City prior to construction. Construction shall be in compliance with O.S.H.A., U.L., A.S.T.M., N.E.C. and other applicable codes and regulations.

All sewage lift stations shall have, as a minimum, two sewage pumps. The pumps shall have sufficient capacity and capability to efficiently handle the peak design flow with one pump and to insure a minimum velocity of 3 feet per second in the force main. Design calculations and pump curves indicating the same shall be provided with the submittal information.

Each sewage pump shall be drilled, tapped and valved with 2-inch drainage fittings on the pump suction between the shut-off valve and the pump, and then piped to the sump.

The pump and motor shafts shall be the maximum diameter available for these units.

Pump motors shall be 3-phase, 60-cycle, and operate at the voltage as supplied by the utility company.

Three phase pump motors shall be N.E.M.A. standard starting or better as noted:

<u>Code</u>	<u>Starting KVA/HP</u>	<u>Typical Size Range</u>
A	0-3.15	---
B	3.15-3.55	---
C	3.55-4.0	---
D	4.0-4.5	---
E	4.5-5.0	---
F	5.0-5.6	15 HP & Up
G	5.6-6.3	10 HP
H	6.3-7.1	7.5 & 5 HP
J	7.1-8.0	3 HP
K	8.0-9.0	2 & 1-1/2 HP
L	9.0-10.0	1 HP
M	10.0-11.2	Less Than 1 HP

The sewage lift station supplier shall check the station during installation to determine if the installation is correct. Written confirmation of each visit and recommendations shall be provided to the City Engineer.

The sewage lift station supplier shall provide four hours of check-out training for City personnel at the station site during start-up.

The sewage lift station supplier shall provide four complete copies of maintenance and operation material to the City Engineer.

The Developer shall demonstrate that no surge problems exist with the station, and if found to exist, that they shall be corrected at no expense to the City.

Provide mouse proofing where applicable to ground-mounted structures.

All keys, miscellaneous items, and spare parts shall be given to the City prior to approval.

The Developer shall provide an area yard light for the lift station site.

2. Capacity

The Developer shall perform a study and make the determination to assure that the lift station installation is sized to serve the overall sewage flows generated within the potential service area. The flow study shall include the Developer's plat boundary area as well as adjacent and future service areas (tributary areas). The service areas shall be the areas within that which could be served by the installation of the lift station(s). The City must review and approve of the developer submitted calculations and service area.

The station's design flow capacity shall be based on an average daily per capita flow with related peaking factors and inflow/infiltration allowances.

Documentation of present and future service area flow rates for lift station size and capacity determination shall be provided to the City.

The effects of the minimum flow conditions shall be estimated to be sure that retention of the sewage in the wet well will not create a nuisance and that pumping equipment will not operate too infrequently.

Lift station capacity shall meet the maximum rate of flow expected. The capacity of the receiving sewer shall also match the flow expected. At least two pump units shall be provided at each lift station installation, each capable of handling the expected maximum flow. Design calculations shall be provided regarding detention time at "start-up" and "build out". Odor control facilities as determined by the City may be required.

3. Location

The Developer shall furnish a site layout for the lift station installation.

The sewage lift station shall be located as far as practicable from present or proposed built-up residential areas, and an asphalt concrete access road shall be provided. Noise control, odor control, and station architectural design shall be taken into consideration. Sites for sewage lift stations shall be of sufficient size for future expansion or addition, if applicable.

The limits of the cut and fill areas for the lift station site and access shall be within the easement area and the slope of all embankments shall not exceed 2:1. The method of fill construction, i.e., compaction, etc., shall be noted on the plans. The easement shall be submitted to the City for review prior to construction of the lift station. Lift station sites not located within the plat boundary shall be procured by the developer and deeded to the City of Pacific.

The water service to the lift station site shall be 1-inch with a 1-inch buried washdown hydrant, together with backflow preventer of the reduced pressure type, both installed near the wet well, including meter box, meter and hose bib and 1-inch heavy-duty rubber hose, 50-foot long with a spray nozzle.

A 7'-0" high galvanized chain link fence with vertical wooden redwood or plastic slats in-laid for screening, and a combination 12-foot wide gate all with 3 rows of barbed wire enclosing the lift station and generator site shall be provided.

4. Wet Well

The wet well shall be of pre-cast concrete construction with flat slab cover and 30-inch hatch or manhole cover for access. The flat slab concrete cover shall be provided with a 4-inch vent which is "hooked and screened".

The wet well shall provide for the volute of the pumps to be fully submerged and a minimum of 3 minutes between pump cycles at pump capacity. The high water alarm shall be set a minimum of 7 inches below the invert of the lowest gravity sewer inlet pipe, or at an elevation as may be set by the City.

The wet well and the steel lift station shall be located on a common reinforced concrete slab. Protection against buoyancy shall be provided, together with the calculations to verify the same. The wet well chamber shall be provided with polypropylene safety steps as specified for typical precast manhole in accordance with the City's Standard Details.

The suction lines from the wet well to the pumps shall be a minimum of 6-inch inside diameter ductile iron, Class 53.

The force main shall be (unless otherwise specified or approved by the City Engineer) a minimum 6-inch diameter ductile iron Class 53, or PVC (C900) pipe (if approved by City Engineer) and provided with a continual positive slope. There shall be no intermediate high point between the pump station and the force main discharge point (depth shall be a minimum of 4'-0"). All pipes (gravity and pressure) entering and leaving the wet pit or dry pit shall have flexible couplings within 18-inches of the structure.

Odor control facilities may be required to be installed by the Developer based on design conditions as required by the City Engineer.

An emergency pump connection shall be located near the wet well. A "pig" launching and retrieving facility shall also be provided for maintenance of the force main. Two cleaning "pigs" as approved by the City shall also be provided.

C. Electrical Service/controls & Telemetry System

1. General

Codes and regulations exist at the federal, state, and local level dictating minimum acceptable requirements for electrical systems. The following partial list of codes and regulations shall be used as a basis for design and review.

- National Electric Code (NEC)
- Occupational Safety & Health Act (OSHA)
- State & Local Building Codes
- National Electrical Safety Code (NESC)

Various manufacturers and technical societies publish standards and recommendations. The following partial list of standards and recommendations shall be used as a basis for design and review whenever the project specifications have not made them mandatory.

- National Electrical Manufacturers Association (NEMA)
- Underwriters' Laboratory (UL)
- Insulated Power Conductor Engineering Association (IPCEA)

- American National Standards Institute (ANSI)
- Institute of Electrical & Electronic Engineers (IEEE)

2. Electrical Service

The local electric utility will be the primary source of electrical power. The Developer shall ascertain proper coordination between the nominal secondary delivery voltage supplied by Puget Sound Power and Light (PSP&L) and the connection to the lift station equipment. The electrical service shall be 4-wire, 3-phase, 60 hertz, with a solid neutral terminal at the disconnect or as may otherwise be required by local power company; this shall be confirmed with the local power company and confirmed by the suppliers.

The pump motors, generator and transfer switch shall match the utility supplied voltage.

All wire shall be copper.

All conduit shall be galvanized, rigid.

All installation shall be approved by the local power company and shall be in conformance with the N.E.C. (current issue) U.L. 98, O.S.H.A. and County and State electrical codes. The City shall be furnished with a certificate of final inspection by the various regulatory and inspecting agency(ies).

All underground conduits shall be marked with polyethylene tape placed 6-inches below finished grade and directly above the conduit.

All conduit shall have a minimum of 24 inches of cover.

Heating strips shall be provided for outside electrical enclosures.

A service entrance shall be provided with a pedestal on which shall be mounted, as a minimum, the following equipment:

- a. Meter and meter can (as required by the PSP&L).
- b. Meter C.T. (as required by the PSP&L).
- c. Main disconnect circuit breaker in a N.E.M.A., 3-R, enclosure, with padlock to City standards.
- d. A generator transfer switch, sized for the full connected load, in a N.E.M.A. 3-R enclosure, with padlock to City standards.
- e. 277/480 Volt circuit, a 5 KVA minimum, 480 to 240/120-volt, single-phase transformer for outside installation with padlock to City Standards.
- f. A 240/120-volt panel (12-circuit) in a N.E.M.A. 3-R enclosure with padlock to City standards.

- g. A 120-volt duplex in N.E.M.A. 3-R enclosure with padlock to City standards.
- h. Ground rod and connector wire in conduit to N.E.C. standards.
- i. For mounting electrical equipment, provide two, 6'-0" high (above ground) 4" H.W. steel galvanized pipe support posts with H.W. galvanized "*super strut*" for supporting equipment; for minimum required the length of the pedestal secure to the posts. Post shall be encased in ground 3'-0" with 12-inch diameter concrete encasement. Enclose assembly in 8-inch thick poured-in-place concrete pad (finished surface 3 inches above ground), reinforced with #5 bars at 8 inches wide. Chamfer all concrete edges 3/4-inch.
- j. When applicable, as determined by the City, include a galvanized roof structure over electrical enclosures.
- k. Provide a 2-inch future conduit from a point 6 inches above the concrete slab as noted above, thence, underground to a point 24 inches from slab. Cap both ends.

Provide electrical single-line diagram showing all components and control between pedestal, lift station and generator with wire and conduit sizes.

The City shall be provided with a complete reproducible set of as-constructed Plans and Details showing final location of all equipment, conduit and wire.

3. Controls

Control and instrument system plans shall thoroughly and completely depict system design. The plans, in conjunction with the specifications, shall define the type of control system, the type of components in the system, set points and the interface between the instrumentation and control system and the lift station system. To accomplish this, the control and instrument plan(s) shall include, as a minimum, the following

- a. control and instrumentation system legend and general notes
- b. control, instrumentation and distribution diagram
- c. plans showing location of all control, instrument, and distribution system equipment and components, both electrical and pneumatic
- d. all equipment and installation details

The power, control and instrumentation systems shall be designed with both operational reliability and maintainability. Use standard products wherever possible.

All components within the lift station system, including both internally and face-mounted instruments and devices, shall be clearly identified with

phenolic nameplates of black background with white letters.

All wiring between cabinet, equipment and components shall be marked and multiple color coded where applicable.

All wiring shall be copper.

All pump motors shall have an independent circuit breaker located within the lift station and the lift station shall have a main circuit breaker located outside the lift station.

The lift station shall be furnished with a wet well gauge in the control panel. The control panel shall be furnished with an A-O-H switch for each pump motor and voltage monitor relays to protect the pump motors from single-phasing, phase reversal and low voltage.

The pump controls shall be air bubbler type with two compressors alternating on timer control, and shall provide for both pumps to operate at high water conditions. The control elevations shall be indicated on the plans, i.e., on-off, first pump on, second pump on, and high water alarm.

The single-phase transformer for the lift station shall be 5 KVA, or as required for proper operation of the single phase side system.

The lift station electrical circuit shall be modified for generator starting and telemetry as required.

Provide check valve limit switches and relays to confirm pump run to telemetry on each pump.

A complete set of spare fuses shall be provided for all fused equipment.

4. Telemetry

The lift station installation shall be installed with a complete telemetry system. This shall include all remote equipment, at the lift station, and all central based equipment, at the office of the City of Pacific.

Telemetry shall be furnished and installed by Rugid and shall be compatible with any current City system and shall send all signals to the City office. The alarm priority shall be: 1) telemetry line failure; 2) normal power failure; 3) water in dry pit; 4) high/low water wet well; and 5) pump failure; 6) generator run. All contacts shall close on alarm. The panel shall be installed within the lift station. A water level sensor shall be provided.

The City will coordinate with the telemetry supplier and further mandate those alarms which the City desires to transmit.

All telemetry equipment shall be installed in a single NEMA 3R metal enclosure with an inner and outer door and shall be padlocked to City Standards. This equipment shall be installed on the electrical service mounting rack.

For ease of serving and maintaining the equipment, all wiring shall be multi-colored and numbered, using solderless pressure connectors.

All major components, including relays, timers, tone transmitters, and receivers, and power supplies shall be identified using phenolic or vlam engraved labels.

A line (surge) protector unit shall be provided for the telemetry equipment. The unit shall protect the equipment from transient and electrical surges on the telephone line. Protection shall include line fuses and clamps for voltages over 25 volts, gas tubes shall be provided as an integral part of the lighting protection unit.

The telemetering between the central based system and the lift station site shall be performed over a voice grade circuit leased to the City from the local telephone company. The telemetry supplier shall coordinate with the City to ensure proper circuits are furnished.

D. Auxiliary Power System

1. General

Emergency power generation equipment shall be provided at the lift station site which will operate the lift station in the event of a commercial power outage.

It is essential that the emergency system be designed with capacity and rating to carry safely the entire connected lift station load.

The auxiliary power unit shall be complete in every respect and shall include, but not be limited to, the following:

1. Generator, control panel & circuit breaker.
2. Engine, radiator & exhaust system.
3. Fuel tank.
4. Generator set enclosure.
5. Automatic transfer switch.
6. Battery & rack.
7. Battery charger.
8. Conduit, wire and piping.

The auxiliary power unit shall be new, factory assembled, tested and as manufactured by Cummins/Onan, or owner approved equal. The generator set shall be manufactured and installed to meet all current electrical and building codes and regulations, as required by national, state, county and local agencies having jurisdiction.

Generator shall be capable of automatic starting and maintaining a full load from a cold start.

Generator shall have locking panels to engine and butterfly compartment. Fuel tank and radiator cap shall be lockable with common key.

Provide mouse proofing where applicable to ground-mounted structures.

2. Power System

Generator, engine and accessories enclosed in metal enclosure with removable panels and sides. Enclosures shall be lockable to City standards.

Generator shall be designed so that the danger of accidents to the operator will be minimized.

Suitable guards shall be provided on all electrical parts to minimize the personal shock hazard.

Generator shall be broken-in sufficiently to permit application of full load immediately upon installation.

Generator supplier shall provide all tools for the generator set as recommended and required by the manufacturer.

Generator installation shall be checked three (3) times by the supplier during construction to determine that the installation is correct. Written confirmation of each visit and recommendations shall be provided to the City.

Generator supplier shall provide two (2) eight (8) hour days of supervision during start-up.

