FOREWORD

These Public Works Design Standards are intended to set minimum standards and provide a uniform set of guidelines for public works improvements within the City of Stayton. These Public Works Design Standards shall apply to all improvements within existing and proposed public right-of-way, within public utility and other related easements, to all improvements that ultimately will be owned, operated, or maintained by the City, and to all improvements for which the Stayton Municipal Code requires City approval.

Most of the elements contained in these Public Works Design Standards are public works oriented and are intended that they apply to both publicly financed public improvements under City contract and privately financed public improvements under private contract designated herein. Private construction firms, Developers, consulting engineers, or any other individuals or business entities engaged in the design and construction of public works improvement projects within the City shall comply in every respect with these Public Works Design Standards.

The Public Works Standards are intended to provide the following:

- Summarize, streamline, and provide general guidance and criteria on the administration, design and construction, and operation and maintenance of public works improvements and related facilities within the City.
- Set forth uniform construction standards for the materials and workmanship that is to be used within the City.
- Ensure the long-term viability of City infrastructure and to avoid excessive maintenance and replacement costs.
- Outline the provisions necessary to prevent or reduce adverse impacts to the environment and to the City's essential water resources.
- Supplement applicable public health, safety, and general welfare requirements of the Stayton Municipal Code, Stayton Fire District, State and Federal guidelines, etc.

If any improvements are proposed in the jurisdictional right-of-way of another agency such as Marion County or the Oregon Department of Transportation, the applicable standards from that jurisdiction will govern, including applicable permit requirements. In addition, any improvements in or near wetlands, sensitive areas, floodplains, and floodways may require State and Federal permits and/or approvals from the Army Corps of Engineers and/or the Oregon Division of State Lands (DSL). Other permits and standards may be applicable to specific projects. The Developer shall bear all the responsibility to obtain necessary permits and to apply with applicable standards related to any specific project.

It is anticipated that these Public Works Design Standards will be updated periodically by the City and, as such, all persons should ensure they are working with the most current set of Public Works Design Standards. In the case of conflicts between the text of the Public Works Design Standards, Standard Construction Specifications, Standard Drawings, and/or Standard Forms, the more stringent as determined by the City Engineer shall apply. Where minimum values are stated, greater values should be used whenever practical; where maximum values are stated, lesser values should be used whenever practical.

This edition of the Public Works Design Standards replaces all previous Public Works Design Standards. Being a totally new document, there may be some minor discrepancies or omissions. It would be appreciated if the users of these Public Works Design Standards would notify the City of any such corrections.

DIVISION 1 – GENERAL POLICIES, PROCEDURES, AND REQUIREMENTS

DIVISION 1

GENERAL POLICIES, PROCEDURES, AND REQUIREMENTS

101 GENERAL

101.01 AUTHORITY AND PURPOSE

101.01.A These Design Standards shall apply to all improvements within existing and proposed public right-of-way and public easements, to all improvements to be maintained by the City, and to all improvements for which the City Code requires approval by the City. Most of the elements contained in these Design Standards are public works oriented and it is intended that they apply to both publicly financed public improvements under City contract and privately financed public improvements.

101.01.B Private construction firms, Developers, consulting engineers, or any other individuals or business entities engaged in the design and construction of improvement projects that ultimately will be owned, operated, or maintained by the City shall comply with these standards. Where minimum values are stated, greater values should be used whenever practical; where maximum values are stated, lesser values should be used whenever practical.

101.01.C The purpose of these Design Standards is to provide a consistent policy under which certain physical aspects of public improvements shall be implemented. All public system improvements and public works facilities shall be designed and constructed in accordance with applicable rules and regulations of the City and any City interpretations of those rules and regulations, including applicable technical guidance manuals, and in accordance with applicable federal, state, and local statutes and rules. Approval of public improvements must be made by the City Engineer or the Public Works Director before construction is permitted. An authorized representative of the City will be available for construction observation during construction of the project.

101.01.D It is important to emphasize that these Design Standards are not intended to inappropriately restrict or constrain the originality or innovativeness of the Design Engineer and his or her ability to exercise and apply professional judgment to each situation and project. The City recognizes that every public improvement project has unique characteristics and situations. These Design Standards cannot provide for all situations and are intended to assist, but not to serve as a substitute for competent work by design professionals. It is expected that the Design Engineer will bring to each project the standard of care from the Design Engineer's respective discipline.

101.01.E If the Design Engineer anticipates challenges in meeting these Design Standards, they should contact the City Engineer prior to extensive design efforts. The City Engineer will seek to work with each designer to achieve a satisfactory design and construction project that is in the best long-term interests of the City of Stayton and one that complies with applicable rules and regulations.

101.01.F These Design Standards are not intended to limit any innovative or creative effort which could result in better quality, better cost savings, or both. Any proposed departure from the Design Standards will be judged; however, on the likelihood that such variance will produce a comparable result, or long-term benefit to the City, while meeting the intended purpose of the design standard.

101.01.G Requests for alternatives to these Design Standards will be considered for approval by the City Engineer as the need arises and conditions warrant modification. Request must show that the variance meets the intent of the Design Standards and will not compromise safety, impact other properties or cause an increase in maintenance. This consideration will be on a case-by-case basis and require sufficient justification prior to approval. All requests will be in writing and be accompanied by engineered drawings and final design calculations.

101.01.H All franchise utility improvements, including telephone, electrical power, gas and cable TV shall meet the current standards of the appropriate agency as well as City Standards.

101.01.I In the case of conflicts between the text of these Design Standards and the Standard Drawings, or between the provisions of these Design Standards and the Standard Construction Specifications, the more stringent as determined by the City Engineer shall apply.

101.01.J All surveys for public works facilities shall be performed under the direction of a Professional Land Surveyor registered in the State of Oregon. All elevations shall be referenced to NAVD 88 vertical datum. Vertical benchmark locations shall be coordinated with the City.

101.01.K On completion of projects to become public works, the Design Engineer shall submit one complete set of reproducible "Record Drawings" (As-Builts), a compact disc (CD) containing electronic PDFs and cad files (AutoCAD or others as approved) to the City Engineer. The drawings shall show any deviations from the original construction drawings and shall include sufficient information to accurately locate public works facilities. No bond will be released until the City Engineer receives and approves an acceptable set of reproducible Record Drawings from the Design Engineer, with his/her stamp of certification.

101.01.L For privately financed public improvements, the Design Engineer, at the completion of construction, shall submit a completion certificate to the City stating that all work has been completed in accordance with the approved project plans and specifications.

101.01.M Before the City accepts a public works project for operation and maintenance and releases the Performance Bond, a one (1) year Warranty Bond on all materials and workmanship incorporated in the project shall be provided to the City.

101.02 APPLICABILITY

101.02.A These Design Standards will govern the design of public improvements and applicable work within the City and its service areas. This document will be routinely referred to as the Design Standards.

101.03 REFERENCES

101.03.A These Design Standards are intended to be consistent with the most current provisions of the documents and requirements listed below

- Stayton Municipal Code (SMC)
- Stayton Comprehensive Plan
- Oregon Statewide Planning Goals and Guidelines
- Stayton Transportation System Plan (TSP)
- Stayton Master and/or Facility Plans
- Oregon Administrative Rules Chapter 333, 340(Division 52)
- State of Oregon Specialty Codes (Building and Fire Codes)
- State statutes and regulations
- Federal statutes and regulations

101.04 SPECIAL DESIGN APPLICATIONS

101.04.A Special design applications not covered in these Design Standards require review and approval by the City. Submittal of full design calculations, supplemental drawings, and information will be required prior to any approval. Such design applications requiring special review and approval include, but are not limited to, the following:

1. STREETS AND ALLEYS:

- ❖ Bridges
- ❖ Roundabouts/Traffic Calming
- ❖ Traffic Signals
- ❖ Electrical/Control/Telemetry Devices

2. WATER SYSTEM:

- ❖ Treatment Plants
- ❖ Reservoirs
- ❖ Pump Stations
- ❖ Pressure Regulating Devices
- ❖ Flow Measurement/Monitoring
- ❖ Electrical/Control/Telemetry Devices

3. SANITARY SEWER SYSTEM:

- ❖ Treatment Plants
- ❖ Sewer Facilities
- ❖ Sewer Outfalls
- ❖ Pump Stations and Force Mains
- ❖ Electrical/Monitoring/Telemetry Devices
- ❖ Siphons
- ❖ Internal Sealing of Existing Sewers
- ❖ Relining of Existing Mains
- ❖ Energy Dissipaters
- ❖ Flow Measurement/Monitoring
- ❖ Hydrogen Sulfide and/or Hazardous Gases

4. STORM DRAIN SYSTEM:

- ❖ Pump Stations and Force Mains
- ❖ Electrical/Monitoring/Telemetry Devices
- ❖ Siphons
- ❖ Internal Sealing of Existing Storm Drains
- ❖ Relining of Existing Storm Drains
- ❖ Energy Dissipaters
- ❖ Bank protection
- ❖ Flow Measurement/Monitoring

101.05 STANDARD CONSTRUCTION SPECIFICATIONS AND STANDARD DRAWINGS

101.05.A Except as otherwise provided by these Design Standards, all construction design detail, workmanship, and materials shall be in accordance with the current edition of the City of Stayton Public Works Standard Construction Specifications and Standard Drawings.

