

City of Castle Rock

PUBLIC WORKS DEPARTMENT

PO Box 370

Castle Rock, WA 98611

(360) 274-7478

DEVELOPMENT POLICIES AND

PUBLIC WORKS STANDARDS



JULY 2020

FORWARD

The Mayor and Council of the City of Castle Rock welcome you to develop in a community dedicated to maintaining a quality environment.

Castle Rock's Staff will work with you to create first class additions to our city. As staff, we believe that the best way to help you through this process is to meet with you prior to the development of plans and details.

This document will show you our process and our standards. We feel that many of your questions will be answered here. While these standards are intended to apply to all projects within the City limits, they are also intended to be utilized in applicable circumstances where the City's service areas, annexation areas or planning areas extend outside its limits. These standards can also be used for annexation agreements with the county.

We attempt to achieve maximum uniformity of planning, engineering, and construction practices within the City of Castle Rock. These are minimum standards and are intended to assist, but not to substitute for competent work by engineering and design professionals. Special conditions or environmental constraints may require a more stringent design than would normally be required under these standards. It is not the intent of the City to unreasonably limit any innovative effort which could result in a superior project design. A proposed design which is different than these Development Guidelines will be evaluated on the basis that the proposed design will produce a comparable or superior result, and in every way adequate for the user, the City, and the public.

This document may contain minor errors, discrepancies or omissions which will be corrected in future updates. In the interim, the City shall have the right of imposing the "intent" of the City.

David Vorse

Public Works Director

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 or maintenance by the City and for all other improvements for which the City Code requires approval from the City Public Works Director and/or City Planning Commission and/or the City Council. These standards are intended as guidelines for designers and developers in preparing their plans, studies and/or reports and for the City in reviewing same. 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, *or adjacent to critical areas* which include, but not limited to; steep embankments, creeks, ponds, lakes, wetlands, certain wildlife habitat, unstable soils, high water tables, wetland areas, etc.

Alternate design standards may be accepted when it can be shown, to the satisfaction of the City, that such alternate standards will provide a design 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, including the WSDOT Standard Specification for Road, Bridge & Municipal Construction, and current amendments thereto.

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 Public Works Director.

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.

A. Definitions: As used herein:

- (a) “Alley:” A strip of land dedicated for public use which is 20 feet in width between property lines and which is intended to provide driveway access to adjacent properties. Alleys shall not be the only access to a property. All lots must front on a public street.
- (b) “City:” means the City of Castle Rock, Washington, Cowlitz 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.

- (c) “City Engineer:” means the City of Castle Rock Engineer, whether staff engineer or consultant.
- (d) “Complete Streets”: means a street that is designed to be safe and accessible for all: drivers, bicyclists, transit riders and vehicles, freight vehicles, emergency service providers, and pedestrians of all ages and abilities.
- (e) “Contractor:” means the Developer’s contractor or subcontractor.
- (f) “CRMC:” means the City of Castle Rock Municipal Code
- (g) “Developer:” means 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.
- (h) “Director of Public Works:” The City of Castle Rock Public Works Director or his/her duly authorized representative.
- (i) “Easement:” The right to use a defined area of property for a specific purpose/purposes as set forth in easement documents, on a subdivision plat or short subdivision plat or as required for purposes of this ordinance.
- (j) “Engineer:” Any Washington State licensed professional engineer who represents the developer.
- (k) “Facility:” means trenching and trench repair, electric lines, telephone lines, fire alarm and telephone/television cables, gas lines, water and sanitary sewer lines, storm drainage lines, all pump stations, transfer stations, buildings and structures needed in their support and/or service.
- (l) “Half Street:” means those streets with a high probability that lots or dwelling units will be proposed on the opposite side of the street and eventually the street will be at full designated width.
- (m) “Interceptor:” means a sewer line that receives flow from a number of main or trunk sewer lines, force mains, etc.
- (n) “Lateral:” means that section of the sewer line extending from the City’s main line to the right-of-way or easement line that has no other common sewers discharging into it.
- (o) “Mayor:” means mayor of the City of Castle Rock or his/her authorized representative.
- (p) “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.

- (q) “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.
- (r) “Plans:” mean drawings, including reproductions thereof, of the work to be done as an extension to the City’s transportation or utility systems, prepared by an Engineer licensed in the State of Washington.
- (s) “Project:” means the general term encompassing all phases of the work to be performed and is synonymous to the term “improvement” or “work”
- (t) “Right-Of-Way:” means all real property owned or held by the city in fee, or by way of easement, or dedicated to the public and located within the city, and used or intended for use as a street, alley, sidewalk, public way or easement for public or private utilities, whether developed or undeveloped.
- (u) “Road:” Used interchangeably with street.
- (v) “Sidewalk:” means a concrete walk for pedestrian use outside the building lot line of any privately owned property, for use by the general public.
- (w) “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.
- (x) “Street:” 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.
- (y) “Work:” means the labor or materials or both, superintendence, equipment, transportation, and other facilities necessary to complete the project.

B. Developer to be Informed:

It is the Developer’s responsibility 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.

C. Authority of the Public Works Director:

The Public Works Director or his authorized representative shall have the authority to determine compliance with these standards.

D. 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 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 may pay any of the above charges and fees under protest to receive project approval, while appealing the costs to the Castle Rock City Council if he/she does not believe the bills are accurate or believes the amount is exorbitant.

E. Acceptance by City:

Upon completion of required infrastructure improvements, the City shall conduct a final inspection of improvements. If the City finds that the improvements have been completed in accordance with these standards, the City will accept the improvements as complete and the Developer shall transfer the improvements to the City through a Bill of Sale. An example document is included in the Appendix.

SECTION 2

2. PERMITS

2.01 Permit Process

No person(s), firm or corporation shall commence work on the construction, connection, alteration or repair of any facility located either in the public right-of-way or a public easement or any project or work which may jeopardize the City's infrastructure without first having been obtained from the City *all* necessary approvals and permit(s)

Any party requesting such approval or permit shall file a written Right-of-Way Use Application Form with the City at least 7 working days before construction activity is proposed to start. The application shall be made on the following form, available in the Castle Rock Public Works Department or the Castle Rock City Hall. In addition to the information below, **a complete application shall contain "proof-of-insurance" as per, Section 3.03 of these standards.** Fee for right-of-way permits shall be as established in the City of Castle Rock fee schedule.

Application Denied - Appeal:

- No permit shall be issued until the application has been approved by the Public Works Director or his/her designee
- No application 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 Castle Rock, nor shall issuance of a permit be construed as a waiver of any ordinance requirements concerning the plan. Any permit issued in error shall be null and void.
- Appeal of a denied Application shall be to the Castle Rock City Council. Decision of the Council shall be final and binding on both parties.

Application Approved:

Upon approval of the aforementioned application and collection of all related fees, a Right-Of-Way Permit, as illustrated on the following pages.

The City shall be the applicant for Cowlitz County right-of-way permits required along county roads within the Castle Rock water service area. The party requesting the approval shall provide the project drawings to the City of Castle Rock Public Works Department and shall also reimburse the City of Castle Rock for all permit fees charged to the City by Cowlitz County.



APPLICATION TO PERFORM WORK ON PUBLIC RIGHT-OF-WAY
CITY OF CASTLE ROCK
PUBLIC WORKS DIRECTOR/ENGINEERING
360-274-7478

The undersigned hereby makes application to:

Location:

And agrees to perform the work in strict compliance with the provisions enumerated below and states that he/she has read and will adhere to the general provisions applicable to permits contained on the **reverse** side of this form.

NAME: _____ PHONE: _____

ADDRESS: _____ FAX: _____

E-MAIL: _____

SIGNATURE: _____

Proposed starting date of installation: _____

Duration of Project: _____

Permission is hereby granted to perform the above described work subject to the general provisions on the reverse side of this form, and with the following special conditions:

The Public Works Director (360-274-7478) must be contacted for inspection 24 hours before backfilling trenches or repairing pavement.

The Underground Utilities Locates (Phone #: 811) must be contacted three (3) working days before proceeding with any excavation associated with this permit.

A bond in the amount of \$ _____ is required to insure compliance with the above conditions, refundable upon satisfactory completion of work.

No work shall be done under this permit until the party or parties to whom it is granted shall

have communication with and received instructions from: _____

PERMIT ISSUED: _____, 20 ____ BY _____

INSPECTED: _____, 20 ____ BY _____

REMARKS: _____

GENERAL PROVISIONS APPLICABLE TO ALL PERMITS

In accepting this permit, the petitioner, his successors and assigns, agree to protect the City of Castle Rock, Washington, and save it harmless from all claims, actions or damages of every kind and description which may accrue to or be suffered by any person, or persons, corporation or property by reason of the performance of any such work, character of materials used or manner of installation, maintenance and operation or by the improper occupancy of rights of way or public structure and in case of any suit or action is brought against said city for damages arising out of or by reason of any of the above causes, the petitioner, his successors or assigns will upon notice to him or them of commencement of such action, defend the same at his or their own sole cost and expense and will satisfy any judgement after the said suit or action shall have finally been determined if adverse to the said city.

If the work done under this permit interferes in any way with the drainage of the area, the grantee shall wholly and at his/her own expense make such provision as the city may direct to take care of said drainage.

On completion of said work herein contemplated all rubbish and debris shall be immediately removed and the roadway shall be left neat and presentable and satisfactory to the City of Castle Rock.

The party or parties to whom this permit is issued shall maintain at his or their sole expense the structure or object for which this permit is granted in a condition satisfactory to the City of Castle Rock.

The City of Castle Rock may revoke, annul, change amend, amplify, or terminate this permit or any of the conditions herein enumerated if grantee fails to comply with any or all of its provisions, requirements or regulations as herein set forth or thru willful or unreasonable neglect, fails to heed or comply with notices given or if the utility herein granted is not installed or operated and maintained in conformity herewith or at all or for any cause or reason whatsoever.

All work areas shall be adequately barricaded according to MUTCD standards. Barriers shall be properly lighted at night. Prior to closing any street or alley to traffic, the following shall be notified:

Castle Rock Public Works Department _____ 360-274-7478
Castle Rock Police Department _____ 360-274-4711
Castle Rock School Transportation Office _____ 360-501-3126
Fire District 6 _____ 360-274-4413

All work within the City right of way shall comply with City requirements as outlined in the City of Castle Rock Engineering Standards, Development Policies and Public Work Standards.

Trench backfill and pavement restoration shall be per Chapter 4, Section 4.17 and Table 4.3.

<https://ci.castle-rock.wa.us/engineeringstandards.htm>

All work shall be conducted using current WISHA/OSHA regulations. Particular attention shall be paid to the requirements as they pertain to work in trenches, electrical work, work in high places and to safety apparel such as hard hats and safety vests.

The Public Works Director's office (360-274-7478) must be contacted for inspection 24 hours before backfilling trenches or repairing pavement.

SIGNATURE _____

DATED THIS _____ DAY OF _____, 20____

2.02 Construction Stormwater Permits

A Construction Stormwater NPDES Permit from the Washington State Department of Ecology (WSDOE) will be required for projects meeting the following criteria:

1. Clearing, grading and/or excavation which results in the disturbance of 1 or more acres, and discharges stormwater to surface waters of the state;
2. Clearing, grading and/or excavation on sites smaller than 1 acre which are part of a larger common plan of development or sale, if the common plan of development or sale will ultimately disturb one acre or more, and discharges stormwater to surface waters of the state.

The developer shall submit evidence of coverage by a Construction Stormwater NPDES Permit obtained from the WSDOE, prior to beginning construction activities. Temporary erosion and sediment control (TESC) plans meeting the minimum requirements of the Department of Ecology must be submitted to and approved by the City Engineer prior to the beginning of on-site construction activities.

2.03 Modifications

A. Submittal

Requests to modify City Standards shall be submitted in writing by the developer's engineer, to the City Engineer. This written request shall state the desired modification(s), the reason(s) for the request(s) and a comparison between the specification(s), standard(s), and the modification(s).

Any request for modification or variance of City Standards should be documented with reference to nationally accepted specifications/standards.

B. Review

The request to modify shall be reviewed by the City Engineer, who shall consult the appropriate review authorities and make one of the following decisions:

- Approve as is,
- approve with changes,
- or deny with an explanation.

The modification, if approved, is for project specific use. Approval of a request shall not constitute a precedent.

C. Appeal

The applicant may appeal the City Engineer's decision to the City Council.

D. Criteria for Modification of Standards

The City Engineer may grant a modification to the adopted specifications or standards when any one of the following conditions are met:

- The specification or standard does not apply in the particular application.
- Topography, right-of-way, or other geographic conditions impose an economic hardship on the applicant and an equivalent alternative which can accomplish the same design is available that does not compromise public safety or accessibility for the disabled.
- A change to a specification or standard is required to address a specific design or construction problem which if not enacted will result in an undue hardship.

SECTION 3

3. PUBLIC WORKS CONSIDERATIONS

3.01 Performance Standards and Licensing.

The developer shall comply with all applicable local, state and federal (if applicable) requirements.