Generator supplier shall provide training for City personnel. This training shall be four (4) hours in length, and shall be conducted at the lift station site.

Generator manufacturer shall provide four (4) copies of a maintenance and operations manual. These manuals shall be complete and shall include all information necessary to allow City personnel to maintain the generator.

Generator mounting pad shall be reinforced concrete to carry the weight of the unit and shall extend a minimum of 3 inches beyond generator housing. Chamfer all edges 3/4-inch.

Propane tank support pad shall be as above.

Provide a roof structure over generator. The structure shall be designed by the Developer's engineer and subject to the City's approval. It shall be designed to protect the generator and City personnel from inclement weather, to be utilized as a noise barrier, and be aesthetically pleasing to the surrounding area.

a. Engine

(Shall be provided with/have):

Unless otherwise approved by the City Engineer, the engine shall be propane fueled. No gasoline or diesel engines are permitted without written authorization of the City. Fuel tank shall be above-ground, separate from unit for propane. Capacity shall be 24 hours when full +

25% reserve.

Fuel system shall be provided with an electrical shut-off valve with flexible connection to the generator. The generator set shall be manufacturer in compliance with the following codes, regulations and standards; N.E.M.A., I.E.E., A.N.S.I., N.E.C. and O.S.H.A.

Generator recovery after acceptance of 100% rated load in one step shall be 1 second.

Cooling shall be by radiator, provided with anti-freeze protected to -45°F and with corrosion protection. Provide block heater. Radiator cover shall have padlock hasp and padlock to City standards.

Lubrication shall be full circulation pressure type, with replaceable filter with bypass.

Engine governor shall be gear-type mechanical.

Engine air filter shall be replaceable type.
Generator unit shall be furnished with vibration mounts.

Electrical fuel shut-off and flex-connections to engine.

Engine oil drain extension.

Stainless steel flexible exhaust connector and hospital (critical) rated muffler with condensation and rain collector including insulation.

Skid base with vibration isolators between base and concrete pad; secure to concrete per manufacturer's specifications.

High amperage industrial rated batteries and cables.

Battery charger capable of recharging battery in 4 hours from complete discharge.

Engine shall be 1,800 rpm, 4-cycle.

b. Generator

(Shall be provided with/have):

Designed and manufactured in accordance with N.E.M.A., I.E.E., and A.N.S.I. standards for temperature rise and all applicable electrical codes.

Revolving field, dynamically balanced, static excited, static regulated, 12-lead.

Upon application of rated continuous load, in one step, voltage dip shall be less than 25 percent or less with recovery to normal voltage in less than one second, measured with a light beam oscillograph.

Voltage regulation, solid state, within + 1 percent.

40°C temperature rise above 90°C ambient operation.

Frequency regulation within 3-hertz.

Radio suppression.

Self-ventilated, drip-proof construction.

Brushless, fast response, amortized winding, Class “B” and “F” fungus resistant. Coils and stator mechanically and epoxy braided.

Winding heaters shall be provided (120-volt).

Shock mounted.

Pump lockout circuit when generator is running (locked-out pump to be second call pump).

Low coolant level alarm shall shut down unit if coolant level is low.

Generator shall be 3-phase, 60-cycle and shall match the supply voltage of the utility distribution system.

c. Control Panel

(Shall be provided with/have):

Three position selector switch (off, test, automatic), which shall include a red flashing indicator light which lights in the off position.

Manual start-stop switch for testing without interrupting normal source.

Contact for an alarm and report system (6 contacts) N.O./N.C.

Cranking reset button.

Over-cranking protection shall open cranking circuit after 30-90 seconds of cranking (adjustable).

Cranking cyler with four attempts of 15 seconds each and 10 second rest periods between attempts.

Line circuit breaker rated at full generator capacity.

AC volt meter with switch for each phase.

AC ammeter with switch for each phase.

Current transformers.

Frequency meter.

Running time meter (99,999.9 hours capacity)

Panel light.

Oil pressure gauge.

Water temperature gauge.

Voltage adjusting reostat.

Alarm indication panel with shut-off control; 1) over-speed; 2) over-crank; 3) high temperature; 4) low oil pressure; 5) low coolant level.

All contacts shall close on alarm.

All alarm sensors and instruments shall be protected by individual push-type reset circuit breakers.

Generator load meter (to measure true load on generator) in kW.

Panel to be N.E.M.A. 12 construction.

3. Transfer Switch

The transfer switch shall be sized, in amps, to equal plus 25%, the full connected load of the lift station generator and auxiliary equipment. The transfer switch shall be enclosed in a N.E.M.A. 3-R cabinet with padlock to City standards and mounted on the entrance pedestal.

Shall be U.L., 1008 and C.S.A. approved.

Shall protect all types of loads, inductive and resistive.

Shall be rated, 3-phase, 60-cycle, 3-pole, 4-wire with neutral lug and match the commercially supplied system voltage.

Shall be rated for all classes of loads without de-rating, either open or closed.

Shall automatically transfer load upon failure of normal power and return upon restoration of normal power.

Shall be electrically operated, mechanically-held using circuit breakers.

Shall be provided with time delay in the neutral position.

The automatic transfer panel shall have solid state, close-differential, field-adjustable, voltage-sensing relays, nominally set at 70 percent drop-out and 90 percent pick-up, both modes: emergency to normal and normal to emergency.

Interrupting and withstand capacity, measured symmetrical of breakers shall be as follows:

40, 70, 100 amp =	14,000
150, 260 amp =	30,000
400,600 amp =	65,000
800,1000 amp =	65,000

The automatic transfer switch shall obtain current from the source to which the load is being transferred.

Panel shall be front opening.

All equipment listed shall be mounted directly in the automatic transfer panel lockable cabinet.

All equipment shall be accessible from the front of the cabinet for ease of maintenance or removal.

All pilot devices and/or relays shall be industrial type rated 10-amperes with self-cleaning contacts.

Components of the operation mechanism shall be insulated or electrically dead.

The transfer mechanism shall be energized only momentarily during transfer.

Components of linkages and handles of operating mechanism shall be ruggedly constructed and not subject to deterioration.

Time Delay - transfer from normal power source to standby generator set, shall be delayed in order to override momentary power fluctuations or outages. Adjustable, 0 to 50 seconds.

Time Delay - emergency to normal transfer shall be delayed after normal power resumes to permit stabilization of the normal power source prior to transfer. Adjustable, 30 seconds to 30 minutes.

Time Delay for Engine Cool-Off - a time delay shall allow the engine to run, unloaded for a period of not less than two minutes after power has been transferred back to the normal source. The time delay shall be adjustable from a minimum period of 60 seconds to 15 minutes.

Protection for under-voltage, over-voltage, phase reversal, single-phasing, unbalanced operating voltage; both modes - emergency to normal and normal to emergency.

Auxiliary Contacts - a minimum of six (6) pairs of auxiliary contacts shall be provided in the transfer switch panel, complete with switches to prevent chosen circuits from operating during periods of normal power outage. The contacts shall be cartridge type convertible from normally closed to normally open.

Time delay at the neutral position - when transferring from normal power to

generator power and from generator power to normal power. Time delay shall be adjustable from 0.2 to 50 seconds.

**RECOMMENDED PRESSURE SEWER STANDARDS
(APPROVED BY PUBLIC WORKS COMMITTEE ON SEPTEMBER 11, 2003)**

6.18 STEP/GRINDER PUMP WASTEWATER COLLECTION NEW SECTION

6.18.A General

The City of Pacific technical specifications were developed for use with on-site septic tank effluent pump (STEP) tank installations, grinder pump installations, on-site wastewater disposal system installations that are to be converted to STEP, and pressure collection line installations.

The City of Pacific technical specifications are subject to change as new regulations come into effect.

Anyone who wishes to extend or connect to the City's sewer system should contact the Utility Department for a sewer extension/connection fee estimate of the costs due the City for a sewer extension or connection.

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

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

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

Ownership, operation, and maintenance of the tank, pump, and pump controls shall be the responsibility of the property owner. Pipelines and service lines within public right-of-way easements remain the ownership of the City of Pacific.

Currently, only the Orenco STEP Pump System and Environment One grinder pumps are referenced in the specifications or shown in the drawing section of this standard. These manufacturers' components and references are provided as a guide to property owners. Property owners may opt to substitute similar products as long as they meet the salient features of the components listed.

6.18.A.1 Design Standards

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

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

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

The applicable General Notes preceding the list of drawings shall be included on any plans dealing with pressure sanitary sewer design.

6.18.B Materials

6.18.B.1 STEP Tanks

6.18.B.1.a Loading Criteria

Weight of backfill shall be 135 pounds per cubic foot.

The water table is at ground level. Lateral loading is 85 pounds per cubic foot, which includes hydrostatic water pressure.

The tank will support a minimum 1,000-pound wheel load.

Tanks designated as traffic-bearing tanks shall be designed to withstand HS-20 truck loading with appropriate impact factors. All tanks shall be structurally sound and watertight and shall be guaranteed in writing by the tank manufacturer for a period of 7 years from the date of final acceptance. The tank guarantee/warranty shall be furnished at the time of submittal. Tank warranty shall not limit liability to replacement cost of the tanks.

6.18.B.1.b Fiberglass Tanks

Unless superseded by the Standard Specifications, the fiberglass tanks will meet all requirements of IAMPO PS 1-87. If requested by the City, the manufacturer shall supply to the City, without charge, approved original laboratory report showing compliance with IAMPO PS 1-87 and requirements of the supplier's licensed structural engineer.

1. Method of Calculations: Fiberglass tanks shall be analyzed using finite element analysis for buried structures. Calculations shall address the following:
 - A. Strength with a safety factor of 2.5.
 - B. Buckling with a safety factor of 2.5.
 - C. Deflection of 5 percent of the tank diameter, based on service load (including long-term deflection lag).
 - D. Buoyancy.
2. Performance Testing:

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

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

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

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

- A. Holes required in the tank shall be provided by the manufacturer. Resin shall be properly applied to all cut or ground edges so that no glass fibers are exposed and all voids are filled.
- B. Dual Tite or Ty-Seal neoprene gaskets, or equal, shall be used at the inlet to join the tank wall and the ABS inlet piping. ABS Schedule 40 pipe and fittings shall be used at the inlets.
- C. Inlet plumbing shall penetrate 18 inches into the liquid from the inlet flow line.
- D. Each tank shall be water tested on the project site after assembly by the manufacturer and witnessed by the City. Every tank shall be assembled by the manufacturer and water raised to the brim of the manhole for a minimum of 2 hours. The tank shall show no leakage from section seams, pinholes, or other imperfections. Any leakage is cause for rejection.
- E. When leakage occurs, if the tank is not rejected by the City, an additional water test for a minimum of 2 hours shall be made on the tank after repairs have been completed, upon request by the City. The manufacturer shall be responsible for making all corrective measures in production or assembly necessary to ensure a completely watertight tank.
- F. After installation of tank with riser is completed, each tank shall be filled with water to the top of the riser for a 2-hour period as per Paragraph D, to assure that there is no leakage. Every tank test shall be witnessed by the City.
- G. Each tank will also include a serial number and date of manufacture.
- H. Installation shall be in accordance with the manufacturer's recommendations and as shown on the contract plans; no variations.

6.18.B.1.c Concrete Tanks

Concrete tanks will be allowed in sizes up to 3,000-gallon capacity.

Wall, bottom, and top of reinforced-concrete tanks shall be designed across the shortest dimension using one-way slab analysis. Stresses in each face of monolithically-constructed tanks may be determined by analyzing the tank cross section as a continuous fixed frame.

The walls and bottom slab shall be poured monolithically; alternatively, water stops may be provided.

Reinforcing steel shall be ASTM A615, Grade 60, $f_y=60,000$ psi. Details and placement shall be in accordance with ACI-35 and ACI-318.

Concrete shall be ready mix with cement conforming to ASTM C150, Type II. It shall have a cement content of not less than six sacks per cubic yard and maximum aggregate size of 3/4 inch. Water/cement ratio shall be kept low (0.35 plus or minus), and concrete shall achieve a minimum compression strength

of 4,000 psi in 28 days. The contractor shall submit a concrete mix design to the City for review and approval. Three (3) concrete sample cylinders shall be taken and tested for each tank manufactured until the manufacturer and City are satisfied that the minimum compression strength is being obtained. To ensure compliance, the manufacturer shall then make and test three sample cylinders for a minimum of 20 percent of the remaining tanks at the discretion of the City. If the minimum compressive strength is not being obtained, the manufacturer shall be required to make and test sample cylinders for each tank manufactured. Calcium chloride will not be allowed in the mix design. The cost of testing cylinders shall be the tank manufacturer's responsibility. The tank manufacturer may supply a Swiss hammer for compressive testing in the field in lieu of sample cylinders.

Tanks shall be protected by applying a heavy cement-base waterproof coating (Thoroseal or equal), on both inside and outside surfaces, in compliance with Council of American Building Officials (CABO) Report No. NRB-168; 6181.

Form release used on tank molds shall be Nox-Crete or equal. Diesel or other petroleum products are not acceptable.

Tanks shall not be moved from the manufacturing site to the job site until the tank has cured 7 days or has reached two-thirds of the design strength.

Tanks shall be manufactured and furnished with access openings of the size and configuration to accommodate individual packaged pump systems. Modification of completed tanks will not be permitted.

The septic tank and the top slab shall be sealed with a preformed flexible plastic gasket. The flexible plastic gasket shall be equal to the flexible butyl resin sealant conceal CS-102 or CS-202 as manufactured by Concrete Sealants, Inc. of New Carlisle, Ohio and shall conform to Federal Specification SS-S00210(210A) and AASHTO M-198.

Tanks shall be furnished without concrete access hole lids and equipped with tank riser adapters as manufactured by Orenco Systems or equal. In order to demonstrate watertightness, the tanks shall be tested as follows:

Inlets to the septic tank will be watertight pipe seal as Ty-Seal pipe seal or equal. Outlets for effluent filters shall be configured as shown on the Contract Plans.