101.06 CITY POLICY REGARDING ENGINEERING

101.06.A It will be the policy of the City to require compliance with Oregon Revised Statute 672 for Professional Engineers.

101.06.B Engineering plans, reports, or documents shall be prepared by a registered Professional Engineer or by a subordinate employee under the Design Engineer's direction, and shall be signed by the Design Engineer and stamped with the Design Engineer's seal to indicate responsibility for them. The Design Engineer shall maintain complete responsibility for the design of the project. The Design Engineer shall review any proposed public facility extension, modification, or other change with the City prior to engineering or other proposed design work to determine if there are any special requirements or whether the proposal is permissible.

101.06.C City approval of plans or any other engineering document produced by the Design Engineer does not in any way relieve the Design Engineer of responsibility for the design, or their responsibility to meet applicable City, County, State, and Federal requirements, or their obligation to protect life, health, and property of the public. The plan for any project shall be revised or supplemented at any time it is determined that the project requirements have not been met. It is also required that at any time a revision to the design is required, the Design Engineer shall maintain responsibility to redesign according to these Design Standards per the City's approval. It is therefore necessary for the Design Engineer to be available during construction should timely changes be required. If the Engineer of Record leaves the acting consulting firm then a new registered engineer will have to submit an updated Engineer of Record form to the City prior to work commencing.

101.07 CONVENTIONS USED THROUGHOUT THE DESIGN STANDARDS

101.07.A GENERAL

1. The provisions of Oregon Revised Statutes Chapter 279A and 279C and Oregon Administrative Rules Chapter 137, Divisions 46 and 49, apply to all publicly financed public improvement projects that incorporate the Public Works Standards of the City of Stayton into the Contract. The ORS and OAR provisions control over any conflicting language in the Public Works Standards.

2. In interpreting these Design Standards, it is understood that if the context so requires:
   - ❖ The singular pronoun shall be taken to mean and include the plural pronoun.
   - ❖ The masculine pronoun shall be taken to mean the feminine and the neuter pronoun.
   - ❖ All captions used therein are intended solely for the convenience of reference and shall in no way limit any of the provisions of these Design Standards.

3. The words "directed", "required", "permitted", "ordered", "requested", "instructed", "designated", "considered necessary", "prescribed", "approved", "acceptable", "satisfactory", or words of like import, refer to actions, expressions, and prerogatives of the City.

4. Command type sentences are used, but are not exclusive of other directives throughout these Design Standards. In all cases the command expressed or implied is directed to the Design Engineer and/or Developer.

5. The words, "as shown", "shown", "as indicated", or "indicated" or words of like import, refer to as indicated on the Plans or Standard Drawings.

101.07.B REFERENCES TO LAWS, ACTS, REGULATIONS, RULES, ORDINANCES, STATUTES, ORDERS, AND PERMITS

1. References are made in the text of the Standards to "laws", "acts", "rules", "statutes", "regulations", "ordinances", etc. (collectively referred to for purposes of this Subsection as "Law"), and to "orders" and "permits" (issued by a governmental authority, whether local, State, or federal, and collectively referred to for purposes of this Subsection as "Permits"). Reference is also made to "applicable laws and regulations". The following conventions apply in interpreting these terms, as used in the Standards.

    - **Law** - In each case, unless otherwise expressly stated therein, the Law is to be understood to be the current version in effect. This also applies where a specific Law is referenced or cited, regardless of whether the text of the Law has been included in the Standards or not, and regardless of whether the text of the Law has been summarized or paraphrased. In each case, the current version of the Law is applicable under any Contract. The reader is therefore cautioned to check the actual text of the Law to confirm that the text included in the Standards has not been modified or superseded.
    - **Permits** - Orders and permits issued by a government agency may be modified during the course of performing the Work under a Contract. Therefore, wherever the term "order" or "permit" is used in the Standards, it is intended to refer to the then-current version. That version may be embodied in a modified, superseding order or permit, or it may consist of all terms and conditions of prior orders or permits that have not been superseded, as well as the additional terms added by amendment or supplement. In certain cases, the orders and/or permits are identified by name in the Standards; in other cases the terms are used in the generic sense. The reader is cautioned to check the text(s) of each order and permit identified either by name or by generic reference.
    - **Applicable Laws and Regulations** - Where the phrase "applicable laws and regulations" appears, it is to be understood as including applicable laws, acts, regulations, administrative rules, ordinances, statutes, and orders and permits issued by a governmental or regulatory authority.

101.08 ORGANIZATION AND CLASSIFICATION OF DIVISIONS

101.08.A ORGANIZATION

1. The Design Standards contained herein are divided into categories: DIVISION; SECTION; and SUBSECTION, and are designated as in the following example:

    DIVISION 3 – STREETS AND ALLEYS

    SECTION – 305 PAVEMENT DESIGN

    SUBSECTION – 305.02 ASPHALT CONCRETE PAVEMENT

2. In addition, throughout the Design Standards:

    - Reference to a Section includes applicable requirements of the Section.
    - When referring to a Subsection, only the number of the Subsection may be used; the word "Subsection" is therefore implied.
    - Where Section and Subsection numbers are not consecutive, the interval has been reserved for future expansion of the Standards.

- ❖ Paragraphs under Subsections are shown alphabetical (A), (B), etc. with subparagraphs shown numbered (1), (2), etc. Any further subparagraphs are alternated alphabetical and numerical.

101.08.B CLASSIFICATION OF DIVISIONS

1. The classification of Divisions contained in the Design Standards is as follows:

   a. DIVISION 1 – Contains specific information for the **GENERAL POLICIES, PROCEDURES, AND REQUIREMENTS** for the design of public works improvements. It contains many of the definitions and abbreviations used throughout these Design Standards.

   b. DIVISION 2 – Contains the **GENERAL TECHNICAL REQUIREMENTS** for the design of public works improvements that are to be operated and maintained by the City.

   c. DIVISION 3 – Contains specific requirements for the design of **STREETS AND ALLEYS** that are to be operated and maintained by the City.

   d. DIVISION 4 – Contains specific requirements for the design of **WATER DISTRIBUTION** systems that are to be operated and maintained by the City.

   e. DIVISION 5 – Contains specific requirements for the design of **SANITARY SEWERS** that are to be operated and maintained by the City.

   f. DIVISION 6 – Contains specific requirements for **STORMWATER MANAGEMENT** and the design of storm water facilities and storm drains and that are to be operated and maintained by the City.

101.09 CLARIFICATIONS, MODIFICATIONS, AND REVISIONS TO THE DESIGN STANDARDS AND STANDARD DRAWINGS

101.09.A GENERAL

1. These Design Standards and Standard Drawings are intended to be consistent with the most current provisions of the documents and requirements listed and referenced in Subsection 101.03. Periodic revisions to these Standards will be necessary to maintain consistency in that regard. The date appearing on the title page is the date of the latest revision for each Division. Parenthetical notations at the bottom of each page indicate the most recent change. It will be the user's responsibility to obtain and maintain his/her copy of these Standards with the latest changes.

2. Any user of this document may submit a request for clarification, modification, or revision to these Standards.

101.09.B REQUEST FOR CLARIFICATIONS

1. Requests for clarification or suggestions for revisions to these Standards should be submitted in writing to the City as follows:

   City of Stayton
   Public Works Department
   Attn: Design Standard Clarification
   362 N. 3rd Avenue
   Stayton, OR 97383

2. Any submitted request for clarifications or interpretations will be provided by the City Engineer. The Public Works Director is the final authority on all questions which may arise as to the interpretation of these Standards.

101.09.C REQUEST FOR MODIFICATIONS

1. Modifications to these Standards may be requested as follows. When requested modifications involve or will have an impact on public safety, the City will rule in the direction of safety.

2. SUBMITTAL REQUIREMENTS FOR MODIFICATION OF STANDARDS

   a. Requests for modifications to these Standards shall be submitted in writing to the City as follows:

      City of Stayton
      Public Works Department
      Attn: Design Standard Modification
      362 N. 3rd Avenue
      Stayton, OR 97383
      (503) 769-2919

   b. This written request shall state the desired modification, the reason for the request and a comparison between the Standard and the modification as far as performance and maintenance requirements.

   c. Any modification or variance of these Standards should be documented and reference nationally accepted standards and must meet or exceed the minimum requirements set forth in these Standards. The use thereof shall not compromise public safety or intent of the City's Standards.

   d. The written request is to include, but is not limited to, the manufacturer's specifications and testing results, design drawings, design calculations, and other pertinent information.

   e. Any deviations or special problems will be reviewed on a case-by-case basis and approved by the City Engineer.

3. CRITERIA FOR MODIFICATION OF STANDARDS

   a. The City Engineer may make project-specific modifications and amendments to an existing City Standard when any one of the following conditions is met:

      - The Standard is inapplicable to a particular situation.

- ❖ Topography, right-of-way, or other geographical conditions or impediments impose an undue economic hardship on the applicant, and an equivalent alternative that can accomplish the same design objective is available and does not compromise public safety, accessibility, or anticipated life of facility.
- ❖ A change to a Standard is required to address a specific design or construction problem, and if not modified, the standard will impose an undue hardship on the applicant with little or no material benefit to the public.
- ❖ The modification or amendment will be de minimis, per Subsection 101.09.E.