3.02 Bonding

- A. Developers wishing to obtain final plat approval prior to completion of required public infrastructure must submit a performance bond to the City guaranteeing completion of the required infrastructure. The performance bond must be approved as to surety by the City Public Works Director and as to form by the City Attorney, in their sole discretion. The amount of such bond shall be 150 percent of the City Engineer's approved value of the improvements, as determined in his or her sole discretion.
- B. All developers deeding infrastructure to the City shall furnish a Maintenance Bond to the City. The Maintenance Bond shall guarantee the infrastructure for a 2-year period from the time of inspection and final written approval of the construction by the City. The amount of the bond shall be 20 percent of the value of the City Engineer's approved value of the improvements, as determined in his or her sole discretion. Of particular importance is a Maintenance Bond for construction involving work within the roadway section. Work over areas of certain soils (soils with shrink-swell properties, sliding potential, etc.) or use of materials of questionable quality or functional longevity or signs of paving failures, storm drain failures, etc., may require an extension of the Maintenance Bond for up to 5 years, as determined in sole discretion of the City Engineer.

3.03 Indemnification

- A. The Developer shall hold harmless, indemnify and defend City, its officers, elected officials, agents and employees from and against any and all claims, suits, actions, liability, loss, expenses, damages, and judgments of any nature whatsoever, including costs and attorneys' fees in defense thereof, for damage to any property or business and/or any death, injury, sickness or disability to any person caused by or arising out of or suffered, directly or indirectly, in connection with the performance of this agreement or any act, error or omission of the Developer, Developer's employees, agents, or Subcontractors, whether by negligence of otherwise.

- B. The Developer shall assume the risk, liability and pay all damages, loss, costs, and expenses of any party, including its employees, arising out of the performance of this agreement, except that caused by the negligence and/or willful misconduct solely of City and/or its officers, elected officials, agents and employees acting within the scope of their employment.
- C. The Developer further agrees to waive its immunity under RCW 51 for any injury or death suffered by Developer's employee(s) caused by or arising out of the Developer's acts, errors or omissions in the performance of this agreement. This waiver is mutually negotiated by the parties.

3.04 Developer's Public Liability & Property Damage Insurance

The Developer shall not commence work until he/she has furnished evidence (in duplicate copy) of insurance required hereunder, and such insurance has been reviewed (upon request) by the City Attorney and/or the City's Insurance Carrier; 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. Any approval of the insurance as may be given by the City's Insurance Carrier 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.

The Developer shall maintain, during the life of the Project, 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 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 (vehicles and equipment);
- b. Non-owned automobiles (vehicles and equipment);
- c. Hired automobiles (vehicles and equipment).

The insurance coverage's 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:

- a. Comprehensive General and Automobile Bodily Injury Liability Insurance on an occurrence basis of not less than Two Million dollars (\$2,000,000.00) 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.
- b. Comprehensive General Property Damage Liability Insurance on an occurrence as is for limits of not less than Two Million Dollars (\$2,000,000.00) 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.
- c. 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.
- d. Comprehensive Liability Insurance shall include the City and its agents as Additional Named Insured.
- e. 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:
 - (i) Injury to or destruction of any property arising out of blasting or explosion;
 - (ii) 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.

- (iii) 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
- (iv) Injury to or destruction of property at any time resulting therefrom.

There shall be included in the liability insurance, contractual coverage sufficiently broad to ensure 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.

3.05 Compensation & Employer's Liability Insurance

The Developer shall maintain Workmen's Compensation 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.

In the case of an employer who is self-insured under the provisions of the Industrial Insurance Act, the Developer shall also maintain and shall cause each contractor or subcontractor which is self-insured 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, list the City as an additional insured, and furnish, upon request of the City, satisfactory evidence of same.

3.06 Non-interference

The permittee shall be responsible for minimum interference with:

- Traffic Routing
- Fire Facility Clearance
- Adjoining Property(ies)
- Utility Facilities

- Natural Surface Drainage
- Pedestrian Safety

These items are to be discussed in a pre-construction meeting with the Public Works Department, Fire and Police Departments and the Building Department, and special provisions may be included in any applicable City Permit(s). A written plan to reduce any or all of the aforementioned interference's may be required of the permittee by the City. An erosion control plan shall also be submitted and approved by the City.

3.07 Work Standards

All work performed pursuant to a permit issued shall be done in accordance with these standards and the current amendments thereto, as well as, any prevailing regulatory requirements. Job site safety and trench shoring requirements, in accordance with the Washington State Labor and Industries, shall be the full responsibility of the permittee.

3.08 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 Public Works Director shall be notified on the working day prior to commencing any work in the City's right-of-way or public easements. The Public Works Director 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 written approval of construction, a visual inspection of the job site will be made by the City and a written report may be prepared and submitted. Restoration of the area shall be complete with all improvements being restored to substantially their original or superior condition. Final written approval of construction shall not be given until after satisfactory completion of construction, as witnessed by the City, and the submission and City approval of developer sponsored as-built drawings.

3.09 As-built Drawings

Permittees who install utility or roadway 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 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 in a minimum of 50-foot intervals along the location of said utility. The datum shall be per City datum as mandated by the City engineer.

Such as-built drawings shall be submitted to the City within 30 calendar days after completion of the work, and are required prior to the issuance of the City's final written approval of construction.

In the event that the permittee does not have qualified personnel to furnish the as-built drawing required by this section, he shall advise the Public Works Director (48-hours advance notice) in order that necessary field measurement may be taken during construction for the preparation of as-built drawings. All costs of such field inspection and measurement, to include the preparation of the as-built 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 minimum 20-pound bond with a signature and date which verifies the "as-built" condition of the project. Non-essential data shall be removed from the Plans at the City's discretion. Sticky back (glue) reproductions or "sepia" mylars shall not be considered acceptable. An electronic copy in .pdf and AutoCAD format (check with City on version required) of the drawings shall also be required, unless otherwise approved by the City.

Vertical datum shall be NAVD88 and the horizontal shall be NAD83/2011.

SECTION 4

4. STREET AND ASPHALT CONCRETE PATHS AND/OR BIKEWAYS STANDARDS

4.01 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.

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, and, impacts caused to the existing system.

The City is committed to fulfilling its obligation of meeting the requirements of Complete Streets, per City Ordinance No. 2017-03. All development shall incorporate Complete Streets design features and infrastructure into project design to the extent practicable.

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.

The layout of streets shall provide for the continuation of existing arterial and collector streets in adjoining subdivisions or of their proper projection when adjoining property is not subdivided. Local access streets, which serve primarily to

connect neighborhoods and 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 0.5 percent. The maximum allowable grade shall be 15 percent, depending upon the street classification, unless otherwise approved in writing by the City.

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 on streets without concrete vertical curb and gutter. Vertical concrete curb is the typical City Standard.

3. The Developer is required to retain a licensed Geotechnical Engineer to perform 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 Public Works Director and/or City Engineer, 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 without specific City council approval.
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 after consultation with the Cowlitz County Emergency Services.
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. 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 and constructed to City standards.
 9. Half streets will only be approved where the City and Fire Marshal's office determine that they are necessary at the boundary of plats to facilitate development on adjacent parcels and where they don't adversely impact public safety.
 10. Street layout in residential subdivisions should maintain a minimum intersecting street spacing for local and collector streets of 500 feet. No streets should intersect at intervals closer than 125 feet, unless, in the judgment of the City Engineer, an exception to this rule would be in the public interest.
 11. The street system in residential subdivisions should be laid out to limit the number of intersections with arterial streets at intersections closer than 1,320 feet.
 12. 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 seventy degrees, without specific written City approval.
 13. Streets shall conform to all requirements of the latest edition of the International Fire Code adopted by the City.
 14. 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 50 feet;
- Gutterline elevations every 50 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;
- Length and width of sidewalks and driveways;
- Curb and gutter;
- Wheelchair ramps;
- Illumination. (Illumination not required to be shown on same sheet 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.

15. Grades (slopes).
 - a. Grades shall be as shown in the Minimum Street Design Standard Table.
 - b. Grades of pedestrian ways or crosswalks shall not be more than eight percent (unless otherwise approached in writing by the City Engineer).
 - c. All vertically aligned profile grade changes shall be connected with a vertical curve, which shall have a minimum k-value as recommended in the AASHTO "Green Book" (*A Policy on Geometric Design of Highways and Streets*)
16. 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.
17. Cul-de-sac's shall be discouraged and connecting streets shall be utilized where possible.
18. All public streets, sidewalks and alleys shall conform to one of the herein referenced minimum construction standards and shall be adjusted as necessary to match existing facilities, serve the proposed development, and meet the needs of anticipated future development;
19. All topsoil and unsuitable soils shall be removed from below the proposed street between the back of sidewalks.
20. In addition to the above requirements, street design shall incorporate the following minimum requirements:
 - a. All new utility systems such as power, gas, cable TV 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;
 - b. Any project of sixteen dwelling units or more, accessing off of an arterial road requires a center turn lane and right-hand turn lanes unless a traffic study shows that such lanes are not warranted;
 - c. Roads are to be saw cut before permanent patch is made or new asphalt pavement is tied into existing road;

22. The General Notes numbered 1 through 7, 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 Castle Rock Standards and current amendments thereto and the and the most current version of the 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 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 48-hours notice is required to be provided to the Public Works Director for form inspection.
7. See City of Castle Rock 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.

The functional classifications of streets are defined as follows:

- a. Major arterials: streets connecting two or more arterials together or serving industrial areas.
- b. Minor arterials: streets connecting two or more collector streets.
- c. Collector streets: streets currently serving or anticipated to serve more than 64 dwelling units or connecting to an arterial.
- d. Local access: streets currently serving or anticipated to serve in the future up to 64 dwelling units.
- e. Minor access:
- f. Alley: a strip of land dedicated for public use which is 20 feet in width between property lines and which is intended to provide driveway access to adjacent properties. Alleys shall not be the only access to a parcel. All lots should front on a public street.

STREET & ASPHALT CONCRETE PATHS AND/OR BIKEWAYS STANDARDS

TABLE 4-1
MINIMUM STREET DESIGN STANDARDS[†]

Design Standard	Major Arterial	Minor Arterial	Collector	Local Access	Minor Access	Alley
Minimum Right-of-Way	100'	80'	60'	60'****	40'	20'
Minimum Pavement Width*	52'	40'	36'	36'****	20'	20'
Travel Lanes and Minimum Width	4 – 12'	2 – 12'	2 – 10'	2 – 10'	2-10'	2 – 10'
Center Turn Lane**	No	Yes (12')	No	No	No	No
Parking Lane	None	None	Both Sides	Both Sides	None	None
Minimum / Maximum Grade	0.5%-10%	0.5%-10%	0.5%-15%	0.5%-15%	0.5%-15%	0.5%-15%
Curb	Cement Concrete Curb and Gutter Both Sides	Cement Concrete Curb and Gutter Both Sides	Cement Concrete Curb and Gutter Both Sides	Cement Concrete Curb and Gutter Both Sides	None.	None: Center Gutter
Sidewalks <2% cross slope	6' Both Sides: (commercial areas may require up to 10' widths at discretion of Public Works Department)	6' Both Sides: (commercial areas may require up to 10' widths at discretion of Public Works Department)	5' Both Sides	5' Both Sides	None.	None.
Planter Strip	6'	6'	6'	6'	N/A	N/A
Intersection Curb Radius	30'	30'	30'	25'	15'	15'
Design Speed (MPH)	45	35	25	25	25	25
Minimum Centerline Radius for Normal Crown***	520'	520'	205'	205'	N/A	N/A
Stopping Site Distance	250'	250'	155'	155'	155'	155'

NOTES:

[†] Street improvements may require implementation of additional features to satisfy Complete Streets requirements.

* Pavement Section for arterials includes 2-foot shoulder on each side

** Center turn lane may be required based on Traffic Impact Analysis.

*** Low speed horizontal curve design as shown in Table 4-2 may be used on Local Access Streets.

**** Upon approval by the City, Residential Local Streets may be reduced in width to 50-foot right-of-way and 28-foot paved width, with only one parking lane, if developments provide at least 4 off street parking spaces for each lot.

TABLE 4-2
Minimum Centerline and Curb Radius for Low Speed Curves

		<u>Up to 75°</u>	<u>75° & Over</u>
A.	Minimum Centerline Radius (2-lane)	100'	55'
B.	Minimum Curb Radius	80'	35'

4.04 Street Names

The City shall review all proposed street names to ensure that the name assigned to a new street is consistent with City policies and approved by Cowlitz County Emergency Services.

An address number will be assigned to all new buildings at the time the building permit is issued by the City. 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, with a minimum height of 6-inches. The City shall approve locations, numbers, size and type of street signs.

4.06 Right-of-Way

Required right-of-way is determined by the functional classification of a street. See Minimum Street Design Standards Table for specific additional information. At the time of site plan approval or land use approval, the City may require additional right-of-way to be dedicated to bring existing streets to current street standards.