1. **Factory Test:** All of the tanks supplied by the precast manufacturer will be hydrostatically tested in the factory. Test the tank by filling with clean water to the soffit, and let stand for a minimum of 24 hours. After the 24-hour period, the water will be replaced to soffit. The water level shall be checked after 2 hours. Any water loss will not be acceptable.
2. **Field Tests:** After the tanks have been set in place, but prior to backfilling, each tank shall be tested for a 2-hour period. Any tank that fails the test as outlined in 11A shall be repaired and/or replaced until the tank passes said test. After backfilling, the tank shall be filled with water to 4 inches above riser and tank connection and tested for exfiltration over a 2-hour period. No tank will be accepted if there is any leakage over the 2-hour period.

6.18.B.2 Pressure Pipeline Materials

6.18.B.2.a Pipelines and Service Line Materials

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

Schedule 40 PVC pipe shall be designed for solvent weld joints and shall comply with ASTM D1785.

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

PVC IPS 1120 SDR 21 Class 200 pipe shall have rubber ring gasket joints and be constructed with materials in conformance with ASTM D1784 and have a working pressure rating of 200 psi.

6.18.B.2.b Bedding

Bedding shall be crushed or granular material as per Section 9-03.16 of the Standard Specifications.

Bedding shall be installed as shown on the Standard Details.

6.18.B.2.c Joints

1. Solvent Weld Joints: Solvent cements and primer for joining PVC pipe and fittings shall comply with ASTM D2564 and be as recommended by the pipe and fitting manufacturers.
2. Rubber Ring Gasket Joints: SDR 21 PVC pipe joints shall conform to ASTM D3139 and have restrained rubber gaskets in conformance with ASTM F477. Pipe lubricant shall be water soluble, nontoxic, nonsupportive of bacterial growth, and have no deteriorating effect on the PVC or gasket.

6.18.B.2.d Fittings

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

1. Solvent Weld Fittings: Solvent weld fittings for pipe less than 2 inches shall be socket type Schedule 40 fittings and shall comply with ASTM D2466 and 2467.
2. Rubber Ring Gasket Fittings: Rubber ring gasket fittings for pipe 2 inches and larger shall be PVC 1120 meeting the requirements of ASTM D2466, as manufactured by Head Manufacturing Co., Preston, Idaho; Gault Fabrication Company, Stockton, California; Spears Fabrication, Stockton, California; or approved equal.

6.18.C Construction Requirements – STEP Tanks/Pipelines

6.18.C.1 STEP Tanks

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

STEP tanks with an effluent pipe invert elevation of less than or equal to 4 feet, which are not placed in traffic-bearing areas, shall meet the following criteria:

1. All models of tanks will be certified by a licensed Structural Engineer that they will meet the loading conditions specified herein. The Structural Engineer certifying each model of tank shall submit drawings including, but not limited to, the following:
 - A. Plan view showing dimensions of tanks and the size and location of any openings in the tank.
 - B. Side section of tank showing dimensions and thickness.
 - C. End section of tank showing dimension and thickness.
2. STEP tanks with influent pipe inverts greater than 4 feet, and/or are subject to traffic-bearing loading, shall meet the following criteria:
 - A. All models of tanks will be designed by a licensed Structural Engineer; calculations shall be submitted for review.
3. An inspection port will be required over the inlet baffle for all STEP tanks. A 21-inch-minimum riser inspection port/cleanout shall be required.

6.18.C.1.a STEP Tank Sizing

STEP tanks for the City of Pacific will be sized and configured as outlined, and shall meet the DOE Design Manual criteria for vessel sizing and configuration (see Table 1).

Table 1. STEP Tank Sizing

Descriptions	Tank Size
Up to 4 Bedroom Home	Minimum: 1,000 gallons (liquid capacity)
5 or 6 Bedroom Home/Duplex	Minimum: 1,500 gallons (liquid capacity)

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

1. All STEP tanks 1,000 to 4,500 gallons will be two-compartment tanks divided by a baffle as shown in Drawing Detail PS4A and PS4B. On 1,000 to 4,500-gallon tanks, install the equivalent of three each 4-inch-diameter holes uniformly spaced across the width of tank baffle, 29 inches above floor of tank in each baffle.
2. On 6,000-gallon tanks, install three each 6-inch-diameter holes uniformly spaced across the width of tank baffle, 40 inches above floor of tank in each baffle.

3. If approved by the City, 6,000-gallon tanks, used in conjunction with a pump tank, may not require a baffle.

Table 2. Estimated Daily Sewer Flows

Type of Establishment	Gallons per Person per Day (Unless otherwise noted)
Airports (per passenger)	5
Apartments – Multiple family (per resident)	65
Bathhouses and swimming pools	10
Camps:	
• Campground with central comfort stations	35
• With flush toilets, no showers	25
• Construction camps (semi-permanent)	50
• Day camps (no meals served)	15
• Resort camps (night and day) with limited plumbing	50
• Luxury camps	100
• Cottages and small dwellings with seasonable occupancy	50
• Country clubs (per resident member)	100
• Country clubs (per nonresident member present)	50
Dwellings:	
• Boarding houses:	50
> With flush toilets, no showers	10
• Luxury residences and estates	150
• Multiple family dwellings (apartments)	65
• Rooming houses	40
• Single family dwellings	75
Factors (gallons per person, per shift, exclusive of industrial wastes)	35
Hospitals (per bed space)	250+
Hotels with private baths (2 persons per room)	60
Hotels without private baths	50
Institutions other than hospitals (per bed space)	125
Laundries, self-service (gallons per wash, i.e. per customer)	50
Mobile home parks (per space)	250
Motels with bath, toilet, and kitchen wastes (per bed space)	50
Motels (per bed space)	40
Picnic parks (toilet wastes only) (per picnicker)	5
Picnic parks with bathhouses, showers, and flush toilets	10
Restaurants (toilet and kitchen wastes per patron)	10
Restaurants (kitchen wastes per meal serviced)	8
Restaurants additional for bars and cocktail lounges	2
(Table Continues)	

Table 2. Estimated Daily Sewer Flows (Continued)

Type of Establishment	Gallons per Person per Day (Unless otherwise noted)
Schools:	
• Boarding	100
• Day, without gyms, cafeterias, or showers	15
• Day, with gyms, cafeterias, and showers	25
• Day, with cafeteria, but without gyms, or showers	20
Service stations (per vehicle served)	10
Swimming pools and bathhouses	10
Theaters:	
• Movie (per auditorium seat)	5
• Drive-in (per car space)	5
Travel trailer parks without individual water and sewer hookups (per space)	50
Travel trailer parks with individual water and sewer hookups (per space)	100
Workers:	
• Construction (at semi-permanent camps)	50
• Day, at schools and offices (per shift)	15

All tanks install a 4-inch-diameter hole within 1 inch of crown of baffle for venting.

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

Underestimating the wastewater flow anticipated to be received by either the STEP tank or primary tanks by the property owner or the City's designer based on estimated use will result in the property owner increasing the septic tank holding capacity to meet the above criteria. Refusal to increase the size of the septic tank to meet the design criteria will result in discontinuance of sewage collection services.

6.18.C.1.b STEP Tank Installation

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

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

The contractor shall be responsible to obtain all necessary permits for work on public right-of-way, such as street opening permit, available at City Hall. All cost for permits will be the contractor's responsibility.

Excavations for all tanks shall be sufficient to leave a minimum of 6 inches of bedding (see list of Drawings).

All tank installations shall adhere to the following:

1. Location of the STEP tank site will be submitted to the City upon request.
2. For work within public right-of-way, the contractor shall be responsible on a daily basis for providing ingress and egress for both pedestrian and vehicle traffic on all work sites. The contractor shall clean up his work area on a daily basis to avoid inconvenience to the public.
3. For work within public right-of-way, the contractor shall safeguard his work on a daily basis to prevent possible injuries. The contractor shall submit to the City the method of safeguarding the work prior to beginning any construction on public right-of-way.

6.18.C.2 STEP Pipelines

6.18.C.2.a General

Installation and materials used for construction of the City of Pacific STEP system shall conform to the requirements of Sections 7-10 through 7-12, 7-15, and 7-17 of the Standard Specifications, unless amended herein.

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

6.18.C.2.b Pipeline and Service Line Installation

Grade and Alignment: Service lines shall be placed at a minimum of 18 inches of cover within private property. Deeper excavation may be required due to localized breaks in grade such as curbs, retaining walls, and terraced ground. Where required by the City of Pacific, the pipeline shall be laid to the profile or elevation shown, regardless of depth. Minimum cover of any main line within public right-of-way or easement shall be 60 inches.

6.18.C.2.c Trench Excavation and Backfill

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

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

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

Maximum density and optimum-moisture content shall be determined using the modified Proctor maximum dry density procedure (AASHTO T180 or ASTM D1557). In-place density shall be determined using the Washington Densimeter method or Nuclear Gauge as outlined in the WSDOT Construction Manual.

6.18.C.1.d Detectable Marking Tape

Heavy-duty 14-gauge insulated copper toning wire designed for direct-bury applications, shall be placed directly over all nonmetallic pressure sewer lines and service lines. The contractor shall ring the toning wire to the surface of the valve box and service boxes for purposes of attaching a utility detection device. All connection of the toning wire for service connections shall be stripped of insulation and attached to the copper portion of the main line toning wire. The connection point shall be wrapped with heat shrink tape acceptable for direct bury in accordance with manufacturer’s recommendations.

6.18.C.1.e Hydrostatic Pressure Test

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

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

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

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

The quantity of water required to restore the pressure shall be accurately determined by pumping through a positive displacement water meter with a sweep unit hand registering 1 gallon per revolution. The meter shall be approved by the City.

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

<u>Test Pressure</u>	<u>Pipe Diameter</u>			
	<u>3 inch</u>	<u>4 inch</u>	<u>6 inch</u>	<u>8 inch</u>
150 psi	.28	.37	.55	.74
125 psi	.25	.34	.50	.67
100 psi	.23	.30	.45	.50

The above table values give the allowable loss in gallons per 1,000 feet of sewer pipeline per hour. The allowable loss can be calculated for any condition with the formula:

$$L = \frac{SD \times P}{133,200}$$

where:

L = Allowable loss for push-on or mechanical joints (GPH).*

S = The length of the pipe tested, in feet.

D = The nominal diameter of the pipe, in inches.

P = Average test pressure (psi), during the test duration.

*Add .0078 GPH/inch of nominal valve size for metal seated gate valves pumped against.

Portions of the sewer line that are determined to be critical, or suspected of leaking, should be left with the joints exposed during the testing procedure to allow visual inspection. The use of dye in the testing water will assist the location of leaks if groundwater is present in the trench. Any visible leakage detected shall be corrected by the contractor regardless of the allowable leakage specified above. Should the tested section fail to meet the pressure test successfully as specified, the contractor shall, at his expense, locate and repair the defects and then retest the pipeline.

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

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

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

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

1. Sewer Main Line Testing:

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

After the sewer main test has been completed, each main line valve shall be tested by closing valves in turn and relieving the pressure beyond. This test of the valves will be acceptable if

there is no immediate loss of pressure on the gauge when the pressure comes against the valve being checked. The contractor shall verify that the pressure differential across the valve does not exceed the rated working pressure of the valve.

The ball valve (or self-tapping saddle if used) at the sewer main shall be opened during testing of the sewer main so that the main is tested with pressure against the service line check valves.

Prior to any main line testing, all service lines within the main line test area shall be installed, tested, and approved. The contractor shall test no more than 5,000 linear feet for the first test to qualify crews and materials. Sections of collection main line to be tested shall not exceed 10,000 linear feet per each individual test. Once successful test results have been achieved, the contractor may request, in writing, test sections greater than 10,000 linear feet for the City's approval. The contractor is required to keep his pipe testing and service line testing concurrent with his pipeline laying operations.

2. Sewer Service Line Testing:

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

6.18.C.2.f Air and Vacuum Release Valves

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

Because the air released by these valves will contain hydrogen sulfide, the valves and their enclosures have to be constructed of corrosion-resistant materials. The air released from the valve will be quite odoriferous; thus, each vent will be equipped with an odor control system such as activated carbon filters impregnated with sodium hydroxide.

6.18.C.2.g Pigging Ports/Cleanouts

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

Pigging ports are required at every 2-inch-diameter change in pipeline size, and at the end of every dead end line.

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

6.18.C.2.h Thrust Blocking

Thrust block concrete shall be Class B poured against undisturbed earth. A plastic barrier shall be placed between all thrust blocks and fittings.

See Standard Drawings TB and VAB. Designed and approved restraining joint systems may be allowed in lieu of thrust blocking. Restraining joint brand, type, and size shall be specified on the Plans.

6.18.C.2.i Service Connections

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

6.18.C.2.j Service Interruption/Line Connections

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

6.18.C.3 STEP Pump Assemblies Materials and Installation

6.18.C.3.a General

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

6.18.C.3.b Ball Valves

Ball valves (1-inch) shall be PVC ball valves and shall comply with ASTM D2846. It shall be designed for use with corrosive fluids, for low torque manual operation, and for a working pressure of 150 psi. The PVC material shall be Type 1 (NSF). The valve shall be Model No. LT-1000-S as manufactured by KBI (King Brothers Industries), or equal approved by the City.

6.18.C.3.c Gate Valves

Gate valves for sewer systems shall be NRS gate valves, complying with AWWA C509. Buried valves shall have 2-inch-square AWWA Standard operating nuts. Valve stem extensions, if necessary, shall be provided by the same supplier as the gate valves.

All gate valves buried greater than 60 inches shall be equipped with operator extensions.

6.18.C.3.d Check Valves

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

6.18.C.3.e Valve Boxes

The word “SEWER” shall be cast into the lid. The top section shall be made of cast iron conforming to the following specifications: ASTM A4876; WWP 401 and CS-88. It shall be slip type with top flange, weight 40 pounds or more, be 10 inches in length, have an inside diameter sufficient to house the bottom section, and have an average material tensile strength of 30,000 psi. It shall be Rich Model 910 heavy duty, or equal approved by the City. The bottom section of the valve box shall be 6-inch PVC pipe (ASTM 3034). The entire valve box top and bottom shall perform as a unit that has the ability to extend.