4. CITY REVIEW PROCESS FOR MODIFICATION OF STANDARDS

   a. The City Engineer will review a request to modify a City Standard relating to, and only for, a specific project. The City Engineer will:

      - ❖ Approve the request as proposed;
      - ❖ Approve the request with conditions; or
      - ❖ Deny the request.

   b. The City Engineer's decision will be documented in writing. A denial of a request will be accompanied with a brief explanation of the reason for the denial.

   c. Whether a request for modification is approved as proposed or with conditions, the approval is for project-specific use and shall not constitute a precedent or general modification of the City Standard.

   d. The applicant may appeal the City Engineer's decision regarding the request to modify a City Standard by filing a written appeal to the Public Works Director within fourteen (14) calendar days of the City Engineer's decision. The Public Works Director will consider the appeal and render a decision within seven (7) calendar days of the date the appeal is received by the City.

   e. The applicant may appeal the Public Works Director's decision regarding the request to modify a City Standard by filing a written appeal to the City Council, as provided in the Stayton Municipal Code.

101.09.D CITY-INITIATED MODIFICATIONS

1. During design or construction of a project, the City Engineer may:

   a. Modify and/or add requirements applicable to a specific City-approved project. Such addition or modification is for project-specific use and shall not constitute a precedent or general modification of the City Standard.

   b. The applicant may appeal the City Engineer's decision regarding the request to modify a City Standard by filing a written appeal to the Public Works Director within fourteen (14) calendar days of the City Engineer's decision. The Public Works Director will consider the appeal and render a decision within seven (7) calendar days of the date the appeal is received by the City.

   c. The applicant may appeal the Public Works Director's decision regarding the request to modify a City Standard by filing a written appeal to the City Council, as provided in the Stayton Municipal Code.

101.09.E REVISIONS

1. These Standards will be periodically updated due to changes in policy or procedures, new technology, design methods, and construction methods. Updates to these Standards will be posted on the City's website.

2. The City will make the following changes or corrections to the provisions of these Standards when the changes or corrections do not alter the sense or meaning of its provisions:

   - Misspellings. Misspelled words may be corrected.
   - Histories. Erroneous legislative histories may be corrected.
   - Cross-references. Cross-references may be changed to agree with new, amended, reenacted, renumbered, re-lettered, reallocated or corrected ordinances or resolutions.
   - Capitalization. Improper capitalization may be corrected.
   - Headings. Descriptive headings of titles, chapters, sections or subsections may be edited or added to briefly and clearly indicate the subject matter of the title, chapter, section or subsection.
   - Renumbering; re-lettering. The numbering or lettering of sections of ordinances and resolutions, including duplicative numbering or lettering created by conflicting enactments, may be corrected or properly arranged.
   - Changed job titles; agency names. References in these Standards to specific job titles or agency names that are changed without substantial affect on job or agency responsibilities may be changed to refer to the new job title or agency name.
   - Punctuation. Punctuation, including hyphenization, may be corrected.
   - Clerical Errors. Typographical or grammatical errors may be corrected.
   - Gender. Gender-specific terms that occur in an ordinance or resolution may be changed to gender-neutral terms and necessary grammatical changes to properly use the gender-neutral terms may be made.
   - Mandated Changes. Additions, deletions, or revisions to these Standards may be made when required for City compliance with mandatory local, regional, state, or federal regulations.
   - De minimis Changes. Additions, deletions, or revisions to these Standards may be made where the addition, deletion, or revision will have no material effect on the cost of constructing the item affected by the changed Standard. A material effect on the cost of constructing an item affected by a changed Standard is an increase or decrease in the cost of constructing an item that is greater than five percent (5%) of the cost of constructing the item under existing Standards. If a change to a Standard affects a specific project, the change, in addition to having no material effect on the cost of constructing the item affected by the changed Standard, must also have no material effect on the cost of a project. A material effect on the cost of a project is an increase or decrease in the cost of the project that is greater than one-tenth of one percent (0.1%) of the estimated total cost of the project at the time of issuance of the project's permit. If the City Engineer makes two or more de minimis changes to a Standard under the authority of this paragraph that affect a specific project, each de minimis change must meet the above requirements of this paragraph by (a) having no material effect on the cost of constructing the item affected by the changed Standard and (b) having no material effect on the cost of a project. In addition, the combined effect of the multiple changes to the Standards relating to that specific project must not increase or decrease the total cost of a project by more than three-tenths of one percent (0.3%) of the estimated total cost of the project at the time of issuance of the project's site development permit.

101.10 DEFINITIONS AND TERMS

Unless otherwise defined by applicable law or the Contract Documents, the following definitions and abbreviations shall apply whenever used.

Acceptance of Work
See Final Acceptance.

Alley
A public way or thoroughfare not more than 20 feet but not less than 10 feet in width which has been dedicated or deeded to the public for public use providing a secondary means of access to property, except in a downtown zone, where it may be the primary means of vehicular access.

Aggregate
Rock of specified quality and gradation.

Approved or Approval
Acceptance, given to the Contractor by the City Engineer, for specific materials, construction or manufacturing processes, changes in contract conditions, or any other items to be used in the Work.

Approved Equal
A product, component, or process whose use in or on a particular project is specified as a standard for comparison purposes only. The "equal" product, component, or process shall be the same or better than that named in function, performance, reliability, quality, and general configuration. Determination of equality in reference to the project design requirements will be made solely by the City Engineer.

Approved Backflow Prevention Assembly
A testable assembly that has been investigated and approved by the Oregon Department of Human Services – Drinking Water Program.

Arterial Street
See Street.

As-Builts
See Record Drawings.

Attorney-in-Fact
An Entity appointed by another to act in its place, either for some particular purpose, or for the transaction of business in general.

Average Daily Demand
The total volume of water delivered to the system in one (1) year divided by three-hundred and sixty-five (365) days.

Backflow
The reverse of flow from its normal or intended direction of flow. Backflow can be caused by back-pressure or back-siphonage.

Backflow Preventer
An approved means to prevent backflow into the potable water system.

Back-siphonage
Backflow that results from negative pressure (partial vacuum) in the supply piping system.

Base
A Course of specified material of specified thickness placed below the pavement.

Bikeway
Any road, path, or way that is some manner specifically open to bicycle travel, regardless of whether such facilities are designated for the exclusive use of bicycles or are shared with other transportation modes. The four types of Bikeways are as follows:

- **Bike Lanes**
  A lane, typically 6 feet in width, in the Traveled Way, designated by striping and Pavement markings for the preferential or exclusive use of bicyclists.

- **Bike Path**
  A designated travel-way for bicyclists that is completely separated from the vehicular travel lanes and is within independent rights-of-way.

- **Shared Bikeway**
  A travel-way for a bicyclist, typically consisting of a paved shoulder that is 4-feet or wider, that is shared with vehicular traffic. The bike way is designated with signs for bicycling (no pavement markings for the bike lanes) and typically shared by bicyclists and pedestrians in rural areas. Synonymous with the term bike route.

- **Shared Roadway**
  A travel lane that is shared by bicyclists and motor vehicles.

Best Management Practices (BMPs)
Schedules of activities, prohibitions of practices, maintenance procedures or other management practices to prevent or reduce the pollution of waters of the state. BMPs for storm water may include operational and structural source controls that minimize and prevent contaminants from entering storm water as well as treatment BMPs that remove contaminants contained in storm water runoff before disposal or discharge.

Boulders
Particles of rock that will not pass a 12-inch square opening.

Bridge
A single or multiple span structure, including supports, that carries motorized and non-motorized vehicles, pedestrians, or utilities on a roadway, walk, or track over a watercourse, highway, railroad, or other feature.

Building Fire Flow Requirements
Fire flow requirements based on type of occupancy and building material construction.

Building Water Supply
The pipe carrying potable water from the water meter or other approved source of water supply to a building. Building water supply shall also mean customer service line.

Building Official
The person(s) empowered by the City Council to administer and enforce the Stayton Municipal Code and building, plumbing, electrical, and other similar codes.

Buttress
A rock fill placed at the toe of a landslide or potential landslide in order to resist\slide movement. Also can be a perpendicular wall to retaining wall to reinforce from overturning.

CAD
Computer aided design.

Check Valve
A valve which allows flow in only one direction.

City
The City of Stayton, a municipal corporation of the State of Oregon, and its elected officials, officers, employees, volunteers and agents.

City-Controlled Lands
Lands owned by the City, or controlled by the City under lease or agreement, or under the jurisdiction and control of the City for the purposes of the Contract.

City Administrator
An appointed official to serve as chief executive and administrative officer to support the information and policy-making needs of the Council, implement Council decisions and directives, and manage the day-to-day operations of City departments. Under the Council/Manager form of government, the Council establishes policies for operations within the City, and it is the City Administrator's responsibility to ensure these policies are carried out. Synonymous with the term City manager.

City Attorney
A licensed attorney hired or appointed by the City Council to provide legal advice and assistance to the City Council, the Planning Commission, and City officials.

City Engineer
A registered professional engineer licensed to practice in the State of Oregon, or his/her authorized representative, acting under the direction of the Public Works Director, who directs and coordinates engineering activities relating to City of Stayton Public Works.

City Inspector
The authorized representative of the City whose authority, instructions, and decisions shall be limited to the particular duties and responsibilities entrusted to him in making detailed inspections of any or all portions of the work or materials therefore.