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 commercial and residential development, plats, and short plats shall install street frontage improvements at the time of construction as required by the City. Such improvements may include curb and gutter, sidewalk, street storm drainage, street lighting system, utility relocation, landscaping and irrigation, and street widening all per these Standards. Plans shall be prepared and signed by a licensed civil engineer currently registered in the State of Washington.
- B. All frontage improvements shall be made across full frontage of property from centerline to right-of-way line.
- C. Exceptions. When the Public Works Director deems that the above such improvements cannot be accomplished at the time of building construction, a recorded agreement on forms provided by the City shall be completed which provide for these improvements to be installed at a later date by the applicant or by the applicant's signing of a waiver of protest in a Local Improvement District (L.I.D.), or Utility Local Improvement District (U.L.I.D.). Work in the right of way shall be completed within 5 years of the City issuing a permit and the Developer shall provide a Developer Bond to ensure completion.

4.08 Cul-de-sac

Cul-de-sacs shall be discouraged. 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 of 45 feet for residential streets and 50 feet for industrial commercial streets. Right-of-way radius shall be 10 feet greater than the paved radius.

4.09 Temporary Dead Ends

Where a street is *temporarily* dead ended, turn around provisions must be provided where the road serves more than two lots. If pre-approved by the local fire marshal and the City, the turn around may be a hammerhead with a minimum inside turning radius of 35 feet and a minimum distance on both sides at the centerline intersection of 60 feet to facilitate emergency vehicle turn-around.

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. Intersection traffic

control devices may include stop signs, signals, or roundabouts.

- 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 1-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 CR014STA and CR014STB 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 4-inches of 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 considered 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. Driveways serving four or more properties shall be considered a minor access road and shall meet the requirements as listed in Table 4-1.
 6. 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.
 7. No commercial driveway shall be approved where backing onto the sidewalk or street will occur.
 8. No driveway aprons shall extend into the street further than the face of the curb.
 9. The angle between any driveway and the street shall be not less than 45°.
 10. The two edges of each driveway shall be parallel.
 11. Every driveway must provide access to a garage, carport, parking apron or other structure on private property requiring the entrance of vehicles. No public curb shall be cut unless a driveway is installed.
 12. Maintenance of driveway approaches shall be the responsibility of the owners whose property they serve.
 13. 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.

14. 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.
15. 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.
16. Driveway approach to City streets to be paved, unless otherwise approved by the Public Works Director. In no case shall a concrete sidewalk be paved over with asphalt.
17. Driveway Size and Number:
 - a. Except as otherwise provided, the width of any residential driveway shall not exceed 24-feet (exclusive of the radii of the returns). The maximum width for any commercial driveway shall be 30-feet unless a large percentage of large truck traffic uses the driveway. 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 12-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 40 percent of that ownership along the street.
 - d. The length of any driveway shall not exceed 150-feet.
 - 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.

18. Driveway Slopes:

Driveway slopes or grades shall not exceed fifteen (15%) percent unless otherwise authorized/approved by the City Engineer in writing. The City Engineer will consider authorizing driveway slopes exceeding fifteen percent, if it is determined that:

- a. The steeper driveway is the only reasonably economical 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.

19. Driveway Access:

- a. No driveway may access an arterial street 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.
- b. 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.
- c. 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.
- d. 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.
- e. 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)**

PROPERTY FRONTAGE	MAXIMUM DRIVEWAY WIDTH
<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

PROPERTY FRONTAGE	NUMBER OF DRIVEWAYS	MAXIMUM DRIVEWAY WIDTH
<16'	1	8'
16' to 30'	1	50% of Frontage
>30' to 50'	1	22'
>50' to 75'	1	26'
	Or 2	18'
>75' to 1,000'	1	30'
	Or 2	22'

- f. 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.
- g. Parking lot circulation and signing needs shall be met on site. The public right-of-way shall not be utilized as part of a parking lot flow.
- h. Road approaches and/or ingress and egress tapers may be required in industrial and commercially zoned areas as directed by the City Engineer.

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 CR011ST 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 of Yield Controlled Intersection
 Sight Distance (feet)

Speed Limit (mph)	(A) Major Street	(B) Minor Street
20	225	*
25	280	*
30	335	*
35	390	*
40	445	*

* 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. See Standard Detail CR011ST.

Uncontrolled Intersection
 Sight Distance (feet)

Speed Limit (mph)	(A) Major Street	(B) Minor Street
20	90	90
25	115	115
30	140	140
35	165	165
40	195	195

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.

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 requirements of WSDOT Standard Specification Section 9-03.9(3)

Base courses and top courses shall be placed in accordance with the approved cross-section. Compaction shall be a minimum of 95 percent 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 will be paved with either Hot Mix Asphalt 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 to determine a statistical representation of the existing soil conditions.

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

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

Construction of streets paved with Hot Mix Asphalt shall conform to Section 5-04 of the Standard Specifications. Pavement material will be HMA Class ½" PG 58H-22 and be constructed at least 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(7) 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-inch HMA Class ½" PG 58H-22 when available or 4-inch medium-curing (MC-250) liquid asphalt (cold mix), 3-inch Asphalt Treated Base (ATB), or steel plates suitable for H-20 traffic loading conditions. Steel plates shall be provided with a cold mix "lip" to accommodate a smooth transition from pavement to steel plate.

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.

Adequate signage per MUTCD shall be provided.

4.17 Trench Backfill and Restoration

Trench restoration shall be either by a patch or patch plus overlay as required by the City. This section provides pavement restoration requirements for roadway and utility work.

- A. All trench and pavement cuts shall be made by sawcuts. The cuts shall be a minimum of 1 foot each side outside the trench width.
- B. All trenching shall be backfilled with gravel base 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) shall be placed and compacted in the trench sections for all street crossings.

If the existing material is determined by the City to be suitable for backfill, the Contractor may use the native material outside the roadway prism, except that the top 12 inches of trench shall be 5/8-inch minus crushed rock. Exceptions may be granted by the City based on site evaluation of excavated materials. All trench backfill materials shall be compacted to 95 percent density.

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

Replacement of the asphalt concrete or Portland cement concrete shall match existing asphalt concrete or Portland cement concrete 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. HMA Class ½" PG 58H-22 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 of the WSDOT Standard Specifications. Asphalt

concrete over 2 inches thick shall be placed and compacted in equal lifts in accordance with Section 5-04 of the WSDOT Standard Specifications.

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 HMA 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 per Section 9-04 of the WSDOT Standard Specifications.
- F. When trenching within the roadway shoulder(s), the shoulder shall be restored to its original or better condition.
- G. The final patch shall be completed as soon as possible and shall be completed within 30 days after first opening the trench. This time frame may be adjusted if delays are due to inclement paving weather, or other adverse conditions that may exist. However, delaying of final patch of overlay work is allowable only subject to the Public Works Director's approval. The Public Works Director 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.
- H. Roadway Restoration for Utilities
Roadway restoration for utility work shall meet the following requirements:

TABLE 4.3
PAVEMENT RESTORATION REQUIREMENTS – UTILITIES

Project Type	New Pavement <5 years old	Pavement >5 years old	Pavements identified by the City to be reconstructed within 2 years
Large Projects – Consist of a project requiring a longitudinal trench cut through the paved roadway surface 50 linear feet or greater, or four or more transverse trench cuts per 300 linear feet of roadway.	Complete reconstruction, grind/inlay or overlay of entire paved surface (all lanes). Pavement section based on pavement design.*	Grind/inlay, reconstruct or overlay. Width per lane requirements in section 7.01. Pavements based on pavement design. Patch per Standard Plan CR029SS.	Depending on intended reconstruction strategy. Could utilize lesser pavement restoration. Minimum restoration is patch per Standard Plan CR029SS.
Small Projects – Consists of a project requiring a longitudinal trench cut through the paved roadway surface less than 50 linear feet or less than four trench cuts per 300 linear feet of roadway.	Patch per Standard Plan CR029SS. Trench restoration penalty assessed per square yard of trench as required by Standard Plan CR029SS.	Patch per Standard Plan CR029SS.	Depending on intended reconstruction strategy, could utilize lesser pavement restoration. Minimum restoration is patch per Standard Plan CR029SS.
Emergency Projects – A project that could not be foreseen requiring immediate attention for the preservation of life or property.	Grind/inlay, reconstruct, overlay or patch (depending on project size, see above). Width per lane requirements in Section 7.01. Pavement section based on pavement design.	Grind/inlay, reconstruct, overlay or patch (depending on project size, see above). Width per lane requirements in Section 7.01. Pavement section based on pavement design.	Depending on intended reconstruction strategy, could utilize lesser pavement restoration. Minimum restoration is patch per Standard Plan CR029SS.
* If it is determined by the Public Works Director that full paved surface restoration impacts are excessive (i.e. traffic congestion, business impacts), restoration can be reduced to trench restoration only and fee-in-lieu equal to the cost of full paved surface restoration assessed.			

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 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 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 performed on all materials and construction as specified in the WSDOT Standard Specifications and with frequency per Section 9-3.7 of the WSDOT Construction Manual, or as required by the City engineer.

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).

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, 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 downtown 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 5-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 meeting the requirements of Section 9-04 of the WSDOT Standard Specifications.

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

The sidewalks shall be a minimum of 6-feet in width. At discretion of the Public Works Director and/or City Engineer, in commercial corridors, sidewalks up to 10-feet wide may be required. See Detail CR012ST and CR013ST.

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

The sidewalks on collector and Local Access Streets shall be a minimum of 5-feet wide. See Detail CR012ST and CR013ST.

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 shown in details. The City Public Works Department shall require that the design of all sidewalks provides for a gradual rather than an abrupt transition between sidewalks of different widths or alignments. Sidewalk shall meet the requirements for Americans with Disabilities Act, with cross slopes less than 2%.

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 4.11 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 3000 Cement Concrete in accordance with Section 8-04 of the Standard Specifications. Curbs shall be of the vertical face type. No rolled curb and gutter profile will be allowed without specific approval of the Public Works Director. When rolled curbs are approved, all sidewalks within the Plat shall be a minimum 6 inches thick.

Extruded curb and gutter per WSDOT Standard Specifications is allowed only with the specific approval of the Public Works Director or 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 1-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 1/8 inch when checked with a 10-foot straightedge. The alignment shall not vary more than 1/4-inch in 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 troweled 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 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 CR017ST and CR014STC. 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. ADA Ramps

All sidewalks must be constructed to provide for ADA ramps in accordance with the current standards of applicable state law. Ramps shall be provided at each corner of every intersection. Ramps shall meet the current ADA ramp detail as included in the WSDOT Standard Plans. For ramps with tangent grades greater than 5%, the applicant shall submit site specific details for the ramp to ensure that proper grades can be achieved.

ADA Ramps shall be constructed of Portland Cement Concrete. Form and subgrade inspection by the City are required before ADA 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 two test cylinders shall be taken once per day. All other testing frequencies shall be as specified in Section 4.19, Materials and Construction Testing.

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

4.21 Illumination

A. General

All new commercial or residential subdivisions, short plats or property development requiring review shall provide street lights in accordance with these standards.

B. Design Standards

A street lighting plan submitted by the applicant and approved by the City shall be required for all street light installations. All public street light designs shall be prepared by an engineering firm capable of performing such work. The plans must be prepared in accordance with Cowlitz County PUD Standards as well as the City's Standards contained herein. All developments shall submit the lighting plans on separate sheets. Street light layout plans shall be on separate drawings from the street plan/profile sheets. The final locations shall be approved by the City and comply with these Standards.

Street lighting plans shall include:

- a. Street light: location, type, height, and wattage
- b. Service Cabinets: location and type
- c. Conduits and Wire: location, type, size and length
- d. Junction Boxes: locations and types

C. General Material Requirements

a. Conduit

All conduit shall be buried a minimum of 24 inches deep. All roadway crossing shall be Schedule 80 PVC. Conduit shall conform to Section 9-29 of WSDOT Standard Specifications. Schedule 40 PVC may be used in locations other than roadway crossings.

b. Junction Boxes (when required):

Junction boxes shall be installed at locations as shown on the Plans. They will conform to WSDOT Standard J-40.10-04, Locking Lid Standard Duty Junction Boxes Type 1. They shall be installed within the landscape strip and material firmly compacted around the box to prevent future settlement.

c. Conductors, Wire, Etc.:

Wire conductors for underground feeders runs and for circuitry from the in-line fuse in the poles to the Junction Box shall be 600 volt, single conductor stranded copper and insulated with USE grade polyvinyl chloride compound or approved equal in accordance with the Insulated Power Cable Engineer's Association Specifications. An AWG 10 bare solid copper wire or green insulated stranded copper wire will be run from the service ground rod to the safety ground lug on each pole. Feeders shall be sized in accordance with the National Electrical Code. Wires inside pole between ballast and in-line fuses shall be Rome 2C AWG 10 stranded pole and bracket wire or approved equal. Splices will be allowed in junction boxes and pole base only.

d. Fuses:

Luminaire Fusing and Electrical connections at Light Standard Base shall conform to Section 9-29.7 of the State of Washington Standard Specifications. In-line fuse holders shall be SEC mode 1791-SF with FNM-5 fuses or approved equal.

e. Safe Wiring Labels.