6.18.C.3.f Saddles

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

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

6.18.C.3.g Standard Service Box

The Standard Service Box shall be made from a structural plastic, have extensions as required, and have a bolt down cover. It shall be Model No. 1419, as manufactured by Carson Industries, Inc., or equal approved by the City.

6.18.C.3.h Traffic Bearing Service Boxes

Traffic bearing service boxes shall conform to 7F.010 E – “Valve Boxes.”

6.18.C.3.i Effluent Pump – 4-Inch Submersible Pumps

Simplex Pumps:

1. Systems for tanks 1,500 gallons or less:
 - A. General – For Discharge to a STEP Collection System:
 - B. Provide Orenco Model P10 05 11 or approved equal. Pumps shall be listed by an approved testing laboratory (e.g., UL or CSA) or use as an effluent pump.

- C. Pumps shall be stainless steel and/or thermoplastic.
 - D. All wetted fasteners shall be 300 series stainless steel.
2. Motors:
- A. Motors shall be permanent split-phase type operating at 3,450 rpm. Motors shall be 1/2 horsepower, 115 volt, single-phase, 60 hertz.
 - B. Motors shall be thermally protected with an automatic reset feature.
3. Operating Conditions: The effluent pump shall be of the submersible turbine type capable of delivering 5 gpm against a TDH of 105 feet, and with a shut-off head of not less than 160 feet. Pumps will be provided with an orifice installed in the discharge piping to restrict flow to a maximum of 9 gpm over any head condition. The supplier shall provide a head curve showing performance of the pump with the orifice installed.
4. Bypass: A 1/8-inch bypass orifice shall be drilled in the discharge head of the pump to allow for cooling pump motor during periods of no discharge.

Duplex Pump Systems and Triplex Pump Systems for 3,000-Gallon Tanks or Larger:

1. General – For Discharge to a STEP Collection System:
- A. Provide Orenco Model P20 05 11 or approved equal. Pumps shall be listed by an approved testing laboratory (e.g., UL or CSA) for use as an effluent pump.
 - B. Pumps shall be stainless steel and/or thermoplastic.
 - C. All wetted fasteners shall be 300 series stainless steel.
2. Motors:
- A. Motors shall be permanent split-phase type operating at 3,450 rpm. Motors shall be 1/2 horsepower, 115 volt, single-phase, 60 hertz. The supplier shall provide a head curve showing performance of the pump with the orifice installed.
 - B. Motors shall be thermally protected with an automatic reset feature.
3. Operating Conditions: The effluent pump shall be of the submersible turbine type capable of delivering 20 gpm against a TDH of 105 feet, and with a shut-off head of not less than 160 feet.
4. Bypass: A 1/8-inch bypass orifice shall be drilled in the discharge head of the pump to allow for cooling pump motor during periods of no discharge.

6.18.C.4 Pump Vault, Riser, and Lid

6.18.C.4.a General

Provide an internal pump vault, which will be of sufficient size and structural integrity to house and support the pumping equipment necessary for transportation of effluent. The pump vault will have a screen to prevent solids larger than 1/8 inch from entering the pipeline and to protect the pump and flow restriction device from plugging. The internal vault will be removable for access into the STEP tank for septage pumping. All risers and connections to the septic tank with risers shall be watertight.

6.18.C.4.b Internal Vault

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

6.18.C.4.c Risers

Risers shall be required for access to internal vaults and access into the septic tanks for septage pumping. All risers shall be constructed of PVC, fiberglass, or polyethylene and shall be constructed watertight. Risers over pump vault shall be a minimum of 24 inches in diameter and shall be of sufficient diameter to allow removal of internal vaults without removing splice boxes, etc. All risers shall be of sufficient length to meet minimum requirement of the latest version of the National Electric Code (NEC) and shall vary depending on the depth of bury on the various tanks. The risers shall be attached to the tanks such that a watertight seal is provided. Epoxy required to adhere the PVC or fiberglass risers to fiberglass or concrete tanks shall be a two-part epoxy as supplied by the manufacturer of the riser.

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

Risers shall be Model RR24 (length as required) for simplex systems and RR30 (length as required) for duplex systems as manufactured by Orenco Systems, Inc., or approved equal.

6.18.C.4.d Lids

1. **Standard Lid:** The standard lid shall be a flat fiberglass lid, green in color, with a nonskid aggregate finish. The lid shall be the diameter required to fit the required riser and shall be supplied with a minimum of two stainless steel bolts, and the lid shall have a gasket. Allen wrench will not be included as part of the pump packages, but two wrenches will be included in the spare parts. Lids shall be as manufactured by Orenco Systems, Inc., Model No. FL24-4B or FL30G, or approved equal.
2. **Traffic-Bearing Lid:** The traffic-bearing lid shall be an HS-20 loading frame and cover. The cover shall have the word "SEWER" cast into it. Frame and cover for 24-inch-diameter lids shall meet requirements of Section 9-05.15(1) of the Standard Specifications, and 30- and 36-inch lids (covers) shall be HS-20 and shall be constructed of aluminum.

6.18.C.5 Internal Splice Box

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

For all Class I, Division I installations more than five residential units or nonresidential applications, risers requiring electrical connections shall have two separate splice boxes. All splice boxes shall be installed within 1 foot-0 inches of the riser lid for access purposes. One splice box shall be for the pump wire and one splice box shall be for the low-voltage wire for the float system. The splice boxes for the pump leads shall meet all requirements of the Department of Labor and Industries for a Class I, Division I, Type D gas application. The splice box for the low-voltage float leads on an intrinsically safe relay shall be a nonmetallic PVC splice box. The PVC splice box shall be complete with cord grips and dual wall heat shrink butt connectors. The number of cord grips and wire nuts within the PVC splice box shall be equivalent to the number of floats. The pump wire splice box simplex assemblies shall be single gang Model SBX-S as supplied by Orenco Systems, Inc., and the splice box for duplex assemblies shall be two gang Model SBX-D as supplied by Orenco Systems, Inc. or equal as approved by the City. Mounting box shall be mounted to riser with stainless steel bolts. An explosion-proof EY fitting shall be provided directly outside of the mounting box for the pump wire connection. The pump wires shall be fitted with a watertight plus Model B, Model ECP-2023 as manufactured by Appleton Electric Company or equal as approved by the City.

6.18.C.6 Level Control and Alarm Floats

Level control floats shall be UL or CSA listed for use in effluent on an adjustable or preset PVC stem that attaches directly to the pump vault. Floats shall consist of high level alarm, on, off, and redundant off. Level control floats shall be Model MF-ABT for simplex pump assemblies and Model MF-A2GT for duplex pump assemblies and Model MF-A3GT for triplex pump applications as manufactured by Orenco System, Inc. or equal as approved by the City.

Pump control and alarm panels for simplex pump assemblies shall be Model S1 RO ETMCT as manufactured by Orenco Systems, Inc. or equal as approved by the City. Pump control panels for simplex commercial and intrinsically safe applications shall be Model S1 1R RO ETMCT as manufactured by Orenco Systems, Inc. or equal as approved by the City.

Pump control and alarm panels for duplex pump assemblies shall be Model DAX1 IR2 RO ETMCT as manufactured by Orenco Systems, Inc. or equal as approved by the City.

Pump control and alarm panels for triplex pump assemblies shall be Model TA1 IR3 RO ETMCT as manufactured by Orenco Systems, Inc. or equal as approved by the City.

All pump control panels shall have NEMA 4x fiberglass enclosures, an audio and visual alarm, an elapsed time meter, event counter, stainless steel latch, and internal 120-volt, 20-amp circuit breaker.

Any separate “on-off” disconnect switch, if required by Labor and Industries, shall be manufactured by Scepter Model No. USC 15/10 or equal as approved by the City.

6.18.C.7 Hose and Valve Assembly

Hose and valve assembly for a 4-inch submersible shall include 1-inch-diameter, 100-psi PVC hose with PVC union and ball valve and anti-siphon valve Model No. HV100BASX as manufactured by Orenco Systems, Inc., or equal as approved by the City.

6.18.C.8 Additional Material Requirements

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

6.18.C.9 Electrical Connections

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

Splice boxes shall be installed in the STEP tank riser in accordance with the instructions from the supplier or manufacturer. The control panel shall be installed either on a remote pressure treated 8-inch by 4-inch post or on the garage wall, unless approved by the City of Pacific. The panel shall be affixed by stainless steel wood screws to either the structure or the post. The wood screws shall be of sufficient size and length to securely fasten the panel.

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

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

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

6.18.C.9.a Electrical

All materials used for control and electrical connections shall meet requirements of Labor and Industries and the Uniform Electrical Code.

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

Power supply to the pump control panel shall be a 20-amp dedicated circuit for each pump with separate neutral wires. A dedicated 10-amp circuit shall be required for the control system for duplex and triplex pump systems.

6.18.D Construction Requirements – Grinder Pump/Pipelines

All pump installations must meet all building, plumbing, and electrical codes, and shall have the City's approval prior to installation. Please refer to "Standard Grinder Pump Details" for minimum requirements, located at the end of these standards.

6.18.D.1 Pipe

Unless otherwise called for, side sewer pipe shall be high-density polyethylene plastic pipe (HDPE SDR 11) and meet the following specifications:

1. Base Resin: Conform to all requirements of ASTM D48, Type III, Class C, Category 5, Grade P34, with a PPI rating of PE 3408.
2. Melt Index: Less than 0.25 grams/10 minutes as determined by ASTM D1238, Condition E.
3. Environmental Stress Check Resistance: No cracks after 192 hours at 100 degrees C as determined by ASTM D1693, Condition C.
4. Rating: Long-term hydrostatic strength of 1,450 psi and hydrostatic design stress of 730 psi as determined by ASTM D2837.
5. Working Pressure Rating: 145 psi.
6. Laboratory Test Requirements: Withstand without failure a minimum burst pressure of 560 psi when applied in 60 to 70 seconds with water at 730 degrees F. Test in accordance with ASTM D1599. Test 1 percent but not more than three lengths.

6.18.D.2 Fittings and Joints

Joints shall be either flanged or thermal fusion butt welded. Joints in pipes with a diameter of 2 inches or less shall be made only at pump basins, valves, fittings, and changes in pipe diameter. For pipes larger than 2 inches in diameter, joints between pipe sections shall be thermal fusion butt welded. All flanges and fittings shall be thermal fusion butt welded to the pipe. Internal beads from welding at flanges and fittings of 2-inch-diameter and smaller pipes shall be removed. Operators of fusion welding equipment shall be trained by the pipe manufacturer, who shall certify that operators are qualified. All fittings will be HDPE SDR 11 or SCH 80 PVC where noted on City standards.

6.18.D.3 Laying of Pipe Between Grinder Tank and Street Connection Box

A pressure side sewer from the grinder valve box to the collector valve box shall have a minimum cover of 24 inches and shall be HDPE SDR 11 pipe and shall be equipped with tracer wire for locating purposes. Tracer wire shall be insulated 12-gauge wire (solid core) wrapped around the pipe and looped through the valve box from the collector valve to the grinder cleanout. Refer to City standards for current details. Unless otherwise indicated, it is unnecessary to bed this side sewer.

6.18.D.4 Cut-In Connection

Where a collector valve box is not available at the property line, an HDPE SDR 11 tee shall be cut in to the existing pressure sewer main and thermal fusion butt welded. A collector valve box assembly shall be placed at the property line.

The side sewer contractor doing this type of connection shall be certified in thermal fusion butt welding techniques.

6.18.D.5 Connection into Gravity Line

Where an HDPE pressure side sewer is connecting into a PVC side sewer, the side sewer contractor shall install a collector valve box assembly at the property line and then make a connection into the gravity side sewer according to City standards.

6.18.D.6 Connection into Gravity Manhole

Where an HDPE pressure side sewer is connecting into a gravity manhole, the side sewer contractor shall install an inside drop connection on those manholes deeper than 6 feet. In manholes less than 6 feet deep, the connection must match the crown elevation of the outfall pipe.

6.18.D.7 Backfilling Around Vaults and Valve Boxes

Vaults and valve boxes shall be placed on backfill that has been compacted to a minimum of 90 percent of maximum theoretical density. Backfilling shall be performed carefully so that no damage is done to pipe entering or exiting the vault or valve or to the vault or valve box. The City may direct the contractor to use special backfill techniques when it deems necessary.

6.18.E Grinder Pump Installation

The grinder sewer pump shall be an Environment One Model 2010 as supplied by Correct Equipment, Inc., 14576 NE 95th Street, Redmond, Washington 98052. Contact Howard Taub at 425-869-1233.

Contact the City for a preconstruction meeting for pump tank and control panel locations before any installation. Contractor shall determine the depth of the existing building sewer discharge before any installation, to determine if a 58-inch or 74-inch-deep tank will be suitable.

The grinder pump lift station package shall include the following items:

1. Sewage grinder pumps, semipositive displacement type, equal to Environment One progressive cavity with a 1-hp, 1,800-rpm motor.
2. Corrugated HDPE tank with single complete pump unit, ready for installation. The tank will have a 1-1/4 NPT discharge connection and a 4-inch inlet grommet for drain waste and vent (DWV) pipe.
3. The tank shall include an internal check valve assembly.
4. A breaker panel as supplied by Environment One, with two 15 amp breakers for pump operations, one 15 amp breaker for the alarm system, a "Push to Run" button, and audible alarm with "Silence Button," and a red light alarm. All wires and connectors are to be color coded and labeled for ease of installation.
5. A minimum of 25 feet of direct bury cable (supply cable) between the tank and breaker panel.
6. The pump system operates on two pressure switches. One switch operates the pump on/off and the second operates the alarm.
7. The package system shall meet the requirements of the Washington State Department of Labor and Industries, Division for Residential, grinder pump systems.
8. The electrical supply to the breaker panel shall be 240-volt single-phase power.
9. The tank location shall be accessible for maintenance and repair. The tank cover shall be approximately 3 inches above finished grade. Finished grade shall slope away from the station, and the station shall not be installed within a "pot hole." No plants are to be located with 5 feet of the tank, and the property owner shall maintain a 3-foot clear zone around the tank.
10. The location of the breaker panel shall be:
 - a. Accessible for maintenance and repair.
 - b. In sight of the tank.
 - c. The bottom of the panel must be 5 feet from finished grade.
 - d. The alarm light shall be visible from 50 feet and must be visible in a 180-degree radius.
11. The maximum distance between the breaker panel and the grinder tank shall be 25 feet, within sight and within easy access.
12. The breaker panel shall be equipped with a knife-type lock-out switch. The lock-out switch shall be visible from the tank.