Clay
Soil passing a No. 200 sieve that can be made to exhibit plasticity (putty-like properties) within a range of water contents.

Clear Zone
Roadside border area, starting at the edge of the Traveled Way that is available for safe use by errant vehicles. Establishing a minimum width Clear Zone implies that rigid objects and certain other hazards within the Clear Zone should be relocated outside the Clear Zone, or shielded, or remodeled to make them break away on impact or be safely traversable.

Close Conformance
Where working tolerances are given on the Plans or in the Specifications, Close Conformance means compliance with those tolerances. Where working tolerances are not given, Close Conformance means compliance, in the City Engineer's judgment, with reasonable and customary manufacturing and construction tolerances.

Coarse Aggregate
Crushed Rock or crushed Gravel retained on a 1/4-inch sieve, with allowable undersize.

Cobbles
Particles of Rock, rounded or not, that will pass a 12-inch square opening and be retained on a 3-inch sieve.

Code
The City of Stayton Municipal Code (SMC) and ordinances and any other federal, state, county, or local codes, laws, or regulations affecting the work.

Collection Systems
Facilities maintained by the City connected thereto for the collecting, pumping, conveying, and controlling of sanitary sewer.

Collector Street
See Street.

Commercial Grade Concrete
Concrete furnished according to Contractor proportioning, placed in minor Structures and finished as specified.

Commercial User
Any user of the sanitary sewer who is neither a residential nor an industrial user. This definition is specific to these Design Standards and is not intended to be used for billing purposes.

Construction Plans
See Plans.

Contract
The written agreement in the Contract Documents that sets forth the rights and obligations of the City and the Contractor for publicly financed public improvements.

Contract Documents
The Contract, including the Invitation to Bid, Instructions to Bidders, the Proposal, Contract, General Conditions (General Requirements), Supplementary Conditions (Special Provisions), Plans, Specifications, schedule of Contract Prices, Addenda, Permits, Payment and Performance Bonds, Insurance Certificate, and Change Orders for any approved revisions made during the performance of the work to any of the above listed documents for publicly financed public improvements.

Contractor
Any individual, firm, co-partnership, corporation or any combination thereof who has or have entered into a Contract either with the City or will be performing public works improvements as part of a particular development or permitted project. For publicly financed public improvement projects, “contractor” will mean the entity awarded the Contract. For privately financed public improvement projects and other work being performed under permit issued by the City, the “contractor” will mean the entity that is listed on the permit.

Cooling Water
Water other than sewage or industrial waste that is used as a medium for carrying away excess heat and that is not co-mingled with any other liquid waste or solids carrying stream.

Copy
An imitation or reproduction of an original; a duplicate.

Core
To cut and remove a portion of pipe, manhole, or pavement with a circular hollow drill.

Course
A specified Surfacing Material placed in one or more Lifts to a specified thickness.

Coverage
A single Pass by a piece of Equipment over an entire designated area.

Creek
Any and all surface water routes generally consisting of a channel having a bed, banks, and/or sides in which surface waters flow in draining from higher to lower land, both perennial and intermittent; the channel, banks, and intervening artificial components, excluding flows that do not persist for more than twenty-four (24) hours after cessation of 1/2-inch of rainfall in a twenty-four (24) hour period from October through March.

Cross Connection
Any actual or potential connection, link, or channel between a domestic water supply system and a pipe or piping system used or intended to be used for some other purpose or between a domestic water supply system and a plumbing fixture, appliance, receptacle, vessel, or other service, or a source other than the intended source of water supply whereby it may be possible for contaminated water or water of questionable or unsafe quality, or fluid substance other than potable water, to enter any part of the domestic water supply system.

Cross Section
The exact image formed by a plane cutting through an object, usually at right angles to a central axis, to determine area or to show detail.

Cul-de-sac
A dead-end street having a circular turnaround area at the end.

Curb
A concrete or asphalt line, typically six-inches wide and six-inches of exposure, indicating the edge of the vehicular roadway within the overall Right-of-Way to: serve as a safety barrier to prevent motorists from driving onto the shoulder, median, sidewalk, pavement, or other designated non-vehicular pathway; and/or to control or direct stormwater drainage along a vehicular roadway.

Cut Sheets
Sheets of tabulated data indicating stationings, structures, fittings, angle points, beginning of curve, points on curve, end of curves, street grade, pipe slope, staking offset, various elevations, and offset cuts for streets, waterlines, sanitary sewers, and storm drains.

Datum, Horizontal
The horizontal survey control network of the City of Stayton.

Datum, Vertical
The vertical elevation survey control network of the City of Stayton identified as "The North American Vertical Datum of 1988 (NAVD88).

Dead-end Street
See Street.

Definition of Words
That whenever in these Design Standards, the words “shall”, “will”, "directed", "required", "permitted", "ordered", "designated", or words of like importance are used, they shall be understood to mean the direction, requirement, permission, or order of designation of the Design Engineer. Similarly, the words "approved", "acceptable", or "satisfactory", shall mean approved by, acceptable to, or satisfactory to the City Engineer.

Design Engineer
A registered professional engineer licensed to practice in the State of Oregon who is responsible for the design of a public improvement project and has stamped and sealed the plans.

Design Intensity
The uniform rainfall intensity, inches per hour, associated with a duration equal to the time of concentration of the basin and a specified return frequency (e.g., 2-year, 10-year, etc.) that is used to calculate the peak discharge rate to be used for stormwater system design.

Design Storm
A rainfall event of a specified duration (e.g., 6-hour, 12-hour, 24-hour) and return frequency (e.g., 2-years, 10-years, etc.) that is used to calculate the runoff volume and/or discharge rate to be used for stormwater system design.

Detention
The storage and subsequent release of excess stormwater runoff to control peak discharge rates prior to discharge to the storm drain or natural drainageway.

Detention Volume
The storage volume required to control the peak discharge rates at the point of discharge from a development.

Developer
Any individual, partnership, corporation, joint venture, or other legal entity in the primary business of developing real property.

Development
Any man-made change to improved or unimproved real estate, whether public or private for which a permit is required, including but not limited to, construction, installation, or alteration of buildings or other structures, condominium conversion, land division, establishment or termination of a right of access, parking or storage facilities on real property, tree cutting, and clearing, mining, dredging, filling, grading, paving, excavation or drilling operations. Development encompasses both new development and redevelopment.

Development Footprint
The new or redeveloped area covered by buildings or other roof structures and other impervious surface areas, such as roads, parking lots, and sidewalks.

Direct Discharge
Any stormwater discharge from a developed site that has not passed through approved water quality treatment or detention facility prior to its ultimate outfall to a natural drainageway, wetland, or other natural resource area.

Discharge Point
The ultimate destination for the stormwater leaving a particular site, also known as the stormwater disposal point. Discharge can be through: onsite infiltration (surface infiltration facilities, soakage trenches, etc.) or offsite flow to ditches, drainageways, streams, or public or private separate stormwater piped systems.

Distribution System
Distribution main pipelines, pumping stations, valves, and associated equipment used to transmit water from the supply source to the service line.

Domestic Sewer
The liquid and water-borne waste derived from the ordinary living processes, free from industrial wastes, and of such character to permit satisfactory disposal, without special treatment, into the public sanitary sewer system or by means of private sanitary sewer disposal system.

Double Check Valve Assembly (DCVA)
An assembly composed of two single, independently acting approved check valves, including tightly closing shut-off valves located at each end of the assembly and fitted with properly located test cocks.

Double-Detector Check Valve Assembly (DDCVA)
An approved double check valve assembly with a parallel meter. The purpose of this assembly is to provide double-check valve protection for the distribution system and at the same time provide partial metering of the fire system showing any system leakage or unauthorized use of water.

Drainageway
An open linear depression, whether constructed or natural, that functions for the collection and drainage of surface water. It may be permanently or temporarily inundated.

Drainage Basin
Stormwater drainage basins for the City of Stayton, as defined in the Storm Water Master Plan.

Drainage Facilities
Pipes, ditches, detention basins, creeks, culvert bridges, etc., used singularly or in combination with each other for the purpose of conveying or storing stormwater run-off.

Drainage Report
A required stormwater report prepared by the Design Engineer that provides a hydrologic and hydraulic evaluation of the stormwater impacts associated with a particular development. The report shall demonstrate how the proposed stormwater management and water quality facilities will comply with City public works standards. The report must be signed and stamped by a professional engineer registered in the State of Oregon.

Drawings
See Plans.

Driveway
A minor private way used by vehicles and pedestrians to gain access from an approved public access or right-of-way onto a lot or parcel of land.

Drywell
See Stormwater Sump.

Durable Rock
Rock that has a slake durability index of at least ninety percent (90%) based on a two-cycle slake durability test, according to ASTM D 4644. In the absence of test results, the City Engineer may evaluate the durability visually.

Dwelling Unit
A facility designed for permanent or semi-permanent occupancy and provided with minimum kitchen, sleeping and sanitary facilities for one family.

Easement
An area outside public right-of-way in which the property owner (grantor) conveys a privilege to a second party (grantee) the right to construct, operate, and maintain public works facilities on such property. The City is typically grantee for public easements, and a neighboring property owner is typically grantee for private easements.

Emulsified Asphalt
An emulsion of asphalt cement and water with a small quantity of an emulsifying agent.