The Contractor is advised that Safe Wiring Labels as required by Labor and Industries shall apply on all projects.

f. Location and Spacing:

In general, poles and luminaries shall be spaced as described below to provide average illumination of 0.4-foot candles on the roadway with a Uniformity Ratio of 6 to 1 (average/minimum), as prescribed for a Local-Residential classification with R 2/3 surface in IES Standard RP 8, "Roadway Lighting."

- 1 Poles shall be spaced a minimum of 16 inches from the face of the curb.

2. Poles shall be spaced to provide the specified illumination. Locate poles on alternate sides of residential streets wherever possible. Calculations supporting the selected spacing shall be provided.
3. Locate extra luminaires on corners if more than 50 feet from another luminaire.
4. Locate an extra luminaire at the end of a cul-de-sac shorter than 50 feet.
5. Street light conduit for wiring shall be located in the utility easement for power, gas, telephone, and cable TV wherever possible.

For all streets other than “local-residential,” please refer to the I.E.S. Standards and provide photometric calculations.

D. Poles and Luminaire

Shall be per the City’s standard detail.

4.22 Street Lighting Specifications

Street lighting for all subdivision, commercial and industrial development shall be designed and provided by the Developer’s engineer. The design plans shall be stamped and signed by a Washington State licensed professional electrical engineer. The installation shall be in accordance with the National Electric Code. The installation shall be inspected by the Washington State Department of Labor and Industries Electrical Inspection Division. The design shall meet the following design criteria.

A. Luminaire

Luminaire shall be Sternberg Lighting post top A850SRLED, solid roof with finial, acrylic acorn style, 96 watt, 7990 lumen, 3500K color temperature with minimum 70CRI, with IES Type III full cutoff Dark Sky distribution. The LED driver shall be Sternberg MDL-03 range voltage (120-277 volt) designed for on/off and 0-10 volt dimming, with L70 rating of 100,000 hours minimum. Solid roof and post luminaire fitter to have Castle Rock Green powder coat finish (code with 4.22B) to match pole assembly.

Luminaire Part No.: PT-A850SRLED-5P-6ARC35T3-MDL03-A/CM

B. Pole

Pole shall be a 16 ft cast and welded assembly, made from 6063-T6 structural grade aluminum, consisting of an ornamental Richmond 3900 series cast base with 5-to-3 inch smooth tapered shaft (T5), modified bolt slots to accept 5/8" anchor bolts (MOD). Standard post accessories to include a single 15 amp GFI receptacle with in-use cover (GFI-IUC), one set of double banner arms (1-DBA), one set of dual hooked planter arms with custom straps rated at 75 pounds each (DHPA-Strap). Post and all exposed metal accessory components, including luminaire roof and 5P fitter, to have custom factory applied powder coat finish ref number CM PSP350053/Castle Rock Green.

Assembly Part No.: 3916T5(MOD)/GFI/IUC/1-DBA/1-DHPA-Strap/CM

C. Conduit

All conduit shall be buried a minimum of 24 inches deep. All roadway crossing shall be rigid metallic or schedule 80 PVC. Conduit shall conform to Section 9-29 of WSDOT Standard Specifications. Schedule 40 PVC may be used in locations other than roadway crossing.

D. Junction Boxes (when required)

Junction boxes shall be installed at locations as shown on the Plans and conform to WSDOT Standard J-40.10-04, Locking Lid Standard Duty Junction Boxes, Type 1. Junction boxes shall be installed within the landscape strip and the material firmly compacted around the box to prevent future settlement. The cover shall be galvanized and grounded. The letters "LT" and "ELECTRIC" shall be etched on the cover.

E. Conductors, Wires, etc.

Wire conductors for underground feeders runs and for circuitry from the in-line fuse in the poles to the Junction Box shall be 600 volt, single conductor stranded copper and insulated with USE grade polyvinyl chloride compound or approved equal in accordance with the Insulated Power Cable Engineer's Association Specifications. An AWG 10 bare solid copper wire or green insulated stranded copper wire will be run from the service ground rod to the safety ground lug on each pole. Feeders shall be sized in accordance with the National Electrical Code. Wires inside pole between ballast and in-line fuses shall be Rome 2C AWG 10 stranded pole and bracket wire or approved equal. Splices will be allowed

in junction boxes and poles based only. No more than two conduits will be allowed inside street light pole.

F. Fuses

Luminaire Fusing and Electrical connections at Light Standard Base shall conform to Section 9-29.7 of the State of Washington Standard Specifications. In-line fuse holders shall be SEC mode 1791-SF with FNM-5 fuses or approved equal.

G. Electrical Services

- All electrical services shall be Tesco service cabinet catalog #26-000, skyline service cabinet series 47700-pl or approved equivalent and must be keyed to the City's Best Lock core.
- Contractor to verify that detail specifications and equipment locations meet with servicing utility's requirements and City of Castle Rock engineering requirements.
- Conduit size and quantity as required by plans of N.E.C.
- It shall be the Contractor's responsibility to coordinate the installation of the street light system with all utilities, private and public, to avoid schedule and location conflicts.
- For residential street lighting the Contractor shall be responsible to install one meter for the plat lighting system per Cowlitz County PUD requirements. On very large plats Cowlitz County PUD may require more than one meter.
- Base of service cabinet shall be sealed with silicone or approved equivalent and have a ½-inch drain hole.

H. Luminaires

The city will energize the individual streetlights when a home is occupied adjacent to the streetlight or immediately across the street. At the Developer's request, any or all streetlights may be energized prior to the occupancy of homes. However, the Developer shall assume full responsibility for electrical power costs and repair costs due to damage from vandalism.

I. Safe Wiring Labels

The Contractor is advised that Safe Wiring Labels required by Labor and Industries shall apply on this project. (Electrical inspection sticker.)

J. Guarantee

The contractor shall surrender to the City of Castle Rock any guarantee of warranty acquired by him as normal trade practice in connection with the purchase of any materials or items used in the construction of the illumination. Must be keyed for city lock system.

K. Location

In general, streetlights shall be located on the highest corner of the intersection. One streetlight will be placed at all new intersections. One streetlight will be placed at all four corners of any new signalized intersection. If less than four, streets light approval must be given by Traffic Engineer. One street light will be placed at the entrance of new straight road plats and at the following distances:

- Collector Roadway width 36 feet – 140 feet staggered/one side system.
- Local Roadway width 28 feet – 200 feet staggered/one side system.

A streetlight will be placed near the end of all new cul-de-sacs 200 feet of distance from another light location. If determined by the City Engineer, an additional streetlight may be required to be added. Streetlight shall be located a minimum of 16 inches from back of curb unless directed otherwise by the City Engineer. Prior to any work on the streetlight system, the electrical Contractor shall review the system with the City Engineer of his approved representative. A streetlight shall not be energized until such time that the residence adjacent to it is occupied.

L. Installation

It shall be the Contractor's responsibility to coordinate the installation of the street light system with all utilities, private and public, to avoid schedule and location conflicts. The Contractor shall provide written permission from Cowlitz County PUD for the electrical service location, and a copy of the load calculations to the City of Castle Rock.

M. Meter

For residential street lighting, the Contractor shall be responsible to install one meter for the plat's lighting per Cowlitz County PUD requirements. On very large plats, Cowlitz County PUD may require more than one meter.

4.23 Signals

A. General

Signalization will be required if warranted as determined by an existing study and/or transportation study performed at the request of the City by the Developer.

4.24 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. In accordance with the provisions of Washington Administrative Code (WAC) chapter 332-120 and the revised code of Washington (RCW) Title 58; any monument shown on the plans or found in the field which cannot be protected and will be disturbed or destroyed by construction, shall be referenced by a licensed surveyor, and an application filed with the Washington State Department of Natural Resources (DNR), per WAC 322-120-050 prior to the monument being disturbed or destroyed.

The Contractor shall notify the city and a copy of each DNR application submitted shall be provided to the City Engineer.

When construction work is complete, the Contractor's construction surveyor shall verify the monuments shown on this plan set are still in place and submit a stamped and signed report to the city documenting their condition. Any monuments disturbed or destroyed shall be replaced by the contractor's surveyor in accordance with WAC chapter 332-120.

No part of this statement shall relieve the contractor or their surveyor of any other provisions of the WAC or RCW with regards to duties and responsibilities related to survey monumentation and its preservation or replacement.

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

A precast concrete monument with cast iron monument case and cover installed per City Standards is required.

If the monument case and cover are placed in cement concrete pavement, the precast 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 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 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 inch to 42 inch 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 be required. Contact the City, not the U.S. Postal Service, for details. Sidewalks shall be constructed to facilitate same. Aluminum traffic friendly mounting required.
- d. Buck-outs in sidewalks and sidewalk realignment may be required per the City Engineer and/or Planning Commission.

3. Mailboxes shall be Type 1 per WSDOT Standard Plans H-70.10-01 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 4 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 4 feet high shall be subject to a building permit and 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 4 feet or walls to be constructed in conditions when soil is unstable require a structural wall having a design approved by the City. 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 filled and compacted 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 & Landscaping Items

Street trees and/or landscaping items (including irrigation and root barriers, if appropriate) shall be furnished and installed as may be specifically required by the City's Public Works Director, and as further approved by the City. If such is required, landscaping shall be of one of the referenced types as listed on the City approved list or as otherwise may be approved by the Public Works Director. 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, and as approved by the City Public Works Director.

4.25 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 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.

4.26 Utilities

See appropriate water, sanitary sewer and stormwater sections of these standards for more detailed requirements. 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 will be required to be extended to “far” property lines. Easements shall be procured and provided by the Developer to facilitate same.

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 (existing roads).
Otherwise: In shoulder 3 feet minimum from edge of travel lane (existing roads).
2. Curb and Gutter Section: Under sidewalk on one side. 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 or west of centerline; depth approximately 8 feet minimum from finished grade, unless otherwise required and/or approved by the City Engineer. Greater depths may be required to serve adjacent properties and tributary properties. Easements shall be provided to facilitate same.

Where subdivisions are provided with alleys, sewer may be installed in the alley instead of the roadway section if approved by the Public Works Director.

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 in right of way, at horizontal location and depth compatible with other utilities and storm drains, unless approved otherwise by City Public Works Director.

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, “private” underground systems shall be located at least 5 feet away from road edge 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.

4.27 HMA Pedestrian Paths and/or Bikeways

- a. Minimum Easement or Right-of-Way Width: Fifteen feet minimum.
- b. Construction Width. Ten feet *minimum*. Greater widths may be required by City.
- c. Subgrade. Prepared per Section 2.06 of WSDOT Standard Specifications.
- d. Bankrun Gravel, Class A. As required.
- e. Crushed Surfacing Base Course one and one-half inch minus. Four-inch minimum depth. Greater depths

- may be required by City Engineer based on use and local ground conditions.
- f. Crushed Surfacing Top Course 5/8-inch minus, four-inch minimum depth. Greater depths may be required by City Engineer based on use and local ground conditions.
- g. Paving Course. Two-inch (minimum) HMA Class 3/8" PG 58H-22. Greater depths may be required by City Engineer based on use, location, and local ground conditions.
- h. The maximum cross slope for pedestrian paths and bikeways shall be 1% unless a greater slope is approved by the City Engineer due to specific topographic constraints.

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 1992 Stormwater Management Manual for the Puget Sound Basin. Adequate provisions shall be made for storm drainage, storm sewers, and associated appurtenances sufficient to transmit maximum seasonal flows and flood waters characterized by the area. Water quality shall be addressed with a BMP currently listed and approved by the Department of Ecology.

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 predevelopment rates. 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. Maximum catch basin spacing shall be 200 feet on road grades up to 3 percent, 300 feet when the road grade is 3 percent or greater. No surface water (unless otherwise approved in writing by the Public Works Director) 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 percent slope.
- B. Stormwater conveyance systems shall be designed to provide free flowing conditions for the 25-year design storm. Culverts with contributing drainage areas greater than 200-acres shall be designed to pass the peak runoff from the 100-year design storm.
- C. Plans for storm drainage shall indicate where the stormwater will be discharged. If the proposed development will increase the quantity of storm runoff, it must be shown that the pipes

and channels downstream from the discharge point (a minimum of 1/4 mile) can convey 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 to decrease the rate of storm runoff.