13. Fences, bushes, or any other object shall not hide the alarm light or hinder in the maintenance and/or repair of the system.
14. There shall be no additional junction boxes or splices made once the system has been installed and inspected by City personnel. Anyone tampering with the approved system shall be liable to the City for any expense, loss, damage, cost of inspection, or cost of correction incurred by the City, plus a penalty not to exceed \$1,000.00.

END OF DIVISION

SECTION 7**7. WATER SYSTEM STANDARDS****7.01 General**

The standards established by this chapter are intended to represent the **minimum** standards for the design and construction of water system facilities. Greater or lesser requirements may be mandated by the City due to localized conditions. Extensions, connections or modifications to the existing system shall be in compliance with the State Department of Health.

Off-site improvements to the existing system may be warranted based on (1) the condition and capacity of the existing water system and (2) impacts caused by the proposed development. These off-site improvements (in addition to “on-site improvements) shall be completed as determined by the City Engineer to mitigate impacts caused by the development.

The following minimum design and construction considerations shall apply:

7.02 Design Standards

The design of water system improvements shall depend on their type and local site conditions. The design elements of water system improvements shall conform to City Standards as set forth herein and follow current design practice as set forth in Section 7.01 and 7.10.

- A. Detailed plans shall be submitted for the CITY'S review which provide the locations, size, and type of the proposed water system and points of connection. These Plans shall be separate from Sewer Plans.
- B. Project plans shall have a horizontal scale of not more than 50 feet to the inch. Plans shall show:
 - 1. Locations of streets, right-of-ways, existing utilities and water system facilities.
 - 2. Ground surface, pipe type and size, and water valves and hydrants stationing.
 - 3. 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, and telephone lines and television cables.
 - 4. All utility easements, and applicable County recording number(s).

- C. Computations and other data used for design of the water system shall be submitted to the City for approval.
- D. The water system facilities shall be constructed in conformance with the 1998 Standard Specifications for Road, Bridge, & Municipal Construction and current amendments thereto, State of Washington, revised as to form to make reference to Local Governments and as modified by the City's requirements and standards.
- E. Material and installation specifications shall contain appropriate requirements that have been established by the industry in its technical publications, such as ASTM, AWWA, WPCF, and APWA standards. Requirements shall be set forth in the specifications for the pipe and methods of bedding and backfilling so as not to damage the pipe or its joints.
- F. Except as otherwise noted herein, all work shall be accomplished as recommended in applicable American Water Works Association (AWWA) Standards, and according to the recommendations of the manufacturer of the material or equipment concerned.
- G. The location of the water mains, valves, hydrants, and principal fittings including modifications shall be staked by the Developer. No deviation shall be made from the required line or grade. The Contractor shall verify and protect all underground and surface utilities encountered during the progress of this work.
- H. Prior to final inspection, all pipelines shall be tested and disinfected.
- I. Before acceptance of the water system by the City, all pipes, assemblies, and other appurtenances shall be cleaned of all debris and foreign material. After all other work is completed and before final acceptance, the entire roadway, including the roadbed, planting, sidewalk areas, shoulders, driveways, alley and side street approaches, slopes, ditches, utility trenches, and construction areas shall be neatly finished to the lines, grades and cross sections for a new roadway consistent with the original section.
- J. 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 covering all material and workmanship for a period of two years after the date of final acceptance and he 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.

7.03 General Requirements

- A. Prior to construction, the Contractor shall notify the City for a pre-construction meeting.
- B. Work shall be performed only by contractors experienced in laying public water mains.
- C. Prior to any work being performed, the Contractor shall contact the City's Utilities Superintendent or City Engineer to set forth his proposed work schedule.
- D. Contractor shall obtain approval of materials to be used from City's Water Superintendent and/or City Engineer prior to ordering of materials.
- E. Water mains shall be laid only in dedicated streets or in easements which have been granted to the City. A street is normally not considered dedicated until the plat which created it has been officially filed with the County Auditor.
- F. All water main distribution pipeline construction shall have a minimum 36" cover from finished grade and 42-inch cover over transmission mains. Mains shall generally be located parallel to and ten feet northerly or easterly of street centerline. Water mains shall be extended to the far property line(s) of the property being served. Off-site extensions may be required to hydraulically loop existing and new systems. Oversizing of water mains may be required to be installed per City's current Water Comprehensive Plan.
- G. Fire hydrants are generally required approximately every 600 feet in residential areas, and every 300 feet in commercial areas. However, fire hydrants shall be furnished and installed at all locations as specifically mandated by the local fire marshall and/or per City Building Code.
- H. Fire hydrants on dead end streets and roads shall be located within approximately 300 feet from the frontage center of the farthest lot. Distances required herein shall be measured linearly along street or road.
- I. Pipes connecting hydrants to mains shall be at least 6 inch in diameter and be less then 17 feet in length.
- J. Dead end lines are not permitted except where the Developer can demonstrate to the City's satisfaction that it would be impractical to extend the line at a future date. Water mains on platted cul-de-sacs shall extend to the plat line beyond the cul-de-sac to neighboring property for a convenient future connection, and extended off-site to create a hydraulic loop, or, as minimum, have a four (4") inch blow off assembly installed at the termination point.

- K. All materials shall be new and undamaged.
- L. Unless otherwise approved or required by the City Engineer, the water main shall be ductile iron pipe class as shown below. The minimum nominal size for water mains shall be 8 inches, unless otherwise approved/required by City Engineer.

<u>Class</u>	<u>Pipe Diameter</u>
Class 52	4" through 14"
16" and larger	Class 50

EXCEPTION: 6-inch hydrant spools and pipelines located beneath rock or retaining walls shall be Class 53.

- M. All fittings shall be cement-lined ductile iron.
- N. Provide bends in field to suit construction and in accordance with pipe manufacturer's recommendations so as not to exceed allowable deflection at pipe joints.
- O. Provide thrust blocking and/or restrained joints at all fittings and bends in accordance with the City standards and conditions. Blocking to be designed by Developer's Engineer.
- P. Provide anchor blocking at all up-thrust vertical bends in accordance with City standards. Blocking to be designed by Developer's Engineer.
- Q. All valve marker posts shall be painted yellow and marked with the distance to valve being referenced.
- R. Residential water service pipe shall be one-inch high plastic "Poly" pipe (no joints beneath pavement areas), meeting or exceed ASTM D2239, SDR-7 as manufactured by Driscopipe (CL 200), or City approved equal.
- S. Minimum size service lines between the water main and the water meter shall be 3/4 inch unless otherwise specified. All service lines shall be the minimum size otherwise specified by the County Plumbing Code in accordance with fixture units, unless otherwise specified.
- T. Meter services and meter boxes shall be set to final grade and all adjustments shall be made prior to final pressure testing of the system, centerline of service inlets shall be located to match bottom elevation of meter box in such a manner that meter inlet and outlet will be the same elevation as bottom of meter box. Contractor shall furnish angle dual check valve with neoprene gaskets for outlet connections to meter at City Utilities Department Public Works Yard for each service

installed. Service inlet shall be centered at inlet end of box and faced toward outlet end of box parallel with long sides.

- U. All water services shall end within road right-of-way or easements.
- V. All meters shall be installed by the City, and the Developer shall pay the current meter installation charge.
- W. Contractor shall furnish water sample stations to City Utilities Department Public Works Yard. One station is required for development in size of 1 to 10 lots. One additional station is required for each additional 50 lots or portions thereof.
- X. All new buildings and residences shall include in their water service a suitable pressure reducing valve to protect the plumbing from excessive pressures, unless waived on the application form of the City.
- Y. All new construction shall comply with the "Accepted procedure and practice in Cross Connection Control Manual" as published by the Pacific Northwest Section of the American Water Works Committee", November 1985, Fourth Edition, and current amendments thereto. A copy of such is available for review at the City office.
- Z. Cut in connections shall not be made on Fridays, holidays or weekends. All tapping sleeves and tapping valves shall be pressure tested prior to making connection to existing mains.
- AA. Contractor shall notify City's Water Superintendent and obtain approval from him prior to any water shut-off or turn-on, affecting the water system, a minimum of 48 hours in advance.
- BB. Road restoration shall be per City, County or State design and construction standards, as may be applicable. Developer and Contractor shall become familiar with all State, County and City conditions of required permits, and shall adhere to all conditions and requirements.

7.04 Materials

A. Water Mains & Fittings:

1. Water mains to be installed unless otherwise approved (or required) in writing by the City Engineer shall be ductile iron pipe for all sizes.
2. The ductile iron pipe shall conform to ANSI/AWWA C151/A21.51-91 Standards, and current amendments thereto, except the ductile iron pipe shall be thickness Class 52 for 4" through 14" diameter pipe (except for 6-inch hydrant spools which shall be Cl. 53) and Class 50 for 16" and larger. Grade of iron shall be a minimum of 60-42-10. The pipe shall be cement lined to a minimum thickness of 1/16", and the exterior shall be coated with an asphaltic coating. Each length

shall be plainly marked with the manufacturer's identification, year case, thickness, class of pipe and weight.

3. Type of joint shall be mechanical joint or push-on type, employing a single gasket, such as "Tyton", except where otherwise calling for flanged ends. Bolts furnished for mechanical joint pipe and fittings shall be high strength ductile iron, with a minimum tensile strength of 50,000 psi.
4. Restrained joint pipe, where shown on the Plans shall be push-on joint pipe with "Fast Tight" gaskets as furnished by U.S. Pipe or equal for 12" diameter and smaller pipe and "TR FLEX" as furnished by U.S. Pipe or equal for 16" and 24" diameter pipes. The restrained joint pipe shall meet all other requirements of the non-restrained pipe.
5. All pipe shall be jointed by the manufacturer's standard coupling, be all of one manufacturer, be carefully installed in complete compliance with the manufacturer's recommendations.
6. Joints shall be "made up" in accordance with the manufacturer's recommendations, Standard joint materials, including rubber ring gaskets, shall be furnished with the pipe. Material shall be suitable for the specified pipe size and pressures.
7. All fittings shall be short-bodied, ductile iron complying with applicable ANSI/AWWA C110 or C153 Standards for 350 psi pressure rating for mechanical joint fittings and 250 psi pressure rating for flanged fittings. All fittings shall be cement lined and either mechanical joint or flanged, as indicated on the Plans.
8. Fittings in areas shown on the Plans for restrained joints shall be mechanical joint fittings with a mechanical joint restraint device. The mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1 and shall be Romac "Grip Ring" (retainer glands) or City approved equal.
9. All couplings shall be ductile iron mechanical joint sleeves.
10. The pipe and fittings shall be inspected for defects before installation. All lumps, blisters and excess coal tar coating shall be removed from the bell and spigot end of each pipe, and the outside of the spigot and the inside of the bell shall be wire-brushed and wiped clean and dry, and free from oil and grease before the pipe is laid.
11. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. After placing a length of pipe in the trench, the spigot end shall be centered in the bell and pipe forced home and brought to correct line and grade. The pipe shall be secured in place with select backfill tamped under it. Precaution shall be taken to prevent dirt from entering the joint space. At times when pipe laying is not in progress, the open ends of pipe shall be closed by a water-tight plug. If water is in the trench when

work resumes, the seal shall remain in place until the trench is pumped completely dry. No pipe shall be laid in water or when trench conditions are unsuitable.

12. The cutting of pipe for inserting fittings or closure pieces shall be done in a neat and workmanlike manner, without damage to the pipe or cement lining, and so as to leave a smooth end at right angles to the axis of the pipe. Pipe shall be laid with bell ends facing in the direction of the laying, unless directed otherwise by the City. Wherever it is necessary to deflect pipe from a straight line, the amount of deflection allowed shall not exceed pipe manufacturer's recommendations.
13. For connection of mechanical joints, the socket, plain end of each pipe and gasket shall be cleaned of dirt before jointing, and shall be jointed according to manufacturer's directions. Bolts shall be tightened alternately at top, bottom and sides, so pressure on gasket is even.
14. For connection of "Tyton" joints, the jointing shall be done according to manufacturer's recommendations, with special care used in cleaning gasket seat to prevent any dirt or sand from getting between the gasket and pipe. Lubricant to be used on the gasket shall be non-toxic and free from contamination. When a pipe length is cut, the outer edge of the cut shall be beveled with a file to prevent injury to the gasket during jointing.
15. Valves, fittings, plugs and caps shall be set and jointed to pipe in the manner as required. All dead ends on new mains shall be closed with dead end M.J. caps.
16. Fittings shall be "blocked" with poured-in-place concrete, with a firm minimum bearing against an undisturbed earth wall. Timber blocking will not be permitted. Thrust blocks shall be poured as soon as possible after setting the fittings in place to allow the concrete to "set" before applying the pressure test. The concrete thrust blocks shall be in place before beginning the pressure test. Anchor blocks shall be allowed to set sufficiently to develop the necessary bond strength between the reinforcing rods and the concrete anchor before beginning the pressure test.
17. All of the new piping, valves and blocking shall have been installed, disinfected and tested up to the point of cutting into existing lines before the crossover is made. The crossover to the existing system shall be in full readiness, including the cut and sized specials. Forty-eight (48) hour notice shall be given the City in advance of the planned "cut-ins". All sleeves shall be ductile iron.

B. Valves:

All valves 14" and larger shall generally be furnished and installed as butterfly valves. All valves 12" and smaller shall generally be furnished and installed as resilient seat gate valves.

1. **Resilient-Seated Gate Valves**

All gate valves shall conform to ANSI/AWWA C509-87 Standards for resilient-seated, high strength, bronze stemmed gate valves. The valves shall be iron-bodied, iron disk completely encapsulated with polyurethane rubber and bronze, non-rising stem with "O" ring seals. The polyurethane sealing rubber shall be fusion bonded to the wedge to meet ASTM tests for rubber to metal bond ASTM D429. The valves shall open counter-clockwise and be furnished with 2-inch square operating nuts except valves in vaults shall be furnished with handwheels. All surfaces, interior and exterior shall be fusion bonded epoxy coated, acceptable for potable water.