Emulsified Asphalt Concrete
A mixture of Emulsified Asphalt and graded Aggregate.

Engineer of Record
See Design Engineer

Entity
A natural person capable of being legally bound, sole proprietorship, limited liability company, corporation, partnership, limited liability partnership, limited partnership, profit or nonprofit unincorporated association, business trust, two or more persons having a joint or common economic interest, or any other person with legal capacity to Contract, or a government or governmental subdivision.

Equipment
All machinery, tools, manufactured products, and fabricated items needed to complete the Contract or specified for incorporation into the Work.

Establishment Period
The time specified to assure satisfactory establishment and growth of planted Materials.

Existing Surfacings
Pavements, slabs, curbs, gutters, walks, driveways, and similar constructions of bricks, blocks, Portland Cement Concrete, bituminous treated materials, and granular surfacing materials on existing streets and alleys.

Expansion Joint
A joint to control cracking in the concrete surface structure and is filled with preformed expansion joint filler.

Final Acceptance
The date at which the City accepts the public improvements for ownership and operation upon successful correction of any noted Warranty deficiencies and upon payment of all fees and charges to the City.

Final Completion
The date at which the work, and all related aspects of the work, has progressed to the point where, in the opinion of the City Engineer, all requirements of the Contract Documents have been met with the exception of Warranty obligations; all construction equipment and unused materials have been removed; all waste has been removed and the project area thoroughly cleaned and restored and when the Work is one-hundred percent (100%) complete in every respect and can be utilized for the purpose for which it was intended and the Project.

Final Inspection
The inspection conducted by the City Engineer to determine that the Project has been completed in accordance with the Contract.

Fine Aggregate
Crushed Rock, crushed Gravel, or Sand that passes a 1/4 inch sieve, with allowable oversize.

Fire Protection Service
A connection to the public water main intended only for the extinguishment of fires and the flushing necessary for its proper maintenance.

Flood Insurance Rate Map (F.I.R.M.)
The official map on which the Federal Emergency Management Agency shows flood elevations for various creeks and rivers and has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

Floodplain
Areas shown on the Flood Insurance Rate Map as areas of special flood hazard.

Floodway
The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than 1 foot.

Flow Control
The practice of limiting the release of peak flow rates and volumes from a site. Flow control is intended to protect downstream properties, infrastructure, and natural resources from the increased stormwater runoff peak flow rates resulting from development.

French Drain or Leach Line
A covered underground excavated trench filled with washed gravel that surrounds a perforated delivery pipe used to receive storm water, wherein the sides and bottom of the trench are porous, permitting the storm water to seep into the ground.

Granular Material
Graded and selected free-draining material composed of particles of Rock, Sand, and Gravel.

Grade
The degree of inclination of a road or slope.

Gravel
An unconsolidated mixture of rock fragments or particles of rock, rounded or not, that will pass a 3-inch sieve and be retained on a No. 4 sieve.

Highway
Every road, street, thoroughfare and place, including bridges, viaducts and other structures within the boundaries of the State, open, used or intended for use by vehicular traffic.

Hydrant Lead
The waterline connecting the fire hydrant to the auxiliary valve on the City distribution main. Synonymous with the term Hydrant lateral.

Impervious Surfaces/Areas
Any surface that has a runoff coefficient greater than 0.80, as defined in PWDS Section 603. Common impervious surfaces include, but are not limited to rooftops, concrete or asphalt sidewalks, walkways, patio areas, driveways, parking lots or storage areas and graveled, oiled, macadam or other hard surfaces. Slatted decks and some gravel surfaces are considered pervious unless they cover impervious surfaces or the gravel surfaces are compacted to a degree that causes their runoff coefficient to exceed 0.80.

Improvements
General term encompassing all phases of work to be performed under a Contract and is synonymous with the term Project or Work.

Industrial User
A business establishment that uses water in a variety of chemical, manufacturing, refining, or other material processing operations, which results in sanitary sewer that is significantly altered in strength, composition, and character from that of domestic sewage. This definition is specific to these Design Standards and is not intended to be used for billing purposes.

Industrial Waste
Solid, liquid, or gaseous waste resulting from any industrial, manufacturing, trade, or business process from development, recovery, or processing of natural resources.

Infiltration
The percolation of water into the ground. Infiltration is often expressed as a rate (inches per hour), which is determined through an infiltration test. See also Subsurface Infiltration and Surface Infiltration.

Infiltration Test
Infiltration tests are conducted to determine the feasibility of on-site stormwater percolation for every new development.

Inlet
A structure or other appurtenance (i.e., catch basin) that collects stormwater runoff from the ground surface for the purpose of conveying it through a piped storm system. Also used to describe the connection point of a pipe conveying stormwater into a junction structure.

Interceptor Sewer
A primary public sanitary sewer pipe that conveys sanitary sewer directly into the Wastewater Treatment Plant.

Irrigation Service
A metered connection intended for seasonal use and delivering water that is not discharged to the sanitary sewer system.

Junction
A structure (i.e., catch basin or manhole) within a storm drain system for the purpose of combining multiple pipe inlets, facilitating changes in horizontal or vertical alignment, providing access for operation and maintenance, or other related function.

Leveling
Placing a variable-thickness Course of Materials to restore horizontal and vertical uniformity to existing Pavements, normally continuous throughout the Project.

Lift
The compacted thickness of material specified for use in the construction of the Project or for incorporation into the Work placed by Equipment in a single Pass.

Local Street
See Street.

Longitudinal Joint
An interface between two adjacent asphalt or concrete mats, which in regards to hot-mixed asphalt surfacing of roadways, typically follows a course approximately parallel to the centerline of the roadway.

Low Impact Development
A sustainable landscaping approach that can be used to replicate or restore natural watershed functions and/or address targeted watershed goals and objectives.

Major Trees
Trees that are 30-inches or larger in diameter and are either within the right-of-way or public easement or are within 10-feet of the right-of-way or public easement. Major trees are important to the City and design modifications of public facilities may be required to accommodate tree preservation.

Manufactured Treatment Device
A manufactured device, often proprietary, in which stormwater receives treatment before being discharged to another BMP or to the receiving water. This is a broad category of BMPs with a variety of pollutant removal mechanisms and varying pollutant removal efficiencies.

Master Plans
Documents adopted by Stayton City Council that describe and evaluate the City's public infrastructure, including existing and planned transportation, water, sanitary sewer, and storm drain systems.

Materials
Any natural or manmade substance specified for use in the construction of the Project or for incorporation into the Work.

Maximum Daily Demand
The maximum volume of water delivered to the system in any single day of the year.

Maximum Extent Feasible
The extent to which a requirement or Standard must be complied with as constrained by the physical limitations of the site, practical considerations of engineering design, and reasonable considerations of financial costs and environmental impacts.

Median
The portion of a divided highway or street separating traffic traveling in opposite directions.

Minor Partition
See Partition.

Multiple Course Construction
Two or more Courses, exclusive of Patching or Leveling, placed over the entire Roadway width.

Multiple Family Dwelling
A building or portion designed thereof for occupancy by two or more families, living independently of each other.

Multi-Use Path
That portion of the highway or street Right-of-Way or a separate Right-of-Way, physically separated from motor vehicle traffic and designated for use by pedestrians, bicyclists and other non-motorized users.

MUTCD
The Manual on Uniform Traffic Control Devices as published by the Federal Highway Administration.

Natural Grade
The grade of the land in an undisturbed state.

Natural Location
The location of channels, swales, and other non-manmade conveyance systems, as defined by the first documented topographic contours existing for the subject property, either from maps or photographs.

Neat Line
Theoretical lines specified or indicated on the Plans for measurement of quantities.

Nondurable Rock
Rock that has a slake durability index of less than 90% based on a two-cycle slake durability test, as tested by ASTM D 4644, or Rock that is observed to readily degrade by air, water, and mechanical influence.

Notice
A written communication delivered by hand or by mail to the authorized individual, member of the firm or officer of the corporation for which it is intended. If delivered or sent by mail it shall be addressed to the last known business address of the individual, firm or corporation. In the case of a Contract with two (2) or more persons, firms or corporations, notice to one shall be deemed notice to all.

Notice of Final Acceptance
Written confirmation by the City Engineer stating that the City has made Final Acceptance of the Project and thereby authorizing the release of the Warranty.

Notice of Final Completion
Written confirmation by the City Engineer that the Project has reached Final Completion, thereby initiating the Warranty period.

Notice of Substantial Completion
Written confirmation by the City Engineer when the Work, or a specified part thereof, has reached Substantial Completion. The Notice of Substantial Completion may also provide a punch list of remaining items for the Project that have yet to be completed.

ODOT/APWA Standard Specifications for Construction
The latest edition of the Specification Document published by the Oregon Department of Transportation and the American Public Works Association entitled Oregon Standard Specifications for Construction. This document is available from the Oregon Department of Transportation, Salem, Oregon.

Offsite Stormwater Facility
Any stormwater management facility located outside the property boundaries of a specific development but designed to reduce pollutants from and/or control stormwater flows for that development.

On-Site Stormwater Facility
Any stormwater management facility located within the property boundaries of a specific development and designed to reduce pollutants from and/or control stormwater flows for that development.

On-Site Work
Any Work taking place on the Project Site, including designated staging areas adjacent to the Project Site.