- D. Where storm drains are located 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 Washington State Department of Ecology's 1992 Stormwater Management Manual for the Puget Sound Basin 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. Fences shall be erected around all ponds. Drive gates with locks (City to also have key) shall be installed. The City requires a "higher" standard in regard to "peak release rates." Peak release rates for the developed condition shall not exceed the peak release rate from 1/2 of the pre-developed 2-year, 2-year, 25-year, and 100-year 24-hour design storm, or a downstream analysis shall be performed to verify the existing system has adequate capacity and structural integrity.
- F. The General Notes, numbered 1 thru 8, as shown and further referenced below 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 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. Contractor shall be responsible for complying with all other permits and other requirements by the City 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. Contractor shall provide traffic control plan(s) as required in accordance with MUTCD.
7. Call underground locate line at 811 a minimum of 72 hours prior to any excavations.
8. Where connections require “field verifications,” connection points will be exposed by contractor and fittings verified 48 hours prior to distributing shut-down notices.

5.03 Conveyance

Structures: Structures shall be installed at all changes in pipe size, slope, and direction. Structures shall consist of WSDOT Type 1 or Type 2 catch basins or 48-inch diameter manholes as appropriate. All inlet structures shall be WSDOT Type 1 or Type 2 catch basins as appropriate.

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 main size shall be 12-inch diameter. Lateral lines, if approved by the City Engineer, may be 8-inch 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 “preapproved” by the City’s Engineer based on localized conditions and comply with one of the following types:

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.

Corrugated Polyethylene: PE smooth wall pipe conforming to requirements of the AASHTO M294 Type S, or City approved equal, constructed per WSDOT Standard Specifications 7-04. See Note E above.

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** Director 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. 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 ensure 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. Gravel Backfill for Pipe Zone Bedding shall meet the requirements of Section 9-03.12(3) of the Standard Specifications (WSDOT).

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 crushed surfacing top course rock conforming with Section 9-03.9(3) of the WSDOT Standard Specifications. Due to localized conditions, the City may allow/permit the backfill of the trench section with suitable excavated material, as determined by the City, or if this material is not available from trenching operations, the City may order the placing and compaction of gravel base conforming with Section 9-03.10 of the WSDOT Standard Specifications 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. WATER SYSTEM STANDARDS

6.01 General

The City of Castle Rock Water System Minimum Standards and Specifications are minimum base level performance, design, and construction standards used to maintain uniformity of design within the water utility.

The standards herein contained shall not supersede any other legally constituted standards that are more stringent than these standards.

Requirements for staking, trench excavation, backfill and street patch and restoration shall be as required in Section 7 Sanitary Sewer Standards. Requirements for pavement and trench restoration shall be per Section 4 – Street and Asphalt Concrete Paths and/or Bikeways Standards.

6.02 Design Standards

A. Pipe Sizing

The minimum main size should be established by a hydraulic analysis using the appropriate land use designation to develop both domestic and fire flow requirements. The minimum size shall be 4 inches in diameter. Minimum line size where fire flows are required shall be 8 inches.

B. Fire Flow Requirements

1. Required Minimum Flow:

Table I presents the minimum fire flow requirements applicable to the various development classifications. Additional flow above these minimums may be required by the local fire protection authority for commercial or industrial complexes or large structures with exposure hazards.

TABLE 1
Required Minimum Fire Flow

Land Use Classification	Minimum Fire Flow Requirements (*)
Low Density Residential	1,000 gpm
High Density Residential	1,500 gpm (**)
Commercial	1,500 gpm (**)
Industrial/Schools	2,000 gpm (**)

(*) Minimum fire flow requirements are in addition to maximum daily domestic demand.

(**) Commercial and industrial buildings may be subject to higher flow requirements when evaluated on an individual basis by the local fire protection authority.

2. Water Pressure:

Water systems shall be hydraulically designed to provide a pressure range of 30-100 psi with desired range of 40-90 psi. A minimum residual pressure of 30 psi under peak hour design flow is required at the City owned water meter or property line. A 20 psi residual pressure shall be maintained throughout the system under combined fire flow and maximum day demand conditions at the meter or property line.

3. Storage:

Storage volumes shall be sized in accordance with the requirements of the current Department of Health Water System Design Manual.

4. Hydrant Maintenance:

Public fire hydrants shall be installed in compliance with these minimum standards and located within publicly owned easements and rights-of-way. The City shall be responsible for mechanical maintenance.

5. Variance from Standard:

The local fire protection authority (LFPA) may require or allow, and shall approve, any variance in required fire flow and/or other requirements in consideration of factors not encompassed within this standard (e.g., large commercial complexes, large structures with exposure hazards, consideration of automatic sprinkler protection, etc.).

6. Other Standards:

The LFPA in conjunction with the water utility, using the Insurance Services Office's grading schedule for

municipal fire protection as a guide, may establish or require additional standards of specifications as required for water supply criteria not specifically set forth herein.

C. Valving

Valving shall be installed at all crosses and tees in a number equaling the number of connecting pipes minus 1, unless otherwise required by the City Public Works Director. In addition, unvalved lengths of pipe should not exceed 500 feet in school, commercial, or multi-family areas, and 800 feet in residential areas, where customers are being served.

D. Fire Hydrants

Installation of hydrants will be initially required on all developments of seven service connections or more, or as required below. Hydrant locations are to be specified by the local fire department and coordinated through the LFPA. Blind flange connections will be provided on distribution piping at suitable locations for future installation of fire hydrants on smaller systems once they reach seven service connections

Fire hydrants shall be connected to a 6-inch minimum diameter main. A minimum 6-inch-diameter lateral pipe is required for connecting to hydrants located 50 feet or less from the main line and a minimum 8-inch-diameter lateral pipe is required where hydrants are located more than 50 feet from an 8 inch or larger main.

Fire hydrant location shall be determined by the appropriate local fire authority. In general, hydrants shall be predicated on the location of street intersections wherever possible and located to minimize the hazard of damage by traffic. They shall have an average normal spacing of 600 feet within residential areas measured along the street frontage. In no case shall hydrants be placed farther than 700 feet apart and no building shall be more than 350 feet from the nearest hydrant. In commercial or industrial areas, the maximum hydrant spacing shall be 300 feet.

E. Facility Placement

All water mains shall be installed in accordance with the City's utility locating standard plan. In addition, all piping, pumping, source, storage, and other facilities shall be located on public rights-of-way or dedicated utility easements. Utility easements must be a minimum of 20 feet in width and piping shall be installed no closer than 5 feet from the easement's edge.

Exceptions to this minimum easement may be approved by the operating water utility. Unrestricted access shall be provided to all public water system lines and public fire hydrants that are maintained by public agencies or utilities.

F. Pipe Cover

A 3-foot-minimum cover and a maximum 6-foot cover are required from the finished or existing ground surface to the top of the pipe for all installed transmission, distribution, and service piping, unless otherwise approved by the Public Works Director.

G. Air and Air-Vacuum Relief Valves

Air or combined air-vacuum relief valves shall be situated at designated points of high elevation throughout the system.

H. Blowoff Valves

A blowoff assembly shall be installed on all permanent dead-end runs and at designated points of low elevation within the distribution system. The blowoff assembly shall be installed in the utility right-of-way. In no case shall the location be such that there is a possibility of back-siphonage into the distribution system.

I. Separation Distances

Transmission and distribution water piping shall be separated at least 10 feet horizontally from on-site waste disposal piping, drain fields, storm drain piping and/or wastewater gravity or force mains. All parallel and crossing installations of water and sewer lines shall be installed in accordance with provisions of WAC 246-290, current Department of Health Water System Design Manual and the “Recommended Standards for Water Works” – Ten State Standards.

J. Auxiliary Power

Unless directed otherwise by the Utility, all source and booster pumping facilities should be equipped with auxiliary power pigtail outlets and at least manual transfer switching devices.

K. Flow Measurement

All service lines shall be installed so that each residential, commercial, and industrial structure will have a separate metered service for domestic water received from the utility. If approved by the designated utility, domestic water consumption may be measured by a master meter for service to a complex under single ownership and where water utility line subdivision is impractical. Service lines providing fire flow will be required to be equipped with a double check valve assembly with detection or other appropriate metering devices, as directed by the designated utility. Minimum size service line from the water main to the water meter is 1” in diameter.

L. Cross Connection Control

Where the possibility of contamination of the supply exists, water services shall be equipped with appropriate cross connection control devices in accordance with WAC 246-290. The City cross-connection control program shall determine the need, size, kind, and location of the device.

6.03 Material Specifications

A. Introduction

All pipe, valves, meters, hydrants, fittings, and special material shall be new, undamaged and designated for use in potable water systems. Material used on water projects shall comply with each project's detailed plans and specifications. In general, all materials and specifications shall be in conformance with the most current Standard Specifications for Road, Bridge, and Municipal Construction, WSDOT and APWA, and the specification of the American Water Works Association, except as modified herein.

B. Pipe, Joints, and Fittings

1. General

Water mains shall be of the following material type unless approved otherwise:

- a. Regional Transmission mains shall be ductile iron.
- b. City transmission mains shall be ductile iron, unless conditions are such that City Engineer may approve PVC AWWA C900, minimum DR-18.
- c. Distribution mains may be ductile iron, PVC AWWA C900, DR-18 or HDPE, PE 4710, Minimum SDR 11 (200 psi).

All pipe sizes, as shown on the drawings, and as specified herein, are in reference to "nominal" diameter, unless otherwise indicated. One type of pipe shall be used throughout the entire project except as necessary to match existing piping or as otherwise specified. Where relocation or replacement of existing piping is necessary during construction, materials used shall be subject to the approval of the City.

All mechanical joint fittings and valves shall be mechanically restrained in addition to concrete thrust blocks.

2. Ductile Iron Pipe (DI)

Ductile iron pipe shall conform to the requirements of AWWA C151 specifications. Pipe thickness shall be of

Class 52, or greater if required in accordance with the criteria specified in AWWA C150.

Ductile iron pipe shall be cement lined and sealed in accordance with AWWA C104. In addition, all pipe shall have push-on rubber gasket joints and be furnished in 10 to 20 foot lengths unless design conditions dictate otherwise.

3. Polyvinyl Chloride (PVC)

PVC pipe shall be AWWA C900, Minimum DR 18.

PVC shall be installed with ductile iron fittings.

All pipe shall be furnished in 18 to 20 foot lengths unless design conditions dictate otherwise and assembled with a non-toxic lubricant.

4. Polyethylene Pipe (PE)

All polyethylene pipe 2 inch diameter and smaller shall be rated for a maximum working pressure of 200 psi with a standard dimension ratio of nine (9). This pipe shall comply with ASTM D-2239 and D-1248. The pipe shall be appropriately marked to designate the nominal pipe size, type of plastic material, pipe dimension ratio or pressure rating and ASTM or AWWA designation code. The pipe shall bear the National Sanitation Foundation seal signifying its use for potable water. The pipe shall be copper pipe size and connected with standard brass or bronze fittings by the use of pack joint with approved insert stiffeners. The pipe shall be installed with tracer wire and marking tape as approved by the City.

5. Potable Water PEX

All PEX potable water piping shall be rated for a minimum of 160 psi at 73 degrees Fahrenheit with a standard dimension ratio of nine (9). This pipe shall meet the requirements of ASTM F-876/F-877 for CTS-OD SDR 9. All fittings shall be specifically made for PEX piping. The pipe shall be installed with tracer wire and marking tape as approved by the City.

6. Fittings

All fittings shall be of the size, type, and type of joint as specified on the plans, by the designated utility, or by the pipe manufacturer.

7. Tracer wire and Marking Tape

Tracer wire and marking tape shall be installed on all piping and service piping as specified in the section and approved by the City.

C. Valves

1. Gate Valves

System gate valves shall be resilient wedge, NRS (non rising stem) with O-rings seals. Valve ends shall be mechanical joint or ANSE flanges. Valves shall conform to AWWA C509 or C515. Valves shall be Waterous, M & H, Clow or Kennedy. Existing valves shall be operated by the City of Castle Rock employees only.

Gate valves, 3 inch and larger, shall be ductile iron body, bronze-mounted, double disc, and “O”-ring stem seal. Gate valves smaller than 3 inch shall be 125 psi, non-stem rising, wedge disk, all brass or bronze valves and screwed, soldered, or flanged ends compatible with the connecting pipe. All valves shall open counterclockwise and, unless otherwise specified, shall be non-rising stem type equipped with standard AWWA 2-inch square stem operating nuts. All thread patterns shall be NPT.

2. Butterfly Valves

Valves larger than 12-inch shall be butterfly valves. Butterfly valves shall meet or exceed all AWWA C504 specifications and shall be Class 150-B with short body, which is suitable for direct bury. When they are installed they shall have a position indicator which clearly shows position of the disc. All valves shall be equipped with an underground manual operator with AWWA 2-inch square operating nut and shall open with a counterclockwise rotation.

3. Check Valves

Check valves, 3 inch or larger, shall be iron body, iron disc, bronze mounted, swing type, clearway, quiet closing, lever and spring valves with flanged ends. All valves shall comply with AWWA C508 specifications.

Check valves, 2-1/2 inches or smaller, shall be bronze body, bronze mounted, swing type with flanged or threaded ends depending upon installation.