For applications with working pressure above 175 psi, a ductile iron valve rated as 250 psi or higher shall be used.

The valves shall be set with stems vertical. The axis of the valve box shall be common with the axis projected off the valve stem. The tops of the adjustable valve boxes shall be set to the existing or established grade, whichever is applicable.

Valves shall be Dresser, M&H, or Waterous.

2. **Butterfly Valves**

Butterfly valves shall be of the tight closing rubber seat type with rubber seat either bonded to the body or mechanically retained in the body with no fasteners or retaining hardware in the flowstream. The valves may have rubber seats mechanically affixed to the valve vane. Where threaded fasteners are used, the fasteners shall be retained with a locking wire or equivalent provision to prevent loosening. Rubber seats attached to the valve vane shall be equipped with stainless steel seat ring integral with the body, and the body internal surfaces shall be epoxy coated to prevent tuberculations buildup which might damage the disc-mounted rubber seat.

No metal-to-metal sealing surfaces shall be permitted. The valves shall be bubble-tight at rated pressures with flow in either direction, and shall be satisfactory for applications involving valve operations after long periods of inactivity. Valve discs shall rotate ninety (90) degrees from the full open position to the tight shut position. The valves shall meet the full requirements of AWWA C504, Class 150B. The valve shall be Henry Pratt Company "*Groundhog*", or owner approved equal.

3. **Tapping Sleeves & Tapping Valves**

The tapping sleeves shall be rated for a working pressure of 200 psi minimum and furnished complete with joint accessories. Tapping sleeves shall be constructed in two sections for ease of installation and shall be assembled around the main without interrupting service.

Tapping sleeves shall be cast iron unless the "wet tap" is for a

connection to A.C. mains in which case stainless steel sleeves can be used.

Mechanical joint style sleeves shall be ductile iron and is required for size-on-size connection to cast iron pipe. Mechanical joint sleeves shall be cast by Clow, Dresser, Mueller, Tyler, U.S. Pipe, or owner approved equal.

Fabricated steel style sleeves shall be fusion bonded coated, acceptable for potable water, and is acceptable for A.C. pipe taps only. Fabricated steel sleeves shall be manufactured by JCM, Romac or approved equal. Tapping valves shall be provided with a standard mechanical joint outlet for use with ductile iron pipe and shall have oversized seat rings to permit entry of the tapping machine cutters. In all other respects, the tapping valves shall conform to the resilient seat gate valves herein specified with regards to operation and materials.

The installation of the tapping sleeves and valves shall be performed by a qualified contractor such as Spear Tap, Pacific Water Works, or owner approved equal.

4. **Pressure Reducing and Relief Valves**

There are two uniform plumbing codes: one is prepared by the International Association of Plumbing and Mechanical Officials, another is prepared by the International Conference of Building Officials. Both codes require installation of pressure reducing valves in the water service pipe when street main pressure exceed 80 psi, as follows:

When street main pressure exceeds 80 psi, an approved pressure reducing valve with an approved pressure relief device shall be installed in the water service pipe near its entrance to the building to reduce the pressure to 80 psi or lower, except where the water service pipe supplies water directly to a water-pressure boost system, an elevated water gravity tank, or to pumps provided in connection with a hydropneumatic or elevated gravity water-supply tank system. Pressure at any fixture shall be limited to no more than 80 psi under no-flow conditions.

Where local water pressure is in excess of eighty (80) pounds per square inch (551 kPa), an approved type pressure regulator preceded by an adequate strainer shall be installed and the pressure reduced to eighty (80) pounds per square inch (551 kPa) or less. For potable water services up to and including one and one-half (1-1/2) inch (38.1 mm) regulators, provision shall be made to prevent pressure on the building side from exceeding main supply pressure. Approved regulators with integral bypasses are acceptable. Each such regulator and strainer shall be accessibly located and shall have the strainer accessible for cleaning without removing the regulatory or strainer body or disconnecting the supply piping. All pipe size

determinations shall be based on eight (80) percent of the reduced pressure.

Both uniform plumbing codes also require installation of pressure and temperature relief valves for hot water tanks as follows:

Pressure-Relief Valves: Pressure-relief valves shall meet the ANSI Standards and the ASME Standards when required by the building office. The valves shall have a pressure relief rating adequate to meet the pressure conditions of the equipment served. They shall be installed either directly in a top tank tapping or in the hot or cold outlet line close to the tank. There shall be no shutoff valves between the pressure relief valve and the tank. The pressure relief valve must be set to open at not less than 25 psi above the street main pressure or not less than 25 psi above the setting of any house water pressure-regulating valve. The setting shall not exceed the tank rated working pressure.

Temperature-Relief Valves: Temperature-relief valves shall be adequate relief rating, express in Btu/hr, for the equipment served. They shall be installed so that the temperature-sensing element is immersed in the hottest water within the top six inches of the tank. The valve shall be set to open when the stored water temperature is 210 degrees Fahrenheit (or less). These valves must conform to an approved standard and shall be sized so that when the valve opens, the water temperature cannot exceed 210 degrees Fahrenheit with the water heating element operating at maximum input.

All storage-type water heaters and hot water boilers deriving heat from fuels or types of energy other than gas, shall be provided with, in addition to the primary temperature controls, an over-temperature safety protection device constructed, list and installed in accordance with nationally recognized applicable standards for such devices.

The City will require that its customers install such pressure-reducing valves in the water service pipe when the street main static pressure exceeds 80 psi. The City will make static pressure information available upon request.

5. **All Valves**

All valves with operating nuts located more than 42" below finished grade shall be equipped with extension stems to bring the operating nut to within 18" of the finished grade.

At the top of the extension stem, there shall be a two-inch (2") standard operating nut, complete with a centering flange that closely fits the five-inch (5") pipe encasement of the extension stem. The valve box shall be set in a telescoping fashion around the five-inch (5") pipe cut to the correct length to allow future adjustment up or down.

Each valve shall be provided with an adjustable two-piece cast iron valve box of five inches (5") minimum inside diameter. Valve boxes shall have a top section with an eighteen-inch (18") minimum length. The valve boxes and covers shall be Rich No. 940 or equal.

6. **Valve Markers**

For each valve outside of asphalt, provide a valve marker post.

The concrete marker posts shall have a 3-inch minimum square section and a minimum length of thirty-six inches (36"), with beveled edges, and contain at least one (1) three-eighths inch (3/8") diameter bar of reinforcing steel. Markers shall be placed at the edge of the right-of-way opposite the valve, and set so as to leave twelve inches (12") of the post exposed above grade. The exposed portion of the marker posts shall be painted with two (2) coats of Preservative Brand No. 43-616 yellow enamel paint. Distance to referenced valve shall be to the nearest 0.5 foot, and shall be clearly stenciled in black numerals two inches (2") in height.

C. **Fire Hydrants:**

All fire hydrants shall be approved by the National Board of Fire Underwriters and conform to AWWA Specification C502, break-away type, in which the valve will remain closed if the barrel is broken. The hydrant barrel shall have a diameter of not less than eight and one-half (8-1/2") inches, and the valve diameter shall be not less than five-and-one-quarter inches (5-1/4"). Each hydrant shall be equipped with two (2) two-and-one-half-inch (2-1/2") hose ports (National Standard Thread), and one (1) four-and-one-half-inch (4-1/2") pumper connection (National Standard Thread), with permanent Storz hydrant adaptor and Storz blind cap. Each hydrant shall be equipped with a suitable positive acting drain valve and one-and-one-quarter-inch (1-1/4") pentagonal operating nut (counter-clockwise opening). The fire hydrants shall be M&H "Reliant" #929, Clow, Mueller, or City approved equal. A blue pavement marker shall be furnished and installed.

The holding spools between the gate valve and fire hydrant shall be made from six-inch (6") Class 53 ductile iron pipe, 0.34-inch wall thickness. The hydrant and gate valve shall be anchored in place using holding spools and mechanical joint restraint device. Holding spools with length in excess of seventeen feet (17') shall be supplied with an M. J. sleeve and mechanical joint restraint device.

The fire hydrants shall be painted per local fire marshall requirements with two (2) coats of Preservative Brand caterpillar or international yellow paint. After installation, they shall be wire brushed and field painted with two additional coats of similar yellow enamel paint. Distance to the hydrant valve shall be clearly stenciled in black numerals two inches (2") in height on the fire hydrant below the pumper port.

Between the time that the fire hydrant is installed and the completed facility is placed in operation, the fire hydrant shall at all times be wrapped in burlap, or covered in some other suitable manner to clearly indicate that the fire hydrant is not in service.

D. Blow-offs & Air Relief Assemblies:

Two (2") or Four (4") inch blowoff assemblies shall be installed at the terminus of all dead end water mains. Blowoffs utilized by the Contractor for flushing the water main shall be sufficient size to obtain 2.5 feet per second velocity in the main. Temporary blow-offs shall be removed and replaced with a suitably sized watertight brass plug.

Two (2") inch air and vacuum release valves shall be installed at principal high points in the system. See detail.

The installation of these items shall include connection piping, gate valve, valve box, and all accessories. Valve markers shall be optional with City.

E. Water Sampling Station

One water sampling station shall be provided to the City for each development in size of 1 to 10 lots. One additional sampling station shall be provided for each additional 50 lots or portion thereof. The water sampling station shall be furnished and installed at a location as determined by the City Engineer and as further shown on the Standard Detail.

7.05 Water Pipe Testing & Disinfecting

All pipelines shall be tested and disinfected prior to acceptance of work. A water hydrant meter shall be required and procured from the City for all water utilized for flushing pipelines. All pumps, gauges, plugs, saddles, corporation stops, miscellaneous hose and piping, and measuring equipment necessary for performing the test shall be furnished, installed and operated by the Contractor. Feed for the pump shall be from a barrel or other container within the actual amount of "makeup" water, so that it can be measured periodically during the test period.

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

As soon as pipe is secured against movement under pressure, it may be filled with water. Satisfactory performance of air valves shall be checked while the line is filling.

Contractor shall preflush all water mains after water has remained in

the main for 24 hours and before pressure testing the main.

After the pipe is filled and all air expelled, it shall be pumped to a test pressure of 250 psi, and this pressure shall be maintained for a period of not less than thirty (30) minutes to insure the integrity of the thrust and anchor blocks. **The contractor/developer is cautioned regarding pressure limitations on butterfly valves.** All tests shall be made with the hydrant auxiliary gate valves open and pressure against the hydrant valve. Hydrostatic tests shall be performed on every complete section of water main between two valves, and each valve shall withstand the same test pressure as the pipe with no pressure active in the section of pipe beyond the closed valve.

In addition to the hydrostatic pressure test, a leakage test shall be conducted on the pipeline. The leakage test shall be conducted at 150 psi for a period of not less than one (1) hour. The quantity of water lost from the main shall not exceed the number of gallons per hour determined by the formula:

$$L = \frac{ND(P)^{0.5}}{7,400}$$

in which

L = Allowable leakage, gallons/hour
 N = Number of joints in the length of pipeline tested
 D = Nominal diameter of the pipe in inches
 P = Average test pressure during the leakage test, psi

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

As sections of pipe are constructed and before pipelines are placed in service, they shall be sterilized in conformance with the requirements of the State of Washington Department of Health Services.

The Contractor shall be responsible for flushing all water mains prior to water samples being acquired. The water mains shall be flushed at a rate to provide a minimum 2.5 feet per second velocity in the main.

In all disinfection processes, the Contractor shall take particular care in flushing and wasting the chlorinated water from the mains to assure that the flushed and chlorinated water does no physical or environmental damage to property, streams, storm sewers or any waterways. The Contractor shall chemically or otherwise treat the chlorinated water to prevent damage to the affected environment, particularly aquatic and fish life of receiving streams.

Chlorine shall be applied in one of the following manners, listed in order of preference, to secure a concentration in the pipe of at least 50

ppm.

- 1) Injection of chlorine-water mixture from chlorinating apparatus through corporation cock at beginning of section after pipe has been filled, and with water exhausting at end of section at a rate controlled to produce the desired chlorine concentration;
- 2) Injection similarly of a hypochlorite solution;
- 3) Other City pre-approved method(s) selected by Developer/Contractor.

After the desired chlorine concentration has been obtained throughout the section of line, the water in the line shall be left standing for a period of twenty-four (24) hours. Following this, the line shall be thoroughly flushed and a water sample collected. The line shall not be placed in service until a satisfactory bacteriological report has been received.

City forces only will be allowed to operate existing and new tie-in valves. The Contractor's forces are expressly forbidden to operate any valve on any section of line which has been accepted by the City.

7.06 Backflow Prevention and Sprinkler Systems

1. All water systems connected to the public water system shall have backflow prevention as required by WAC 248-54-285.
2. All fire sprinkler systems as mandated/proposed/or required by the local fire marshall and/or City Ordinance that have a fire department connection shall have backflow prevention as required by WAC 248-54-285.
3. Building sprinkler systems may be required based on Building Codes/Fire Marshall requirements.

7.07 Staking

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

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

The minimum staking of water systems shall be as follows:

- A. Provide staking sufficient to satisfy City Utilities Superintendent. In new plat development roadway centerline staking must be readily identifiable.

- B. Stake locations of all proposed fire hydrant, blow-off, air-vac, valves, meters, etc.