Organic Soil
A Soil with sufficient organic content to influence the Soil properties.

Outfall
The point at which collected, concentrated stormwater is discharged, generally from a pipe(s), from a development to an open drainage element such as a ditch, channel, swale, stream, river, pond, lake or wetland.

Owner
The owner of record of real property as shown on the latest tax rolls or deed records of the County, and includes a person who furnishes evidence that he/she is purchasing a parcel of property under a written recorded land sale contract. For public improvement projects, the owner is the City of Stayton, acting through its legally constituted City Council.

Panel
The width of specified Material being placed by Equipment in a single Pass.

Pass
One movement of a piece of Equipment over a particular location.

Patching
Placing a variable-thickness Course of Materials to correct sags, dips, and/or bumps to the existing grade and Cross Section, normally intermittent throughout the Project.

Pavement
Asphalt concrete or Portland cement concrete placed for the use of motor vehicles, bicycles, or pedestrians on Roadways, Shoulders, Multi-Use Paths and parking areas.

Partition
To divide an area or tract of land into two (2) or three (3) parcels within a calendar year when such area or tract of land exists as a unit or contiguous units of land under single ownership at the beginning of such year. See the Stayton Municipal Code.

Peak Hour Demand
The maximum volume of water delivered to, or from the system, in any single hour of the year.

Peak Run-off
The maximum stormwater runoff rate determined for the design storm or design rainfall intensity.

Peat
A soil composed primarily of vegetative matter in various stages of decomposition, usually with an organic odor, dark brown to black color, and a spongy consistency.

Performance Bond
The approved security furnished by the Contractor's Surety as a guaranty of the Contractor's performance for the materials, equipment, and labor furnished to complete the Work.

Person
Individual firm, corporation, association, agency, or other entity.

Plans
The official construction plans or drawings, which may include some or all of the following: profiles, cross sections, elevations, details, and other working, supplementary, and detail drawings, or reproductions thereof, that shows the location, character, dimensions, and details of the Work to be performed. The construction plans for privately financed public improvements are not deemed “official” or “approved” unless stamped and signed by the Design Engineer and marked approved by the City Engineer. For publicly funded public works improvement projects, construction plans may either be bound in the same book as the balance of the Contract Documents or bound in separate sets and are a part of the Contract Documents, regardless of the method of binding. Synonymous with the term Drawings.

Post-Developed Condition
The site conditions as they exist after development in terms of topography, vegetation, land use, and rate, volume, or direction of runoff.

Potable Water
Water that is satisfactory for drinking, culinary, and domestic purposes and meets the requirements of the health authority having jurisdiction.

Pre-Developed Condition
The site conditions as they exist prior to development in terms of topography, vegetation, land use, and rate, volume, or direction of runoff. Pre-Developed Conditions as it relates to stormwater calculations shall be as approved by the City Engineer.

Preliminary Review
Review of the construction plans by the City Engineer as outlined in these standards. All City Engineer comments and provisions of these Design Standards must be addressed prior to final review and approval for construction.

Private Collection System
A privately owned and maintained lateral sanitary sewer system installed to serve multi-unit structures on single ownership properties that cannot legally be further divided.

Private Distribution System
A privately-owned and maintained water distribution system serving an industrial or commercial subdivision or a multi-building development on a single lot served through a master meter and backflow prevention assembly installed at an approved location.

Private Road or Street
Any roadway for vehicular travel which is privately owned and maintained and which provides the principal means of access to abutting properties.

Private Service
That part of each property's utility service line that is on private property outside of any public rights-of-way or easements.

Private Storm Drain
A privately owned and maintained storm drain system located outside the building envelope which serves one or multiple building storm drains, catch basins, area drains, or other drainage facilities on private property outside of public easements and rights-of-way.

Project
General term encompassing all phases of the work to be performed under the Contract and is synonymous with the term Improvements or Work.

Projected Maximum Daily Demand
The maximum volume of water anticipated to be delivered to the system in a future single-day of a year divided by one (1) day.

Project Site
The geographical area of the real property on which the Work is to be performed, including designated contiguous staging areas.

Pronouns (Use Of)
As used herein, the singular shall include the plural and the plural the singular; any masculine pronoun shall include the feminine or neuter gender; and the term "person" includes natural person or persons, firm, co-partnership, corporation, or association, or combination thereof.

Public Storm Drain
Any storm drain in public right-of-way or easement operated and maintained by the City.

Public System
Any street, water, sanitary sewer, storm drain, or other public infrastructure in public right-of-way or easement operated and maintained by the City.

Public Traffic
Vehicular or pedestrian movement not associated with the Work, on a public way.

Public Works Director
The person employed or designated by the City as responsible for implementing policy and administrative issues related to public works. The Public Works Director will coordinate with the City Engineer with regard to issues involving technical and engineering aspects or decisions.

Public Works Standards
The Public Works Standards adopted by the City of Stayton and containing Design Standards, Standard Construction Specifications, Standard Drawings, and Standard Forms.

Public Works Superintendent
The superintendent for the Wastewater, Water, Stormwater, or Streets divisions of the City of Stayton's Public Works Department, authorized by the Public Works Director, who oversees and performs the administrative, supervisory, and technical work for their respective division.

Railroad
Publicly or privately owned rail carriers, including passenger, freight, and commuter rail carriers, their tenants, and licensees. Also, Utilities that jointly own or use such facilities.

Receiving Bodies of Water
Creeks, streams, lakes, and other bodies of water into which waters are artificially or naturally directed.

Record Drawings
Construction plans signed and dated by the Design Engineer indicating that the plans have been reviewed and revised, if necessary, to accurately show all as-built construction. Also referred to as As-Builts.

Redevelopment
Any development that requires demolition or complete removal of existing structures or impervious surfaces at a site and replacement with new impervious surfaces. Maintenance activities such as top-layer grinding, repaving (where all pavement is not removed), and reroofing are not considered to be redevelopment. Interior remodeling projects and tenant improvements are also not considered to be redevelopment. Utility trenches in streets are also not considered to be redevelopment. Redevelopment within the City of Stayton is regulated as Development.

Reduced Pressure Principle Backflow Prevention Device (RPBD)
A device for preventing backflow which has two check valves, a differential relief valve located between the two check valves, two shut-off valves, one on the upstream side and the other on the downstream side of the check valves, and four test cocks for checking the water tightness of the check valves and the operation of the relief valve.

Reference Specifications
Bulletins, standards, rules, methods of analysis or test, codes and specifications of other agencies, Engineering societies, or industrial associations referred to in the Contract Documents. All such references specified herein refer to the latest edition thereof, including any amendments, updates, or new editions thereto which are in effect and published at the time of the Invitation to Bid for a publicly financed public improvements or date of development application for privately financed public improvements.

Release Rate
The controlled rate of release of drainage, storm, and runoff water from property, storage pond, runoff detention pond, or other facility during and following a storm event.

Residential Street
See Local Street.

Residential User
The owner, lessee, or occupant of a single dwelling unit in one structure.

Retention
The process of collecting and holding surface and stormwater runoff with no surface outflow from a developed property.

Right-of-Way (R/W or ROW)
A general term denoting public land, property, or interest therein, acquired for or devoted to a public street, public utility, public access or public use. Typically, the area between boundary lines of a street.

Roads
See Streets.

Roadbed
Completed excavations and embankments for the Subgrade, including ditches, side slopes, and slope rounding, if any.

Roadside
The area between the outside edges of the Shoulders and the Right-of-Way boundaries. Unpaved median areas between inside Shoulders of divided Highways and infield areas of interchanges are included.

Roadway
That portion of a highway or street and its appurtenances between curbs, gutters, or ditches, improved, designed, or ordinarily used for vehicular travel. If a highway or street includes two or more separate Roadways, the term "Roadway" refers to any such Roadway separately, but not to all such Roadways collectively. (See Traveled Way.)

Rock
Natural deposit of solid material composed of one or more minerals occurring in large masses or fragments.

Sand
Particles of Rock that will pass a No. 4 sieve and be retained on a No. 200 sieve.

Sanitary Sewer System
The Sanitary Sewer System shall include all interceptors, mainlines, service laterals, force mains, pump stations, manholes, cleanouts, and related facilities, all of which are located within dedicated public Right-of-Way or easements and all of which are owned, operated, and maintained by the City. Overall, that public infrastructure maintained and operated by the City for collecting, pumping, and conveying domestic sewer and industrial waste.

Sedimentation
Deposition of erosional debris soil sediment transported by water.

Sewer Basin
Sanitary sewer drainage basins and service areas for the City of Stayton, as defined in the Wastewater Facility Plan.

Sewer Service Lateral
That part of each property's sanitary sewer service line which extends from the public main to the limit of the public right of way. For sanitary sewer mainlines located within easements, the limit of the sewer lateral will be the edge of a sanitary sewer easement.

Shall
An auxiliary word used to express a command which describes a specific requirement or course of action that is required of the Contractor and/or Design Engineer.

Shoulder
The part of a Roadbed contiguous to the Traveled Way or Roadway, whether paved or unpaved, for accommodating stopped vehicles, for emergency use and for lateral support of Base and surface Courses. Term applies to uncurbed streets and roads.

Shown
As used herein, the word “shown”, or “as shown”, shall be understood to refer to work shown on the Plans or in the Contract Documents.