4. Air and Air-Vacuum Relief Valves

Air and air-vacuum relief valves shall have cast iron bodies and covers and stainless steel floats. Float guides, bushings, and lever pins shall be stainless steel or bronze. Valves shall be designed for a minimum operating pressure of 150 pounds per square inch (psi).

5. Pressure Reducing Valves

This valve shall maintain a constant downstream pressure regardless of varying inlet pressure. It shall be a hydraulically operated, pilot-controlled diaphragm-type globe or angle valve. The main valve shall have a single removable seat and a resilient disc. The stem shall be guided at both ends by a bearing in the valve cover and an integral bearing in the valve seat. No external packing glands are permitted, and there shall be no pistons operating the main valve or any pilot controls.

The pilot control shall be a direct-acting, adjustable, springloaded, normally open, diaphragm valve, designed to permit flow when controlled pressure is less than the spring setting. The control system shall include a fixed orifice. All valves shall be equipped with mechanical joints or flanged ends. Pressure reducing valves shall be as manufactured by Cla-Val or approved equal.

D. Valve Boxes

All valve boxes shall be cast iron, 2-piece, equipped with suitable extension for at least a 36-inch trench depth. The top section and lid will be designed for installation in traffic areas. Lid is to be labeled "W" or "Water". Valve boxes shall be Rich Model 910, or approved equal.

E. Fire Hydrants

Fire hydrants shall conform to AWWA Standard C502 for post-type, dry-barrel, self-draining hydrants suitable for at least a 36 inch depth. Each hydrant shall be equipped with a 6" inlet, a minimum valve opening of 5-1/4", two 2-1/2-inch hose connections, and one 4-1/2-inch pumper port. All ports shall have national standard threads, and the 4-1/2-inch pumper port shall be national standard threads. All valves and caps shall open counterclockwise and have 1-1/2-inch flat point pentagon operation and cap nuts. Hydrants shall be break-away traffic models and yellow color. Fire hydrant valves shall comply with Section 6.03.C.1 or 2 and shall be provided with a valve box as specified herein. Fire hydrants shall be Waterous Pacer Model WB67-250.

F. Cross Connection Control Devices

All cross connection control devices will be specified by the City cross connection control program based on the degree of potential hazard. Such devices will comply with models currently approved by the Department of Health in accordance with WAC 246-290.

G. Tracer Wire

Tracer wire shall be installed on all water mains, hydrant leads, branch lines, and water service lines. The wire shall be attached to the lines at 10 foot intervals and shall be brought to the surface at all water meter boxes and valve boxes. Tracer wire material for water lines constructed using open cut methods shall be rated for underground feeder cable, 12 gauge, soft drawn, insulated 60 MIL PVC, rated for 600V and shall be blue in color. Heavier tracer wire as manufactured by Copperhead Industries shall be used for boring, pushing and horizontal directional drilling.

Joining ends of tracer wire for mains shall only be spliced underground at existing connections into existing tracer wire, connections at main bore locations, and approved locations per the City. Connections shall be made with an approved direct bury wire nut that is rated for underground installation. At locations where locate main wire is tested and found to be damaged and instead of replacing the entire locate wire underground, the Contractor can request to repair line with a splice underground. No splices are allowed along water services or hydrant leads. Direct bury wire nuts shall be Dryconn Direct Bury Wire Nut manufactured by King Innovation, DBY-6 or DBR-6 as manufactured by 3M, or approved equal.

Joining tracer wire from side services or other small branches to main; connections shall be made with direct bury lug designed to not cut the metal wire of the main tracer wire. These connections shall be used at all side service connections, branches and fire hydrants. Direct bury lug connections shall be Dryconn Direct Bury Lug as manufactured by King Innovation, Dryconn 3-way Direct Bury Lug as manufactured by Copperhead, or approved equal.

All tracer wire shall pass a continuity test prior to paving.
Contractor responsible for passing continuity test.

H. Marking Tape

All pipe and services will be installed with continuous marking tape installed 18" to 24" under the proposed finished subgrade. The marker will be 3 inches wide, plastic non-biodegradable, metal core or backing marked sewer that can be detected by a standard metal detector. The marking tape shall indicate,

“CAUTION BURIED WATER LINE” or similar and be blue in color.

I. Meter Boxes and Lids

Meter boxes shall be high density polyethylene of one-piece molded construction for durability and impact strength and shall have a wall thickness of no less than 0.55”. The meter box, with a ductile iron cover installed shall be able to bear a 20,000 pound load in a wheel load (H-20) test. The meter box shall be black on the exterior to prevent UV degradation and bright white on the interior to reflect light and ease meter reading and service. The box shall have removable pre-cut pipe entry areas, 3” wide x 4” high, located on the center of each end of the box for single meter installations. The box shall be designed in such a way as to be securely stackable. The meter box shall be MSBCF1118-12XL as manufactured by Carson Industries or approved equal. Ductile iron cover shall be Carson Industries MSCBC-1118-R.

6.04 Construction Standards

A. General

Installation of water systems shall conform at a minimum to the Standard Specifications for Road, Bridge, and Municipal Construction, WSDOT, and APWA and the specifications of the American Water Works Association, Standard C600, and according to the recommendations of the manufacturer of the material or equipment concerned. Prior to construction, a service connection must be applied for and approved by the City. All requirements of the service connection approval shall become part of these specifications.

B. Fire Hydrant Installation

Hydrant installation shall conform to AWWA Standard C600 provisions. Fire hydrants shall stand plumb and be set to the finish grade. The center of the lowest outlet of the hydrant shall be no less than 18 inches above finished grade. In addition, all hydrants shall be installed with a minimum of a 36 inches unobstructed radius around the hydrant. Hydrants shall be aligned so that pumper ports face toward the road or most probable route of access, if roads are not available, as determined by the appropriate local fire protection authority.

C. Hydrostatic Pressure Test

A hydrostatic and pressure leakage test will be conducted on all newly constructed water mains, fire lines, fire hydrant leads and stub-outs in accordance with WSDOT/APWA Standard Specifications, Section 7-09, and AWWA C-600 specifications, unless specified otherwise by the City.

D. Disinfection and Bacteriological Testing

All pipe, reservoirs and appurtenances shall be flushed and disinfected in accordance with WSDOT/APWA Standard Specifications, Section 7-09.3(24) unless specified otherwise by the City.

E. Improvement Plan Design/As-built Drawings

Unless approved otherwise by the City Engineer, all water system improvements shall be designed by a licensed professional engineer in the State of Washington with sufficient experience in water system design. As-built drawings in hard copy, .pdf and AutoCAD shall be required to be submitted to the City on all improvements and the vertical datum shall be NAVD88 and the horizontal shall be NAD83/2011.

F. City Engineer Review Compensation

All Water System Improvement Plans shall be reviewed and approved by the City Engineer and/or the Public Works Director. All review costs for the City Engineer's review shall be paid by the developer.

SECTION 7

7. SANITARY SEWER STANDARDS

7.01 General

Sanitary sewerage refers to wastewater derived from domestic, commercial and industrial pretreated waste to which storm, surface, and ground water are not intentionally admitted. Pretreatment will follow all the requirements as set forth by the City of Castle Rock.

Any extension of the City's sanitary sewer system must be approved by the City of Castle Rock and must conform to the current City of Castle Rock Comprehensive (Master) Sanitary Sewer Plan, Cowlitz County Health Department, Department of Ecology (DOE), and Department of Health (DOH) requirements.

Maintenance of a private sewer, building, or side sewer will be the responsibility of the property owner. Maintenance of the lateral to and including the point of connection to the sewer main will be the responsibility of the property owner.

A. Sanitary Sewer/Water Main Crossings

The Contractor will maintain a minimum of 18 inches of vertical separation between sanitary sewers and water mains. The minimum cover for water main of 36 inches may be reduced to 30 inches upon approval by the City to provide for as much vertical separation as possible. If the minimum vertical separation is not met, then standards for water-sewer separation shown on drawing CRO28SS will apply.

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

B. Staking

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

A preconstruction meeting will be held with the City prior to commencing staking. All construction staking will be inspected by the City prior to construction and staking will be maintained throughout the construction.

The minimum staking of sewer lines will be as follows:

- a. Centerline alignment must be staked with cuts and/or fills to flowline at 25 feet and 50 feet from the manhole or structure, and every 50 feet from there on, unless more frequent staking is required for construction at the discretion of the City Inspector.
- b. Manholes must be staked with hubs to include invert elevations of all pipes and top of rim elevations to finished grade.
- c. Location of valves and fixtures will be staked for force mains.

C. Trench Excavation

- a. Clearing and grubbing where required will 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 will be disposed of by the owner or Contractor in accordance with the terms of all applicable permits.
- b. Trenches will 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 will be excavated vertically and the trench width will be excavated only to such widths as are necessary for adequate working space as allowed by the governing agency. All necessary shoring operations will be performed to ensure that the excavation can be carried out in accordance with Washington Industrial Safety and Health Administration (WISHA) and the Occupational Safety and Health Administration (OSHA) Safety Standards. The trench will be kept free of water until joining is complete. Surface water will be diverted so as not to enter the trench. The Contractor will maintain sufficient pumping equipment on the job to ensure that these provisions are carried out.
- c. The Contractor will perform all excavation of every description and whatever substance encountered and boulders, rocks, roots, and other obstructions will be entirely removed or cut out to the width of the trench and to a depth 6 inches below the sewer grade. Where materials are removed from below the sewer grade, the trench will be backfilled to grade with material satisfactory to the City and thoroughly compacted.
- d. Trenching and shoring operations will not proceed more than 100 feet in advance of pipe laying without approval of the City, and will be in conformance with Washington

Industrial Safety and Health Administration (WISHA) and Occupational Safety and Health Administration (OSHA) Safety Standard.

- e. The bottom of the trench will 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 will be excavated with hand tools to sufficient size to make up the joint.
- f. The Contractor will maintain the presence of a “competent person” as defined by the Washington State Department of Labor and Industries when any trench excavation and backfill work is being done at the project site.

D. Backfilling

Backfilling will not commence until the pipe installation has been inspected and approved by the City.

Backfilling and surface restoration will closely follow installation of pipe so that not more than 100 feet is left exposed during construction hours without approval of the City.

Crushed surfacing top coarse per WSDOT Standard Specification Section 9-03.9(3) shall be used for pipe zone bedding and backfill. No native material will be used. Bedding and backfill material will be placed and compacted around and under the sewers by hand tools to a height of 6 inches above the top of the sewer. The remaining backfill will be compacted to 95 percent of the maximum density per ASTM D1557 in rights of way and easements, and 90 percent outside of rights of way and easements. Where governmental agencies other than the City have jurisdiction over roadways, the backfill and compaction will be done to the satisfaction of the agency having jurisdiction.

E. Street Patching and Restoration

Temporary restoration of trenches will be accomplished by using 2-inch HMA Class ½” PG 58H-22 or 2-inch medium-curing (MC-250) liquid asphalt (cold mix), U.P.M., 2-inch asphalt treated base (ATB), or steel plates.

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

Prior to beginning street trenching work, the Contractor will ensure that temporary patching material is stockpiled at the project site, both for completing and maintaining the temporary patching.

All temporary patches will be maintained by the Contractor and will be made permanent within 10 working days. Patches that are

not properly maintained will be identified and repaired by the City at the developers/Contractors/private utility's expense.

F. Pavement and Trench Restoration

See Section 4 – Street and Asphalt Concrete Paths and/or Bikeways Standards for pavement and trench restoration requirements.

G. Trench Backfill

All crushed surfacing materials will conform to Section 4-04 of the latest version of the WSDOT/APWA Standard Specifications. The subgrade will be compacted to 95 percent maximum density per ASTM D1557, as described in Section 2-03 of the latest version of the WSDOT/APWA Standard Specifications.

All granular backfill material will conform to Section 9-03.19 of the WSDOT/APWA Standard Specifications. The trench will be compacted to 95 percent maximum density per ASTM D1557, as described in Section 2-03 of the WSDOT/APWA Standard Specifications.

If the existing material is determined by the City to be suitable for backfill, the Contractor may use the native material outside the roadway prism except that the top 8 inches of trench will be crushed surfacing per WSDOT Standard Specification Section 9-03.9(3). All trench backfill materials below the roadway base and subbase level will be compacted to 95 percent density per ASTM D1557.

When trench width is 18 inches or less and is within the traveled way, trench will be backfilled with control density fill (CDF) or Controlled Low-Strength Material (CLSM) per WSDOT/APWA Standard Specification Section 2-09.3(1)E.

Backfill compaction and placement will be performed in compliance with WSDOT/APWA Standard Specifications. Replacement of the asphalt concrete or Portland cement concrete pavement will conform to the latest version of the WSDOT/APWA Standard Specifications.

H. Testing

Prior to acceptance and approval of construction, the following tests will apply to each type of construction.

a. Gravity Sewer

1. After the pipes have been cleaned, the gravity sewer pipe will be subject to a low pressure air test per the current WSDOT/APWA Specifications Section 7-17. The Contractor will furnish all equipment and personnel for conducting the test under the observation of the City inspector. The testing

equipment will be subject to the approval of the City.