7.08 Trench Excavation

- A. Clearing and grubbing where required shall be performed within the easement or public right-of-way as permitted by the City and/or governing agencies. Debris resulting from the clearing and grubbing shall be disposed of by the owner or contractor in accordance with the terms of all applicable permits.
- B. Trenches shall be excavated to the line and depth designated by the City to provide a minimum of 36 inches of cover over the pipe. Except for unusual circumstances where approved by the City, the trench sides shall be excavated vertically and the trench width shall be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency and in compliance with all safety requirements of the prevailing agencies. See Detail. The trench shall be kept free from water until joining is complete. Surface water shall be diverted so as not to enter the trench. The owner shall maintain sufficient pumping equipment on the job to insure that these provisions are carried out.
- C. The contractor shall perform all excavation of every description and whatever substance encountered and boulders, rocks, roots and other obstructions shall be entirely removed or cut out to the width of the trench and to a depth 6 inches below the pipeline grade. Where materials are removed from below the pipeline grade, the trench shall be backfilled to grade with material satisfactory to the City and thoroughly compacted.
- D. Trenching and shoring operations shall not proceed more than 100 feet in advance of pipe laying without approval of the City, and shall be in conformance with Washington Industrial Safety and Health Administration (WISHA) and Office of Safety and Health Administration (OSHA) Safety Standard.
- E. The bedding course shall be finished to grade with hand tools in such a manner that the pipe will have bearing along the entire length of the barrel. The bell holes shall be excavated with hand tools to sufficient size to make up the joint.

7.09 Backfilling

Backfilling and surface restoration shall closely follow installation of pipe. The City, based on the location of construction, shall designate the amount of trenching which may be left exposed. In no case shall more than 100 feet be left exposed during construction hours without approval of the City. Selected material shall be placed and compacted

around and under the storm drain by hand tools. Special precautions should be provided to protect the pipe to a point 12 inches above the crown of the pipe. The remaining backfill shall be compacted to 95 percent of the maximum density in traveled areas and road prisms, 90 percent outside driveway, roadways, road prism, shoulders, parking or other traveled areas. Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction shall be done to the satisfaction of the agency having jurisdiction. Typically, all trenches located in roadway sections, roadway "prisms", and in traffic bearing areas shall be required to be backfilled and compacted with 5/8-inch minus crushed rock. Due to local conditions, as may be specifically approved by the City, suitable excavated backfill material, as determined by the City, may be utilized as backfill, or if such material is not available from trenching operations, the City may order the placing of gravel base conforming with Section 9-03.10 of the Standard Specifications (WSDOT) for backfilling the trench. All excess material shall be promptly loaded and hauled to waste.

7.10 Street Patching and Restoration

See Chapter 4 and Standard Details for requirements regarding street patching and trench restoration.

7.11 Erosion Control

The detrimental effects of erosion and sedimentation shall be minimized by conforming with the following general principles:

1. Soil shall be exposed for the shortest possible time.
2. Reducing the velocity and controlling the flow of runoff.
3. Detaining runoff on the site to trap sediment.
4. Releasing runoff safely to downstream areas.

In applying these principles, the Developer and/or Contractor shall provide for erosion control by conducting work in workable units; minimizing the disturbance to cover crop materials; providing mulch and/or temporary cover crops, sedimentation basins, and/or diversions in critical areas during construction; controlling and conveying runoff; and establishing permanent vegetation and installing erosion control structures as soon as possible.

A. Trench Mulching

Where there is danger of backfill material being washed away due to steepness of the slope along the direction of the trench, backfill material shall be compacted and held in place by covering the disturbed area with straw and held with a covering of jute matting or wire mesh anchored in place.

B. Cover-Crop Seeding

A cover crop shall be sown in all areas excavated or disturbed during construction that were not paved, landscaped and/or

seeded prior to construction. Areas landscaped and/or seeded prior to construction shall be restored to their original or superior condition.

Cover-crop seeding shall follow backfilling operations.

The Developer and/or Contractor shall be responsible for protecting all areas from erosion until the cover crop affords such protection. The cover crop shall be re-seeded if required and additional measures taken to provide protection from erosion until the cover crop is capable of providing protection.

During winter months, the Contractor may postpone seeding, if conditions are such that the seed will not germinate and grow. The Developer and/or Contractor will not, however, be relieved of the responsibility of protecting all areas until the cover crop has been sown and affords protection from erosion.

The cover crop shall be sown at a rate of 10 to 15 pounds of seed per acre using a hand or power operated mechanical seeder capable of providing a uniform distribution of seed.

7.12 Finishing and Cleanup

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

On water system construction where all or portions of the construction is in undeveloped areas, the entire area which has been disturbed by the construction shall be shaped so that upon completion the area will present a uniform appearance, blending into the contour of the adjacent properties. All other requirements outlined previously shall be met.

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

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

All rocks in excess of one (1) inch diameter shall be removed from the entire construction area and shall be disposed of the same as required

for other waste material. In no instance shall the rock be thrown onto private property. Overhang on slopes shall be removed and slopes dressed neatly so as to present a uniform, natural, well-sloped surface.

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

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

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

Castings for monuments, water valves, vaults and other similar installations which have been covered with the asphalt material shall be cleaned to the satisfaction of the City and/or the Engineer.

7.13 General Guarantee and Warranty

The Developer shall be required, upon completion of the work and prior to acceptance by the City, to furnish the City a written guarantee covering all material and workmanship for a period of two years after the date of final acceptance and he 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.

Easement documents, if applicable, shall be filed and recorded with the King/Pierce County Auditor's office and the documents reviewed by the City prior to project acceptance.

SECTION 8**8. MISCELLANEOUS UTILITY SERVICES AND ADDITIONAL DEVELOPMENT REQUIREMENTS****8.01 General**

The standards established by this chapter are intended to represent the **minimum** standards for the design and construction of additional facilities. Greater or lesser requirements may be mandated by the City due to localized conditions. The following design and construction considerations shall apply.

8.02 Utility Services

All utility lines, including electric, telephone, fire alarm and television cables shall be placed underground prior to paving. Easement for maintenance of all utilities, both on and off-site, shall be provided as applicable to the satisfaction of the City Engineer.

8.03 Street Lighting

Street lighting shall be provided by the Developer to the guidelines established by the City Engineer. All costs of such, including, but not limited to, design, underground wiring, light standard base and luminaire shall be borne by the developer. The City shall approve of all street lighting plans as furnished by the developer to include size, spacing, height and type of pole/illuminare.

8.04 Cable Television

Service lines (suitable empty conduits placed and capped) for cable television shall be installed underground (location as approved by City Engineer) on all subdivisions regardless of whether or not cable television service is currently available.

8.05 Street Name and Traffic Signs

All street name signs and traffic directional signs shall be designated by the City Engineering Department. All costs of providing the signs, to include the installation, labor, materials, and other relevant City costs associated with determining the type, location, and associated work items shall be invoiced to and paid by the developer.

8.06 Landscaping

Street landscaping shall be provided where designated by the City Planner. Landscaping items shall be furnished and installed as directed and approved by the City Engineer. Irrigation will likely be required, and if so, shall be designed, furnished, and installed by the developer.

SECTION 9

9. LIST OF MISCELLANEOUS DETAILS

TITLE OF DRAWING

Miscellaneous Roadway Details:

Major Arterial Street Section
Minor Arterial Street Section
Collector Street Section
Minor Access Street Section
Local Access Street Section
Half Street Section
Alley Section
Trench Pavement Restoration Detail
Asphalt Diamond Patch Detail
Poured Monument in Place Detail
Surface Monument Detail
Sight Obstruction Detail
Sight Distance Continued Detail (2 pages)
Sidewalk Without Planting Strip Detail
Sidewalk With Planting Strip Detail
Cement Concrete Driveway Detail
Wheelchair Ramp Detail
Ramp Texture Detail
Concrete Curb and Gutter Detail
Turn Arrow Details
Pavement Marking Details
Parking Space Marking Details
Mailbox (Placement) Detail
Rock Wall Detail
Manhole or Catch Basin (Type II), Grade Adjustment Detail
Valve Box Adjustment Detail
Street Light
Street Light Specification
Street Light Disconnect Detail
Street Light Specifications
Concrete Street Light Foundation Typical

Miscellaneous Storm Sewer Details:

Storm Drain Pipe Trench Section Detail (Rigid Pipe)
Storm Drain Pipe Trench Section Detail (Flexible Pipe)
Catch Basin, Type I, Detail
Catch Basin, Type II, Detail (with Flow Restrictor if Applicable)
Catch Basin Frame and Grate Detail
Riprap and Energy Dissipation for Ditch Detail
New Ditch Construction Detail
Manhole or Catch Basin (Type II) Grade Adjustment Detail

LIST OF MISCELLANEOUS DETAILS

Miscellaneous Sanitary Sewer Details:

Typical Precast Manhole Detail
Typical Manhole Plan (View) Detail
Typical Shallow Precast Manhole Detail
Typical Saddle Manhole Detail
Outside Drop Manhole Detail
Inside Drop Manhole Detail
Manhole Frame and Cover Detail
Manhole Frame Collar Detail
Polypropylene Ladder and Manhole Steps Detail
Force Main Discharge Manhole Detail
Sanitary Sewer Trench Section for PVC Pipe Detail
Sanitary Sewer Trench Section for DI Pipe Detail
Pressure Line and Force Main Typical Trench Section Detail
Typical Side Sewer Detail (within New Development)
New Side Sewer Service (within Existing Street Right-of-Way)
Private Side Sewer Installation
Standing Side Sewer
Roof Structure for Electrical Enclosure Detail Lift Station
Air and Vacuum Release Assembly (Sanitary) Detail
Manhole or Catch Basin (Type II Grade Adjustment Detail)
Grease Interceptor Detail

Miscellaneous Water System Details:

Water Main Depth Requirement Detail
Typical Utility Crossing Detail
Thrust Block Detail
Anchor Block Detail
Water Main Trench Section Detail
Wet Tap Connection Detail
Cut In Connection Detail
Fire Hydrant Assembly Detail
Relocate (Existing) Fire Hydrant Assembly Detail
Fire Hydrant Location (in cut or fill section) Detail
3/4" and 1" Water Service Detail (2 pages)
1-1/2" and 2" Water Service Detail
Meter and Meter Vault Assembly (3" thru 10") Detail (3 pages)
Air and Vacuum Release Assembly Detail
2" Blow-Off Assembly Detail
Permanent End-Line Blow-Off Assembly
Water Sampling Station Detail (2 pages)
Pressure Reducing Station Detail (Two Pages)
Valve Extension Detail
Valve Box Adjustment Detail
Double Check Detector with Fire Connection
Detector Double Check Valve Assembly
Individual Double Check Detector Assembly Detail
Reduced Pressure Backflow Device Detail
Thrust Restraint For Ductile Iron Pipe
Riser Detail

LIST OF MISCELLANEOUS DETAILS

Miscellaneous Details:

Removable Rolland Detail
Type III Barricade - for Future Extended Roadway
Swing Gate and Fence Detail
Straw Bale Dam Detail
Silt Fence Detail
Storm Drain Inlet Protection Detail
Street Tree Planting and Staking Detail
Ground Cover Planting Detail
Ball & Burlap Planting Detail
Rooted Cutting/Offset/Seedling Detail
Bare Root/Can Stock Planting Detail
Alternative Fire Apparatus Access Turnaround

SECTION 9
MISCELLANEOUS DETAILS

SECTION 10
MISCELLANEOUS CITY DOCUMENTS

MISCELLANEOUS DETAILS

MISCELLANEOUS WATER SYSTEM DETAILS

MISCELLANEOUS SANITARY SEWER DETAILS

MISCELLANEOUS STORM SEWER DETAILS

MISCELLANEOUS ROADWAY DETAILS

SECTION 10

10. MISCELLANEOUS CITY DOCUMENTS

- Developer Extension Agreement
- Sample Easement Document
- Sample Bill of Sale Document
- Affidavit of "No Liens" on Project
- Developer Extension Checklist
- Developer's Bond Document
- Sample Right-of-Way Construction Permit (2 pages)

SAMPLE COPY

CITY OF PACIFIC

DEVELOPER AGREEMENT

THIS AGREEMENT, by and between the City of Pacific, a municipal corporation, hereinafter referred to as "City", and _____, hereinafter referred to as "Developer":

WITNESSETH: That whereas the City of Pacific, a municipal corporation, provides water/sanitary/storm/gas or roadway service within this area, and the above-named Developer is preparing to construct an extension or modification or additions thereto, and said development requires the City's service;

WHEREFORE, THE PARTIES AGREE AS FOLLOWS:

1. Developer agrees to construct the water/sanitary/storm/gas or roadway system, or additions thereto, to be connected to the City's infrastructure, and to maintain such additions until such time as the improvements are accepted by the City, with the agreements conditioned as set forth below. The improvements, extension, or additions thereto, shall be located within that area commonly referred to as _____, which property is described in Exhibit "A" attached hereto and referred to hereinafter as "Premises".
2. As a condition precedent to City obligations under this agreement, the Developer shall construct the proposed water/sanitary/storm/gas/or roadway system, or additions thereto, within said premises in conformance with the minimum standards as set forth in the City's currently adopted Construction Standards, as adopted together with any amendments thereto hereinafter made, and further to conform with the City's comprehensive planning documents, which agreement shall include oversizing of mains necessitated by the comprehensive plan.
3. The developer agrees that the construction of any infrastructure items, or additions thereto, shall not commence until the following conditions have been fulfilled:
 - a. The developer shall furnish the City with four (4) sets of detailed plans for the proposed improvements, or additions thereto, at Developer's own expense, prepared by a qualified engineer currently licensed in the State of Washington.
 - b. The above plans shall require the review and approval by the City and its Engineer, and the cost of such review shall be at the Developer's own expense.
 - c. Minimum requirements for all plans, or additions thereto, submitted to the City for review are:

- (1) Four (4) sets of all plans and documents shall be submitted, wherein two (2) sets will be retained by the City, and two (2) sets will be returned to the applicant.
 - (2) A preliminary plat of the area in which said improvement, or additions thereto, are to be constructed, which plat has been approved by the City.
 - (3) A map showing the location of the plat in relation to the surrounding area.
 - (4) A contour map of the plat with contour intervals of five feet or less extending fifty (50') feet beyond the plat/property lines.
 - (5) A map showing the location and depth of all proposed utilities and any connections and/or interconnections to existing facilities or future extensions and connections.
 - (6) A 1" = 50' plan and profile view of the proposed improvements showing streets, lot lines, dimensions, and location of bench marks (City datum) and monuments for the proposed plat, together with an indication of the development of the adjacent property, as may be applicable.
 - (7) A profile 1" = 50' horizontal and 1" = 5' vertical of the finished road grades with any proposed utility system improvements and other pertinent underground utilities located, with elevations noted thereon. The elevation datum shall be the same as used by the City. It shall be the responsibility of the Developer to confirm such datum with the City.
 - (8) Full-sized detail sheets shall be included as part of the construction drawings, as required to clearly indicate the details for all of the infrastructure improvements not otherwise provided for in this text, or additions thereto, to be constructed, consistent with City standards.
 - (9) Specifications sufficient to fully describe the work, consistent with the City's minimum and currently adopted Construction Standards.
 - (10) Approvals from all regulatory agencies.
- d. Construction requirements in addition to the City standards and details for developer extensions, as adopted, are as follows:
- (1) All streets and/or roadways shall be graded to within six inches of final grade before installation of utility improvements, unless otherwise approved by the City Engineer.
 - (2) All lots shall be fully staked to assist all parties involved in the proper location of utility services.