Sidewalk
A path along the side of a road designated for pedestrians and sometimes for the use of non-motorized vehicles.

Sight Distance Triangle
The distance from an intersection of a public or private road to the nearest access connection, measured from the closest edge of the pavement of the intersecting road to the closest edge of the pavement of the connection along the traveled way. The intersection and driveway sight distance is measured from an eye height of 3.5 feet above the controlled road at least 15 feet from the edge of the vehicle travel lane of the uncontrolled public road to an object height of 4.25 feet on the uncontrolled public road. For driveways along local access roads in urban and residential areas, the sight distance triangle is measured along the property lines of the street and along the driveway.

Silt
Soil passing a No. 200 sieve that is non-plastic or exhibits very low plasticity.

Single Family Dwelling
Any residential building designed to house one family.

Specified
As used herein, the word “specified”, or “as specified”, means as required by the Contract.

Standard Construction Specifications
The terms, directions, and provisions set forth which contain construction materials and workmanship requirements included herein and included as a permanent part of the Public Works Standards. Synonymous with the term Specifications or Standard Specifications.

Standard Drawings
Detailed representation of structures, devices, or instructions as set forth in the Public Works Standards as adopted by City as a standard. Synonymous with the term Standard Plans or Standard Details.

State
The State of Oregon.

State of Oregon Plumbing Specialty Code
The State of Oregon Plumbing Specialty Code adopted by the International Association of Plumbing and Mechanical Officials (current edition) as revised by the State of Oregon and called the "Oregon Plumbing Specialty Code".

Station
A distance of 100 feet measured horizontally along the established centerline of a street, sewer, or other work, unless specified otherwise.

Stormwater Management Facility
A technique used to reduce pollutants from, detain and/or retain, or provide a discharge point for stormwater to best preserve or mimic the natural hydrologic cycle, and/or to fit within or improve the capacity of existing infrastructure.

Stormwater Quality Facility
A stormwater management facility that has a primary purpose of improving water quality. This includes any structure, landscape, or drainage device that is designed, constructed, and maintained to collect and filter, retain, or detain surface water runoff during and after a storm event for the purpose of maintaining or improving surface and/or groundwater quality, as further outlined in the most current edition of the City of Portland Stormwater Management Manual.

Stormwater Quantity Facility
A stormwater management facility with a primary purpose of controlling stormwater flow to the City's waterways. This includes any structure or drainage device that is designed, constructed, and maintained to collect, retain, infiltrate, or detain surface water runoff during and after a storm event for the purpose of controlling post-development quantity leaving the site, as further outlined in the most current edition of the City of Portland Stormwater Management Manual.

Stormwater Sump
A drainage facility (or system), also called "underground injection control", designed to utilize the infiltration capability of the ground, commonly referred to as percolation, to return surface and stormwater to the soil.

Street
Any street, avenue, boulevard, alley, lane, bridge, road, public thoroughfare or public way and any land over which a right-of-way has been obtained or granted for any purpose of public travel. The City has the following designated streets:

- **Principal Arterial (Major Arterial)**
  A street that carries the highest volume of traffic in the City and primarily provides access through the City or from the City to other cities. The principal arterial streets are identified in the Stayton Transportation System Plan.

- **Minor Arterial**
  A street that collects and distributes traffic from the principal arterials to streets of lower functional classifications providing for movement within specific areas of the city. Minor arterials service through traffic and provide direct access for commercial, industrial, office, and multi-family development but, generally not for single family residential properties. The minor arterial streets are identified in the Stayton Transportation System Plan.

- **Major Collector**
  A street that provides for land access and circulation within and between residential neighborhoods and commercial and industrial areas. Collectors provide direct access to adjacent land uses but still service through traffic. The major collector streets are identified in the Stayton Transportation System Plan.

- **Minor Collector**
  A street that is primarily within a residential area that is used to funnel traffic to major collectors. Minor collectors allow direct access for abutting properties. The minor collector streets are identified in the Stayton Transportation System Plan.

- **Local Street**
  A street used exclusively for access to abutting properties and offers the lowest level of traffic mobility. Through-traffic movement is deliberately discouraged. Also referred to as a minor or residential street.

- **Cul-De-Sac**
  A short, dead-end street with a circular vehicular turn-around at the dead-end.

- **Dead-End Street**
  A street or series of streets that can be accessed from only one point. Dead-end streets can be either temporary (intended for future extension as part of a future street plan) or permanent. Permanent dead-end streets must provide adequate turn-around capability.

- **Partial-Width Street**
  A portion of the ultimate width of a street, usually along the edge of a subdivision where the remaining portion of the street shall be provided when adjacent property is subdivided. See also PWDS Section 303.

- **Three-Quarter Street**
  A partial-width street with at least 3/4 of the standard street classification width. Where a 3/4-street improvement is required, the right-of-way and pavement width requirements will be as determined by the City Engineer. See also PWDS Section 303.

- **Half-Street**
  A partial-width street with at least 1/2 of the standard street classification width. A development with frontage improvements required on an existing substandard street will be responsible for constructing a continuous 1/2-street improvement, unless otherwise directed by the City Engineer. See also PWDS Section 303.

Street Tree
A street tree is defined as a living, woody plant typically having a single trunk of at least 1.5 inches in diameter at a point 4 feet above mean ground level at the base of the trunk that is located in the public right-of-way.

Structures
Bridges, retaining walls, endwalls, cribbing, buildings, culverts, manholes, catch basins, drop inlets, sewers, service pipes, underdrains, foundation drains, and other similar features which may be encountered or constructed in the Work.

Subbase
A Course of specified material of specified thickness between the Subgrade and a Base.

Subcontractor
An individual, partnership, firm, corporation, or any combination thereof, which the Contractor has selected to perform part of the Work.

Subdivision
To partition a parcel of land into four (4) or more parcels for the purpose of transfer of ownership or building development, either immediate or future, when such a parcel exists as a unit or contiguous units under a single ownership as shown on the tax roll of year preceding the partitioning, or has existed as a unit or contiguous units under a single ownership as shown on the tax roll for any year subsequent to the passage of the Stayton Municipal Code.

Subgrade
The top surface of completed earthwork on which subbase, base, surfacing, pavement, or a course of other material is to be placed.

Substantial Completion
The Work (or a specified part thereof) has progressed to the point where, in the opinion of the City Engineer, it is sufficiently complete in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended.

Substructure
Those parts of a structure which support the superstructure, including bents, piers, abutments, and integrally built wingwalls, up to the surfaces on which bearing devices rest. Substructure also includes portions above bearing surfaces when those portions are built integrally with a substructure unit (e.g., backwalls of abutments). When substructure and superstructure elements are built integrally, the division between substructure and superstructure is considered to be at the bottom soffit of the longitudinal or transverse beam, whichever is lower. Culverts and rigid frames are considered to be entirely substructure.

Subsurface Infiltration
The percolation of water into the ground through a subsurface fluid distribution system or undergound injection control (UIC) system. Subsurface infiltration systems are generally regulated by DEQ under existing UIC rules.

Superintendent
The authorized representative of the Contractor who is responsible for continuous field supervision, coordination, and completion of the Work and is authorized to receive and fulfill instructions from the City Engineer.

Superstructure
Those parts of a structure above the substructure, including bearing devices.

Supplemental Agreements
Agreements made between the City and other governmental agencies, utility companies, or other entities that are included in the Contract Documents and affect some aspect of the work.

Surety
The corporate body which is bound with and for the Contractor, for the acceptable performance of the Contract, and for the payment of all obligations arising out of the Contract Documents. Surety shall be licensed to conduct the business of surety in the State of Oregon and named in the current list of approved sureties published by the U. S. Treasury Circular 570.

Surface Infiltration
The percolation of water into the ground through an open-surfaced stormwater management facility. Surface infiltration systems need to be verified by the Design Engineer whether or not the open-surfaced stormwater management facility is regulated by DEQ under existing UIC rules.

Surfacing
The course or courses of material on the traveled way, auxiliary lanes, shoulders, or parking areas for vehicle use.

Surveyor
A registered professional licensed to practice surveying in the State of Oregon having special knowledge of the principals of mathematics, the related physical and applied sciences, and the relevant requirements of law, who is or will be responsible for surveying of the Project.

Swale
A broad-bottomed, shallow, vegetation-lined channel that allows for reduced flow velocity and filtration of stormwater, generally with flow depths less than 1-foot.

Terrace
A relatively level step constructed in the face of a grade surface for drainage, erosion control, and maintenance purposes.

Ton
The short ton of 2,000 pounds avoirdupois.

Topsoil
Soil ready for use in a planting bed.

Traffic Lane
That part of the Traveled Way marked for moving a single line of vehicles.

Trail
A pathway designed to provide walking, (and sometimes bicycling), equestrian and other non-motorized recreational and transportation opportunities.

Transverse Joint
An interface between two adjacent asphalt or concrete mats, which in regards to surfacing of roadways, typically follows a course approximately perpendicular to the centerline of the roadway.

Traveled Way
That portion of the roadway for the movement of vehicles, exclusive of shoulder, auxiliary lanes, parking lanes, berms, and Shoulders.

Treatment Volume
The storage volume necessary to provide the required level of water quality treatment of stormwater prior to discharge to a storm drain element, facility, or natural drainage element.