The Contractor will make an air test for his own purposes prior to notifying the City to witness the test. The air test for acceptance will be made after the trench is backfilled and compacted and the roadway section is completed to subgrade.

All wyes, tees, and end of side sewer stubs will be plugged with flexible joint caps, or acceptable alternates, securely fastened to withstand the internal test pressures. Such plugs or caps will be readily removable and their removal will provide a socket suitable for making a flexible jointed lateral connection or extension.

2. Testing of the sewer main will include a television inspection by the Contractor and witnessed by the City. Television inspection will be done after the air test has passed, the manhole has been channeled, and before the roadway is paved. Immediately prior to a television inspection, enough water will be run down the pipeline so it comes out the lower manhole and the line is flushed clean. Contractor shall provide the City with an electronic copy of the television inspection.

Acceptance of the line will be made after the television inspection video has been reviewed and approved by the City. Any tap to an existing system needs to be televised as well.

The City may televise the new line during periods of high groundwater within the first year after construction and acceptance of the line. Any conditions resulting in inflow and infiltration (I & I) will be considered a system failure that will be repaired by, and at the expense of, the Contractor.

3. A vacuum test of all manholes is required prior to acceptance. The structure will be tested in accordance with ASTM-C 1244. This test method covers procedures for testing cast in place or precast concrete manhole sections, using the vacuum test method to demonstrate the integrity of the installed materials and the construction procedures. Testing will be done in the following manner:
 - a. All lift holes and pipes entering into the manhole will be plugged, taking care to securely brace each plug from being drawn into the structure.

- b. The test head will be placed at the top portion of the structure in accordance with the manufacturers' recommendations.
- c. A vacuum of 10 inches of mercury will be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. With the valves closed, the time will be measured for the vacuum to drop by 1 inch to 9 inches. The manhole will pass the vacuum test if the time is greater than the time shown in TABLE-7.2, which gives allowable time loss in seconds (i.e., test section is acceptable if vacuum does not drop below 9 inches until after the times shown in the table have expired).

TABLE 7.2 MINIMUM TEST TIMES FOR VARIOUS MANHOLE DIAMETERS									
Depth (ft)	Diameter (inches)								
	30	33	38	42	48	54	60	66	72
	Time (seconds)								
8	11	12	14	17	20	23	26	29	33
10	14	15	18	21	25	29	33	36	41
12	17	18	21	25	30	35	39	43	49
14	20	21	25	30	35	41	48	51	57
16	22	24	29	34	40	46	52	58	67
18	25	27	32	38	45	52	59	65	73
20	28	30	35	42	50	53	65	72	81
22	31	33	39	46	55	64	72	79	89
24	33	36	42	51	59	64	78	87	97
26	36	39	46	55	64	75	85	94	105
28	39	42	49	59	89	81	91	101	113
30	42	45	53	63	74	87	98	108	121

- d. If the manhole fails the initial test, necessary repairs will be made by an approved method. The structure will then be retested until a satisfactory test is obtained.
- e. If the manhole joint is displaced during the vacuum test, the manhole will be disassembled, the seal replaced, the structure reassembled, and retested until compliance is obtained.
- f. Testing can be done either before or after backfill operations around the structure; however, if during backfill operations it is found that the structure has been disturbed and it is suspected that the integrity of the

joint has been compromised, retesting will be required.

- g. All other requirements stipulated in Section 7-05 of the latest edition of the Washington State Department of Transportation Standard Specifications for Road, Bridge, and Municipal Construction, that has been adopted by the City, will also be adhered to for final acceptance of the manhole structure.
- 4. A mandrel test in accordance with Section 7-17.3(2)G of the WSDOT/APWA Standard Specifications will be performed by and at the expense of the Contractor on all sewers except laterals as defined in Chapter 2 of these standards when televising reveals a possible defect or belly in the pipe.
- 5. Any time that testing reveals problems that lead to repairs by the Contractor, the City may require complete re-testing of the entire system that was repaired. This work will be required to ensure that the integrity of the system was not compromised during the repair work.
- b. Force Main
 - 1. Prior to road construction, the backfilled pressure line and service lines will be subjected to a hydrostatic pressure test. The pressure test shall be per Section 7-09.3(23) Hydrostatic Pressure Test in the WSDOT Standard Specifications for Road, Bridge, and Municipal Construction. The test shall be modified as follows: The hydrostatic pressure shall equal 100 psi in excess of operating pressure or in no case shall the test pressure be less than 150 psi. Any leaks or imperfections developing under said pressure will be remedied by the Contractor. The pressure test will be maintained while the entire installation is inspected.

The Contractor will provide all necessary equipment and will perform all work connected with the tests. Tests will be made after all connections have been made and the lines have been backfilled, but prior to road construction. The Contractor will perform all tests to assure that the equipment to be used for the test is adequate and in good operating condition and the air in the line has

been released before requesting the City to witness the test.

2. A water test for all wet wells in accordance with the manhole water test for gravity sewer will be required.
3. Verification of operating parameters such as, pump operation, alarms, and an electrical inspection are required prior to acceptance of all lift stations.

I. General Notes

The General Notes on the following page(s) will be included on any plans dealing with sewage system design. In addition, the specific notes for gravity sewers will be included when these utilities are part of the project.

GENERAL NOTES (SANITARY SEWER MAIN INSTALLATION) (TO BE PRESENT ON ALL SUBMITTALS)

1. All workmanship and materials will be in accordance with City of Castle Rock standards and the most current copy of the State of Washington Standard Specifications for Road, Bridge and Municipal Construction (WSDOT/APWA).
2. City of Castle Rock horizontal datum, NAD83/2011 and vertical datum, NAVD88 will be used for all control. A list of benchmarks is available from Cowlitz County.
3. All approvals and permits required by the City of Castle Rock will be obtained by the Contractor prior to the start of construction.
4. If construction is to take place in the County right-of-way, the Contractor will notify the County and obtain all the required approvals and permits.
5. A preconstruction meeting will be held with the City of Castle Rock prior to the start of construction.
6. The City of Castle Rock Construction Inspector will be notified a minimum of 48 hours (two working days) in advance of a tap connection to an existing main. The inspector will be present at the time of the tap.
7. The Contractor will be fully responsible for the location and protection of all existing utilities. The Contractor will verify all utility locations prior to construction by calling the Underground Locate Line at 811 a minimum of 48 hours (two working days) prior to any excavation.

8. All sewer mains will be field staked for grades and alignment by a licensed engineering or surveying firm qualified to perform such work. Staking will be maintained throughout construction.
9. All pipe and services will be installed with continuous tracer tape installed 12" to 18" under the proposed finished subgrade. The marker will be 3 inches wide, plastic non-biodegradable, metal core or backing marked sewer that can be detected by a standard metal detector. The tracer tape shall indicate, "CAUTION BURIED SEWER LINE" or similar and be green in color.

Tracer tape will be Terra Tape "D" or approved equal. The tape and wire will be furnished and installed by the Contractor.

10. All sewer pipe and laterals shall include tracer wire. The tracer wire for sewer laterals shall be connected to the sewer main line tracer wire.

The wire shall be attached to the lines at 10-foot intervals and shall be brought to the surface at all manholes and cleanouts. Tracer wire material shall be rated for underground feeder cable, 12 gauge, soft drawn, insulated 60 MIL PVC, rated for 600V and shall be green in color.

Joining ends of tracer wire for mains shall only be spliced underground at existing connections into existing tracer wire, connections at main bore locations, and approved location per the City. Connections shall be made with an approved direct bury wire nut that is rated for underground installation. At locations where locate main wire is tested and found to be damaged and instead of replacing the entire locate wire underground, the Contractor can request to repair line with a splice underground. Direct bury wire nuts shall be Dryconn Direct Bury Wire Nut manufactured by King Innovation, DBY-6 or DBR-6 as manufactured by 3M, or approved equal.

Joining tracer wire from side services, cleanouts, or other small branches to main; connections shall be made with direct bury lug designed to not cut the metal wire of the main tracer wire. These connections shall be used at all side service connections and branches. Direct bury lug connections shall be Dryconn Direct Bury Lug as manufactured by King Innovation, Dryconn 3-way Direct Bury Lug as manufactured by Copperhead, or approved equal.

11. Bedding of the sewer main and compaction of the backfill material will be required in accordance with the above mentioned specification (See General Note 1).

12. All manholes or cleanouts outside the paved area will be installed in accordance with standard plans CRO03SS and CRO06SS.
13. When temporary street patches are allowed by the City, cold mix asphalt will be placed and compacted to a maximum depth of two inches. Contractor will be responsible for maintenance as required by the City.
14. Erosion control measures conforming to the requirements of the City of Castle Rock & Cowlitz County will be taken by the Contractor during construction to prevent erosion and siltation of existing and proposed storm drainage facilities and roadways.
15. Provide traffic control plan(s) in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) as required.
16. It will be the responsibility of the Contractor to have a copy of the approved construction plans on site at all times.
17. Any changes to the design will first be reviewed and approved by the developer's project engineer and the City of Castle Rock.
18. After backfilling, but prior to paving, all mains and appurtenances will be tested, inspected and approved by the City of Castle Rock Construction Inspector. Approval does not constitute final acceptance of the sewer line. The Contractor will retain the responsibility to repair all deficiencies and failures revealed during all required testing for acceptance and through the duration of the warranty. It will be the Contractor's responsibility to notify the City of Castle Rock for the required inspections. Any main or appurtenance backfilled prior to inspection will be re-excavated for inspection.

GRAVITY

1. Gravity sewer mains will meet the following: PVC pipe conforming to ASTM D3034 SDR 35, or ASTM F679 with joints and gaskets conforming to ASTM 3212 and ASTM F 477.

HDPE pipe may be used upon approval of the Public Works Direction and shall PE4710 resin with a minimum SDR of 26.
2. Precast manholes will meet the requirements of ASTM C 478. Manholes will be Type 1 – 48 inches unless otherwise specified on the plans. Joints will be rubber gasketed conforming to ASTM C 443 and will be grouted from the

inside. Lift holes will be grouted from the outside and inside of the manhole. (See General Note 1.)

3. Side sewer services will be PVC, ASTM D3034 SDR 35 with flexible gasketed joints. Side sewer connections will be made by a tap to an existing main or a wye branch from a new main connected above the springline of the pipe. Side sewer services will be installed according to applicable standard detail(s).
4. All lines will be high velocity cleaned and subjected to a low pressure air test per current WSDOT/APWA Specifications after backfilling, but prior to paving (See General Note 1). Hydrant flushing of lines is not an acceptable cleaning method. Testing of the sanitary sewer main will include television inspecting of the main by and at the expense of the Contractor.

Immediately prior to television inspecting, enough water will be run down the line so it comes out the lower manhole and the line is flushed clean. Acceptance of the line will be made after the television inspection tape has been reviewed and approved by the inspector. A test of all manholes in accordance with Castle Rock standard is also required. Testing will take place after all underground utilities are installed and compaction of the roadway subgrade is completed.

7.02 Lift Stations

A. General

All lift stations will be designed to serve the appropriate basin as identified in the Comprehensive Sewer Plan.

B. Design Standards

The design of any lift station will conform to City standards, Department of Ecology's "Criteria of Sewage Works Design" and applicable standards as set forth herein. Each lift station will be evaluated for buoyancy resistance using site specific soil and groundwater information.

The following equipment and special modifications are standard requirements for all permanent wastewater pump stations and lift stations constructed within the City of Castle Rock. The following requirements are minimum standards and not all inclusive:

1. The proponent is required to provide the City of Castle Rock a fee simple site outside existing right-of-way for construction of the lift station. The site will have sufficient

area with dimensions that allow for easy and safe access to the lift station.