- (3) All contractors and subcontractors shall have a current Washington State Contractors License on file with the City.
 - (4) The Developer's proposed improvements, or additions thereto, on Premises 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.
- e. 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.

The Developer 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.

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, any 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' benefit acts. The City and the Developer agree that all third part claims for damages against the City for which the Developer's insurance carrier does not accept defense of the City may be tendered by the City by the Developer who shall, if so tendered by the City, accept and undertake to defend or settle with the Claimant. The City retains the right to approve claim investigation and counsel assigned to said claim and all investigation and legal work product regarding said claim shall be performed under a fiduciary relationship to the City. In the event that the City agrees or a court finds that the claim arises from the sole negligence of the City, this indemnification shall be void and the City shall be responsible for all damages payable to the third party claimant. In the event that the City and the Developer agree or a court finds that the claim arises from or includes negligence of both the Developer and the City, the Developer shall be responsible for all damages payable by the Developer to the third party claimant under the court findings, and, in addition thereto, the Developer shall hereunder indemnify the City for all damages paid or payable to the City under the court findings in an amount not to exceed the percentage of total fault attributable to the Developer. For example, where the Developer is 25% negligent, the Developer shall not be required to indemnify the City for any amount in excess of 25% of the claimant's total damages.

- f. In the event the Developer in his operation damages or disrupts existing improvements, the repairs shall be made at the Developer's expense. In the event they are so damaged or the service disrupted and the Developer fails or

is unable to immediately restore the service, then the Owners of the improvements may cause the repairs to be made by others and all costs for the same shall be at the Developer's own expense.

Where the construction crosses or is adjacent to existing utilities, the Developer shall exercise extreme care to protect such utilities from damage.

If any damage is done to an existing utility, the Developer shall notify the utility company involved, who will dispatch a crew to repair the damage at the Developer's expense. All costs for the same shall be at the Developer's own expense.

The Developer shall be aware that some existing City owned facilities are known to contain asbestos cement pipe. The Developer shall conduct all work related to existing asbestos cement pipe in strict accordance with current WISHA safety regulations and provisions contained within WAC 296-62-077. All costs related to work in compliance with established rules and regulations shall be the responsibility of the Developer. Demolition of existing asbestos cement pipe, if required, will be permitted only after the proper permits are obtained from the Puget Sound Air Pollution Control Agency. The Developer shall be responsible for all associated fees and permits required for asbestos removal and disposal. Work crews shall be provided with proper protective clothing and equipment. Hand tools shall be used, and the asbestos cement pipe shall be scored and broken in lieu of the sawing or other methods which release fibers into the atmosphere. Waste asbestos pipe shall be buried in the trench. Asbestos pipe to be abandoned in place shall not be disturbed, except as noted herein, and shall remain in its original position.

The Developer is cautioned that all existing drainage systems, whether open ditch, buried pipe, or drainage structures, are not on record. It shall be the responsibility of the Developer to repair or replace all such systems found during construction, which are damaged by the Developer's construction in a manner which is satisfactory to the City.

Where the Developer is allowed to use private property adjacent to the work, the property so used shall be returned to its original or superior condition. The Developer shall make all arrangements in advance with such property owners, to insure that no conflicts will ensue after the property is restored as described above. The Developer will be required to furnish the City with a written release from said private property owners, if the City deems it to be necessary to obtain such document.

4. The construction of the Developer's proposed improvements, or additions thereto, on the Premises shall be supervised by the City in such a manner and at such times as the City deems reasonably necessary to assure that construction of the system will conform with the above-mentioned plans and specifications and minimum City Standards. The Developer herewith agrees to allow such inspections and agrees to cooperate providing reasonable advance notice on his construction schedule during the various construction phases as requested by the City. The Developer further

agrees to reimburse the City for all engineering fees and expenses incurred by the City for such supervision.

5. The Developer's proposed improvements, or additions thereto, on Premises shall not be accepted for service and use until the same have been fully inspected and approved, and the following requirements have been performed:
 - a. Submit to the City in Auto-CADD format, latest revision, the computer file supplied on a three and one half (3-1/2) inch disc accompanied by the original "fixed line" mylars, with all changes from the original design clearly marked to reflect the as-built conditions. The Developer's Engineer shall certify the accuracy of the record drawings and shall affix his seal and signature.
 - b. Payment of all permit fees and equivalent assessment charges and any other applicable City charges required for Premises.
 - c. Payment of all plan check and inspection fees and related fees.
 - d. Prepare and furnish the required easements in accordance with City's standard form, and furnish same to the City for approval by the City Attorney, along with the necessary recording fees.
 - e. Furnish the City with an affidavit warranting there are no liens against the improvements constructed on Premises by the Developers, this affidavit shall be in the form prescribed by the City.
 - f. Furnish the City with a Bill of Sale conveying the water/sanitary/storm or roadway system to the City, which shall include a two-year guarantee that the conveyed systems or improvements or additions thereto shall be free of defects in labor and materials. Form shall be as prescribed by the City.
 - g. Payment of all applicable bills, invoices, fees, etc., have been paid in full.
6. In the event any warranty repairs are required, the City agrees, whenever feasible, to provide the Developer with reasonable notice before directly undertaking such repairs. The City reserves the right, however, to effect emergency repairs as deemed necessary by the City. The City shall be reimbursed by the Developer for all costs thereof.

**CITY OF PACIFIC
DEVELOPER AGREEMENT
EXHIBIT "A"**

PLAT NAME: _____

DEVELOPER: _____

LEGAL DESCRIPTION: _____

SAMPLE DOCUMENT

EASEMENT FOR UTILITY MAINS & APPURTENANCES

_____ (herein called the "grantor") hereby dedicates, conveys, and grants to City of Pacific (herein called the "grantee") and its successors and assigns an easement for City utility mains and appurtenances thereto under and upon the following described property situated in King/Pierce County, Washington, more particularly described as follows: (Described here or attach legal description to form):

(INSERT)

That said grantee shall have the right without prior institution of any suit or proceeding at law, at times as may be necessary, to enter upon said property and adjoining property owned by the grantor and his assigns and successors to install, lay, construct, renew, operate and maintain mains and necessary facilities and other equipment, for the purposes of serving the property or other properties with water and other utility service.

The grantor covenants that no permanent structure shall be erected, and no large trees or large shrubs shall be planted in the area of ground for which the easement in favor of City of Pacific has been provided herein.

This easement and the covenants herein shall be covenants running with the land and shall be binding on the successors, heirs, and assigns of both parties hereto.

The grantor warrants that the grantor has good title to the above property and warrants the grantee title to and quiet enjoyment of the easement conveyed herein.

No other easements for utilities shall be granted within the afore described easement area except for necessary crossings as may be mutually approved by the grantor and grantee and the grantee shall have exclusive right to construct and/or maintain City owned utilities within the easement area except for necessary crossings.

By _____ By _____
Grantor Grantor

State of Washington)
) ss.
County of King/Pierce)

On this _____ day of _____, 19__, before, me the undersigned, a Notary Public in and for the State of Washington, duly commissioned and sworn, personally appeared _____, to me known to be the person who executed the foregoing instrument, and acknowledged the said instrument to be his free and voluntary act and deed, for the uses and purposes therein mentioned.

WITNESS my hand and official seal affixed the day and year first above written.

(INDIVIDUAL)

Notary Public in and for the State
of Washington, residing at _____

*Note: Different form is required for Corporate Ownership.

CITY OF PACIFIC

DEVELOPER EXTENSION CHECKLIST

NAME OF PROJECT/PLAT _____

DEVELOPER/OWNER _____

CONTACT PERSON _____ PHONE _____

DEVELOPER'S ENGINEER _____ PHONE _____

CONTRACTOR _____ PHONE _____

JURISDICTION _____ COUNTY _____

RESIDENTIAL _____ MULTI-FAMILY _____ COMMERCIAL _____

INDUSTRIAL _____ MIXED _____

	Applies to Project <u>Yes(Y)/No(N)</u>	City <u>Dept.*</u>	Dept. <u>Initial</u>	<u>Date</u>
1. Plot Plan Received and Distributed to Staff (as applicable)	_____	P.D.	_____	_____
2. Master Plan Received (as applicable)	_____	P.D.	_____	_____
3. SEPA Checklist Received	_____	P.D.	_____	_____
4. D.N.S., M.D.N.S., or D.S. made	_____	P.D.	_____	_____
5. E.I.S. Required/Approved	_____	P.D.	_____	_____
6. Staff's Preliminary Approval	_____	C.A.	_____	_____
7. Public Meeting	_____	P.D.	_____	_____
8. Planning Commission Meeting	_____	P.D.	_____	_____
9. City Council Action Req'd on Preliminary Project	_____	P.D.	_____	_____
10. Civil Plans Completed & Transmitted				

	Applies to Project <u>Yes(Y)/No(N)</u>	City <u>Dept.*</u>	Dept. <u>Initial</u>	<u>Date</u>
to City and Approved by City Engineer	_____	C.A.	_____	_____
11. Performance Bond Received, Reviewed and Approved by City Engineer	_____	C.A.	_____	_____
12. Contractor Insurance Certificate Approved by City Attorney	_____	C.A.	_____	_____
13. Preconstruction Conference	_____	C.A.	_____	_____
14. City, County, State Permits Acq'd.	_____	C.A.	_____	_____
15. Fire Department Review	_____	F.D.	_____	_____
16. City Building Permits Issued	_____	B.O.	_____	_____
17. Construction				
(a) Project officially begins	_____	C.E.	_____	_____
(b) Punchlist Items Completed	_____	C.E.	_____	_____
(c) Final Inspection	_____	C.E.	_____	_____
(d) Resident Inspector accepts construction as complete	_____	C.E.	_____	_____
18. City Staff Approval of Construction	_____	C.A.	_____	_____
19. Bill of Sale Received, Reviewed and Approved by City Engineer	_____	C.E.	_____	_____
20. Easements Received, Reviewed, Recorded and Approved by City Engineer	_____	C.E.	_____	_____
21. Maintenance/Guarantee Bond Received, Reviewed and Approved by City Attorney	_____	C.A.	_____	_____
22. Attorney's Review Memo	_____	C.A.	_____	_____
23. City Council Final Approval & Acceptance of Project	_____	C.A.	_____	_____
24. Council Minutes of City Approval Filed in Project File	_____	C.A.	_____	_____
25. Service Agreements/Interlocal Agreements Completed & Executed	_____	C.A.	_____	_____
26. "As-Builts" (Mylars) Completed, Submitted, Approved and in City's Possession	_____	C.A.	_____	_____

	Applies to Project <u>Yes(Y)/No(N)</u>	City <u>Dept.*</u>	Dept. <u>Initial</u>	<u>Date</u>
27. Capital Facility Charge/ hookup/ Outstanding Bills Paid in Full	_____	C.A.	_____	_____
28. Final Occupancy Approval	_____	B.O.	_____	_____
29. Two Year Warranty Period Expires	_____	C.E.	_____	_____
30. Other	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
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PROJECT CLOSE OUT

City Administrator

- * City Dept. Abbreviations:
- P.D. - Planning Department
 - C.A. - City Administrator
 - B.O. - Building Official
 - F.D. - Fire Department
 - C.E. - City Engineer

SAMPLE COPY

DEVELOPER'S BOND

Developer: _____

Surety: _____

City: _____

Amount: _____

Development: _____

KNOW ALL MEN BY THESE PRESENTS: Whereas the City of Pacific, King/Pierce County, Washington, has accepted an agreement by the Developer for the construction of an extension to the City's roadways and/or utility system(s) to serve the development, in accordance with the City's regulations governing developer extensions, which regulations are incorporated into this agreement by reference, and which require the Developer to furnish a bond for the faithful performance of the work, and completion of the project within 365 days (within twelve months) from the date of preliminary approval of the Developer's application.

NOW, THEREFORE, we, the Developer and surety, are held and firmly bound to the City of Pacific in the amount named above for the payment of which we do jointly and severally bind ourselves, our heirs, personal representatives, successors, and assigns by these presents.

THE CONDITIONS OF THIS OBLIGATION are such that if the Developer, or the Developer's heirs, personal representatives, successors, and assigns shall well and truly keep all the provisions of the regulations of the City applicable to the work described in the Developer's Agreement, and pay all laborers, mechanics, subcontractors, and materialman, and all persons who shall supply such person or subcontractors with provisions and supplies for carrying on such work and shall indemnify and save harmless the City, its officers and agents, from any pecuniary loss resulting from the breach of said regulations, including the obligation of the Developer to replace or correct any defective work or materials discovered by the City within two years from the date of acceptance of the work, then this obligation shall become void; otherwise, it shall remain in full force and effect.

No change, extension of time, alteration or addition to the work to be performed by the Developer shall affect the obligation of the principal or surety on this bond, and the surety waives notice of any such change, extension, alteration, or addition thereunder.

This bond is furnished pursuant to the requirements of Chapter 39.08 of the Revised Code of Washington, and the regulations of the City, and in addition to the foregoing, is made for the benefit of the City, together with all laborers, mechanics, subcontractors, materialmen, and all persons who supply such person or subcontractors with supplies and equipment for the carrying on of the work covered by this agreement, whether or not such work is deemed to be "public work" under the laws of the State of Washington.

In witness whereof, the principal and surety have caused this bond to be signed and sealed by their duly authorized officers or representatives this ____ day of _____, 19____.

Principal

By _____

Surety

By _____