2. A concrete slab 6 inches in depth, will surround the pump station wet wells and dry wells, with a minimum of two feet side exposure for all openings. The slab will be continuous between the wet well and the dry well, and will be installed at ground level as per detail CRO20SS.
3. An access road, with easement, that will support 20,000-pound axle loads throughout the year, will be provided from the nearest public road to the station, to allow for maintenance of the station.
4. The dry well will be vented with an exhaust fan to meet state safety standards.
5. Wet well will be provided with a permanent, attached, full depth, internal galvanized access ladder, impervious to corrosion, and mounting socket for the City's portable hoist.
6. Entry lid to the station wet well will be located closest to the access drive. The lift station will be accessible at all times to operations and maintenance equipment and vehicles.
7. Entry lid to the station dry well will be constructed of aluminum with rust proof coating or fiberglass.
8. Station entry access will be keyed to match all other city package stations. The Best Lock key system with single key operation of the mechanism will be supplied for all other lock points and padlocks, a blank tumbler will be supplied, and the City will key to the desired code.
9. Dry wells will be provided with an automatic sump pump plumbed to the lift station wet well.
10. Dry wells will be provided with dehumidifier equipment appropriately sized to remove moisture from the dry well.
11. Safety guards will be provided for all exposed drive lines and couplings.
12. Spare parts will be provided as recommended by the manufacturer, with a minimum of one spare impeller, one complete set of seals, filters, and one set of volute gaskets. Four complete sets of O&M manuals, and a list of the nearest dealers for spare parts and repair will be provided. All replacement parts will be readily available from distributor in the U.S.A.
13. The pumps, motors, and wet well will be in compliance with current engineering practice. They will be fully

- compatible as an assembly, and will be engineered for the specific basin.
14. The station will be designed to have an isolation valve located in the discharge line between the station and the pumping bypass port, no less than 12 pipe diameters from the dry well.
 15. City water will be provided to the station for hose down and pump seal supply. An approved back flow prevention device will be provided on the water supply line outside the dry well to protect the public water system. The back flow device will be tested by a Washington State-certified backflow assembly tester, with the results forwarded to the Castle Rock Public Works Department Cross-Connection Program, prior to acceptance of the system. The back flow device will be covered by a hot box to prevent freezing.
 16. A 100 amp minimum 480/277 volt, 3 phase, 4 wire main service will be provided as per plans.
 17. All electrical equipment will be enclosed in a free-standing, vandal proof, all-weather enclosure NEMA 3R or better. (Refer to Standard Drawing CRO19SS.)
 18. A 100 amp minimum, 480-volt, 3 phase emergency power hookup will be provided. The transfer switch will be sized to accommodate the load with a 100-amp minimum. The receptacle will be Crouse-Hinds AREA-10314 or Appleton ADR-1033 4 wire 3 pole with male pins.
 19. The electrical equipment will include a 5-kVA minimum transformer in the dry well for the 120 volt single phase equipment.
 20. Wiring will be THHN stranded copper.
 21. Lift station telemetry will consist of a RUGID PLC, 12 volt isolated power supply, Metricom radio, and antenna cable with lightning arrestor and 6dB gain stick antenna to provide an adequate signal, which will be supplied and installed by the Contractor. Alarm and station status points will be as per attached list. The telemetry will be enclosed in a NEMA 1 enclosure within the electrical cabinet. Prior to ordering the above equipment, the Contractor will contact the City of Castle Rock's Department of Public Works, for complete ordering specifications for the above telemetry. Nominal lead time is 12 weeks.
 22. Pump control system will be of the solid state programmable logic controller (PLC) type, RUGID model 9 or approved equivalent. The system will possess a solid state liquid level sensing device of the 4-20ma analog design. The controller must be compatible with all

established City systems and will be accessible for ease of maintenance.

23. Pump motors will be 3 phase, 480 volt, and be provided with elapsed time meters.
24. Verification of operating parameters by City personnel, such as pump operation, alarms, and an electrical inspection is required prior to acceptance of all lift stations.
25. Wetwell Sizing Criteria:
 - a. Provide a holding period not to exceed 10 minutes for the design average flow per DOE Criteria for Sewage Works Design.
 - b. Provide for minimum of 45 seconds pump run time per pump cycle, and a maximum of ten pump cycles per hour.
26. Lift Station Emergency Storing Criteria

Option #1:

- a. Emergency storage will be provided for 2 hours of design average flow using a peaking factor of 2. This calculation is to be submitted with the system design and approved by the City Engineer.

Note: The 2-hour time was determined as an average response time by a City crew. The peaking factor was set at 2, as opposed to 3 or 4, due to typical emergency being caused by power outage.

- b. All volume above area basements and below the hydraulic gradient may be used as emergency storage, i.e., wetwell and manholes. This condition must be verified by calculation and submitted for approval by the City Engineer.
- c. Provide standby generator receptacle. Generator receptacle must be compatible with City's generator.

Option #2:

- a. Provide emergency power per DOE Criteria for Sewage Works Design.
27. The program for the pump controls will be furnished and installed by City of Castle Rock personnel. For assistance contact the Public Works Director at 274-7478.
 28. Pump station design will be a self priming, wet well - dry well, as manufactured by Smith and Loveless, Paco, or Hydronix, and currently in use by the City of Castle Rock, or equal.

29. Plans and specifications must be submitted and approved in writing prior to ordering a package lift station.
30. Alarm and Station Status points:
 - Wetwell level - Blue
 - Seal pressure - White with red stripe
 - Pump #1 run - Red with green stripe
 - Pump #2 run - Red with yellow stripe
 - Pump # 1 auto - White with green stripe
 - Pump #2 auto - White with yellow stripe
 - A/C power fail - Red
 - Generator run - Purple
 - Generator fail - White with black stripe
 - Low wetwell - White with blue stripe
 - High wetwell - Red with black stripe
 - Drywell flood - Pink
 - Intrusion - Brown
 - Fire - Orange
 - Pump # 1 call - Green
 - Pump #2 call - Yellow

The Contractor will supply and install all sensors for the above alarm points and connect them with the appropriate wire size and color to an alarm terminal strip. The alarm points terminated on the terminal strip will be identified by number and a label showing the number, and alarm will be provided adjacent to the terminal strip. From the terminal strip to the telemetry terminal strip, all points will be connected by a single multi conductor shielded cable encased in a single conduit. The following note will be added to all lift station plans:

Prior to ordering and wiring of telemetry components, the Contractor will contact the City of Castle Rock Public Works for approval of Telemetry Components.

See Section 7.04, Pressure Sewer for additional information regarding force mains.

7.03 Pressure Sewer (Force Main)

A. General

Low pressure systems, i.e., force mains may be considered for situations where high ground water table or topography make gravity sewer impractical.

B. Design Standards

The design of any sewer extension/connection will conform to City standards, Department of Ecology's "Criteria of Sewage Works Design," and any applicable standards as set forth herein.

The layout of extensions will provide for the future continuation of the existing system as determined by the City. In addition, main extensions will be extended to and across the side of the affected property fronting the main.

The system will be designed at full depth of flow on the basis of an average daily per capita flow as shown on the table in Section 7.02.B. A coefficient of friction of 120 will be used for the Hazen-Williams “C” value.

New sewer systems will be designed by methods in conjunction with the basis of per capita flow rates. Methods will include the use of peaking factors for the contributing area, allowances for future commercial and industrial areas, and modification of per capita flow rates based on specific data. Documentation of the alternative method used will be provided along with plans.

The applicable General Notes in section 7.02. will be included on any plans dealing with pressure sanitary sewer design.

C. Force Main

a. Material

Force mains up to 12 inches will be HDPE with a minimum SDR 17, ductile iron minimum pressure class 50 and PVC C900 with ductile iron fittings and gasketed joints. A more rigid pipe may be required where unlimited trench widths occur. All ductile iron pipe and fittings will be coated or PE lined and designed for use with corrosive materials. All force mains shall include tracer wire and locate tape as specified earlier this chapter.

b. Depth

Force mains will have a minimum 30 inches of cover to top of pipe. See Section 7.02.C for sanitary sewer/water main crossing requirements.

c. Velocity

The minimum velocity allowed is 3 feet per second (fps) at average Dry Weather Flow. Maximum velocity allowed will be 8 fps.

D. Surge Protection

PVC pipe is subject to fatigue failure due to cyclic surge pressures. Lift stations will be constructed to minimize rapid changes in velocities and a properly sized surge tank and “soft start and stop” pump controls, if required.

E. Air/Vacuum Valves

Air release valves and air/vacuum valves will be constructed as shown in Standard Drawing CRO08SS and located at the high points of the line within a manhole or approved vault that provides 18 inches of clearance on all sides between the assembly and the walls. Air release valves will be fitted with an activated carbon canister sewer guard to prevent the release of disagreeable odors to the surrounding area. Grades will be designed to minimize the need for air/vacuum valves when practical. Vehicular access to valve is required for maintenance.

F. Force Main Drain

Provisions to drain a force main to facilitate repairs or to temporarily remove force main from service will be provided. This may be accomplished through the use of a valved tee connected to a drain line at the low point of the line, with isolation plug valves on both sides of the tee along the main. A manhole will be set over the force main at the valved tee.

G. Thrust Blocking

Location of thrust blocking will be shown on plans. Thrust block concrete will be 3,000 psi at 28 days, poured against undisturbed earth. A plastic barrier will be placed between all thrust blocks and fittings.

See standard detail number CRO26SS and CRO27SS. Restraining joint systems may be allowed in lieu of thrust blocking when designed by a licensed engineer and approved by the City Engineer. Restraining joint brand, type, and size will be specified on the plans.

H. Force Main Termination

Hydrogen sulfide odors (H_2S) and the buildup of sulfuric acid (H_2SO_4) occur in the operation of a force main. To mitigate these conditions some type of control method(s) will be used. This may include chemical addition at the pump station and/or at or near the terminus. The outfall manhole (point of connection where force main discharges into gravity sewer) and the next downstream manhole on the gravity sewer will be lined with PVC to protect the system against corrosion. The PVC lining will be cast into the walls and floor of the manhole. No exposed concrete will be permitted. All work will be done in accordance with manufacturer's recommendations and must be approved by the City. If a new outfall manhole and subsequent downstream structures are installed as part of the new system design, the configuration will be approved by the City. In all other cases, the PVC liner will be installed in previously existing system manholes. The downstream gravity sewer line pipe connecting these manholes will also be protected from the affects of hydrogen sulfide. Epoxy coatings are acceptable upon approval of the Public

Works Director and shall be Raven 405 by Raven Lining Systems or approved equal. Coating shall be provided with a 5 year warranty and will be required to pass a high voltage spark test.

7.04 Private Sewer Lines

A. General

Private Sewer - will be that portion of the system located on private property where no easements are granted to the City, including gravity laterals, building sewers, and sewer collection systems internal to single parcel developments; such as, apartment complexes, condominiums, townhouses, shopping centers, commercial office parks, mobile home parks, etc. It also includes the portion of the lateral between the property line and force main or gravity sewer. Private sewer systems shall be constructed to City Standards. Maintenance of private sewer will be the responsibility of the property owner(s).

B. Specifications for New or Replaced Private Sewer Lines

- a. Use approved sewer line materials such as Schedule 40 ABS plastic pipe or ASTM D3034 PVC pipe.
- b. Connect to the existing cast iron or ABS plastic house drain, which should be located at least 2 feet from the house with a mechanical joint coupling or other approved connection.
- c. When using bell end pipe, lay bell ends of pipe facing house.
- d. Pipe should ideally run at a uniform slope of 1/4 inch to 1 foot of fall (2%).
- e. Changes in direction of sewer line and cleanout risers should be made with Y's and 45 degrees bends or combo TYs. Do not use sanitary T's or short sweeps.
- f. A cleanout must be installed within 5 feet of the house, at the property line, every 100 feet, and at any changes in direction over 135 degrees. Cleanouts must be readily accessible by extending them to near finish grade and must flow in the same direction as the sewer.
- g. Call 274-8181 for the Building Inspector when piping is completed and before backfilling. Do not backfill with materials that could damage or break the piping.
- h. Special procedures for sewers replaced at the City's written request (Sewer Rehab. Areas or LIDs): The cleanout at the property line will be installed by the property owner. After a private sewer passes a visual inspection by the Building Department the pipe must be backfilled except for the cleanouts at the house and the property line.

C. Sewer Hook-up Procedures

a. Acceptable Materials

- ABS – 4 inch minimum diameter, sewer grade, Schedule 40 pipe
- PVC – 4 inch minimum diameter, ASTM D3034 or equivalent per UPC
- Other – UPC approved with IAPMO Logo
- Grade of Sewer Pipe:
 - 1/4 inch per foot
 - 1/8 inch per foot when impractical conditions exist and permission is obtained from administrative authority prior to placement of sewer line
 - For terrain sloping greater than 1/4 inch per foot, stepping methods should be employed; contour grading of sewer slope is permitted providing approved and appropriate fittings are installed according to accepted plumbing practices without undue strains or bends placed on the sewer pipe

b. Imbedment:

- Depth: minimum 12 inches from top of pipe to finish grade
- Bed: shall be of approved materials – fine granular material (i.e., sand is preferred over coarse materials) – avoid sharp rocks
- Water lines in same trench: water line must be 12 inches above sewer with a 12-inch offset

c. Clean Outs Required:

- One at building – inside or outside at end of building drain and extended to grade
- At intervals not exceeding 100' in straight runs
- For each aggregate change in direction exceeding 135°
- See standard plan CRO33SS (sewer diagram example)

7.05 Grinder Pump Stations

A. General

Individual lots that cannot be served by gravity sewer service may be provided with Grinder Pump Systems, if approved by the City Engineer.

B. Design Standards

Grinder pump systems shall be engineered positive displacement systems, Eone or equal. Lots served by grinder pumps must include a statement on the face of the plat indicating that operation and maintenance of the grinder pumps is the responsibility of the home owner.

C. Submittal Information

For grinder pump installations, the following information shall be submitted to the City for review: manufacturer and model of grinder pump, static, dynamic, and total head requirements, discharge velocity, power requirements, and the pump curve.