Trunk Sewer
A sanitary sewer pipe that is primarily intended to receive sanitary sewer from collector pipes, other trunk sewers, existing major discharges of raw or inadequately treated sanitary sewer, or water pollution control facilities.

Trunk Storm Drain System
The portions of the storm drain system of the City which receives waters from an adjacent land area in excess of 20 acres. The trunk storm drain system may consist of watercourses or man-made facilities such as pipes, ditches, and culverts.

Turnaround Area
A paved area of sufficient size and configuration that a motor vehicle may maneuver so as to travel in the opposite direction.

Typical Section
That Cross Section established by the Plans which represents in general the lines to which the Contractor shall work in the performance of the Contract.

Underground Injection Control (UIC)
Any system, structure, or activity that is intended to discharge fluids below the ground surface and classified by the Oregon Department of Environmental Quality (DEQ) as an underground injection system (UIC). UICs are regulated by DEQ to limit and control injection of wastes into the subsurface to protect existing groundwater quality for current and future beneficial uses including use as a source for drinking water.

Unsuitable Material
Frozen material, or material that contains organic matter, muck, humus, peat, sticks, debris, chemicals, toxic matter, or other deleterious materials not normally suitable for use in earthwork.

Utility
Tracks, overhead or underground wires, pipelines, conduits, ducts, or structures, owned, operated or maintained, typically within or across a public right-of-way or easement. A line, facility, or system for producing, transmitting, or distributing communications, power, electricity, heat, gas, oil, water, steam, waste, storm water, or any other similar commodity which directly or indirectly serves the public. The term may also mean the utility company, district, or cooperative owning and operating such facilities, including any wholly-owned or controlled subsidiary.

Warranty
The Contractor's responsibility to the City for the repair or replacement of defective materials and/or workmanship relative to the work or a portion or a component part thereof.

Warranty Bond
The approved security furnished by the Contractor's Surety as a guaranty of the Contractor's performance of its warranty obligations.

Wastewater
See Sanitary Sewer.

Water Distribution System
Water distribution pipelines, pumping stations, reservoirs, valves, and ancillary equipment used to transmit water from the supply source to the service line.

Water Demand
The total quantity of water supplied for a given period of time to meet the various required uses. The various uses include residential, irrigation, commercial, and industrial uses as well as fire fighting, system losses, other unaccounted for, and miscellaneous uses.

Water Main
The water-supply pipe for public or community use.

Water Service Line, Public
The pipe connection from the City water main to the metering device or backflow prevention assembly.

Waterway
A surface water route consisting of a channel having a defined bed, banks, and/or sides in which surface water flows, draining from higher to lower elevations. May also refer to a closed pipe system or bridge structure under limited circumstances.

Wet Weather Construction Season
Defined for the purposes of construction and development in the City as the period between October 1st and the following May 31st. The Wet Weather Construction Season is not to be confused with the wet weather period typically used for calculating current or prevailing sewage flow rates.

Wetlands
An area inundated or saturated by surface or ground water at a frequency and duration sufficient to support and which, under normal circumstances, does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands are considered to be part of the watercourse and drainage system of the City. Wetlands generally include swamps, marshes, bogs, and similar areas, but also include seasonally wet meadows, farmed wetlands and other areas that may not appear “wet” all the time. They may be, but are not necessarily, characterized by special soils such as peat, muck, and mud.

Wetland Protection Area
An area subject to the provisions of Title 17 of the Stayton Municipal Code that includes all wetlands determined to be locally significant.

Will
Used in the Standards as an auxiliary verb to express a determination to meet a specific requirement or to take a specific course of action or to describe the inevitable.

Work
All materials, labor, tools, equipment and, incidentals necessary to successfully complete any individual item or, if the context requires, the entire Project including the successful completion of all duties and obligations imposed by the Contract Documents and/or plans and specifications.

Working Day
Calendar day, any and every day shown on the calendar, excluding Saturdays, Sundays and Legal Holidays.

Written Notice
See Notice.

101.11 ACRONYMS AND ABBREVIATIONS

Meanings of acronyms and abbreviations commonly used in these Design Standards, Standard Drawings, on the Plans, and other related documents are as follows:

AAN	American Association of Nurserymen
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ABC	Associated Builders and Contractors, Inc.
AC	Asphalt Concrete
ACI	American Concrete Institute
ACP	American Concrete Pavement
ACWS	Asphalt Concrete Wearing Surface
AGA	American Gas Association
AGC	Associated General Contractors of America
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APA	Engineered Wood Association
APWA	American Public Works Association
ARA	American Railway Association
AREMA	American Railway Engineering and Maintenance of Right-of-Way Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATPB	Asphalt-Treated Permeable Base
AWG	American Wire Gauge
AWPA	American Wood Protection Association
AWS	American Welding Society
AWWA	American Water Works Association
CAgT	Certified Aggregate Technician
CAT-I	Certified Asphalt Technician I
CAT-II	Certified Asphalt Technician II
CBM	Certified Ballast Manufacturers
CCO	Contract Change Order
CCT	Concrete Control Technician
CDT	Certified Density Technician
CEBT	Certified Embankment and Base Technician
CMDT	Certified Mixture Design Technician
CPF	Composite Pay Factor
CRSI	Concrete Reinforcing Steel Institute
CFR	Code of Federal Regulations
CS	Commercial Standard, Commodity Standards Division, U.S. Department of Commerce
D1.1	Structural Welding Code - Steel, American Welding Society, current edition
D1.5	Bridge Welding Code, American Welding Society, current edition
DBE	Disadvantaged Business Enterprise
DEQ	Department of Environmental Quality, State of Oregon
DOGAMI	Department of Geology and Mineral Industries, State of Oregon
DSL	Department of State Lands, State of Oregon
EA	Each
EAC	Emulsified Asphalt Concrete
EPA	U.S. Environmental Protection Agency

ESCP	Erosion and Sediment Control Plan
FHWA	Federal Highway Administration, U.S. Department of Transportation
FSS	Federal Specifications and Standards, General Services Administration
GSA	General Services Administration
HMAC	Hot Mixed Asphalt Concrete
ICEA	Insulated Cable Engineers Association (formerly IPCEA)
IES	Illuminating Engineering Society
IMSA	International Municipal Signal Association
ISO	International Standards Organization
ITE	Institute of Traffic Engineers
JMF	Job Mix Formula
LS	Lump sum
MFTP	(ODOT) Manual of Field Test Procedures
MIL	Military Specifications
MSC	Minor Structure Concrete
MUTCD	Manual on Uniform Traffic Control Devices for Streets and Highways,
NEC	National Electrical Code
NEMA	National Electrical Manufacturer's Association
NESC	National Electrical Safety Code
NIST	National Institute of Standards and Technology
NPDES	National Pollutant Discharge Elimination System
NPS	Nominal Pipe Size (dimensionless)
NLMA	National Lumber Manufacturer's Association
OAR	Oregon Administrative Rules
ODA	Oregon Department of Agriculture
ODOT	Oregon Department of Transportation
ORS	Oregon Revised Statutes
OR-OSHA	Oregon Occupational Safety and Health Division of the Department of Consumer and Business Services
OSHA	Occupational Safety and Health Administration, U.S. Department of Labor
PCA	Portland Cement Association
PCC	Portland Cement Concrete
PCI	Precast/Prestressed Concrete Institute
PCP	Pollution Control Plan
PF	Pay Factor of a constituent
PLS	Professional Land Surveyor
PMBB	Plant Mixed Bituminous Base
PTI	Post-Tensioning Institute
PUC	Public Utility Commission, State of Oregon
QA	Quality Assurance
QC	Quality Control
QCT	Quality Control Technician
QL	Quality Level
QPL	Qualified Products List
RAP	Reclaimed Asphalt Pavement
REA	Rural Electrification Administration, U.S. Department of Agriculture
RMA	Radio Manufacturers Association or Rubber Manufacturers Association
SAE	Society of Automotive Engineers
SI	International System of Units
SMC	Stayton Municipal Code
SRCM	Soil and Rock Classification Manual (ODOT)
SSPC	Steel Structures Painting Council
SWMM	Stormwater Management Manual (City of Portland)

T	Tolerances, AASHTO Test Method
TM	Test Method (ODOT)
TV	Target Value
UBC	Uniform Building Code (as adopted by the State of Oregon)
UL	Underwriters Laboratory, Inc.
UPC	Uniform Plumbing Code (as adopted by the State of Oregon)
USASI	United States of America Standards Institute
USC	United States Code
WAQTC	Western Alliance for Quality Transportation Construction
WCLIB	West Coast Lumber Inspection Bureau
WWPA	Western Wood Products Association

102 PUBLIC IMPROVEMENT DESIGN PROCEDURES AND REQUIREMENTS

102.01 PRE-APPLICATION CONFERENCE

102.01.A The City of Stayton will hold a pre-application conference with the applicant (Owner/Developer), unless otherwise waived by the Planning Director, before formal application for public works permits and review of site design and construction plans. The pre-application process allows the applicant and the City to discuss the proposed project and the standards and regulations that apply, while the project is still in a preliminary stage. Any specific development standards, regulations, or problem areas can thus be discussed before the applicant makes a substantial investment in the project or proceeds with a formal application unaware of the issues.

102.02 PRE-DESIGN CONFERENCE

102.02.A The Developer is encouraged to meet with the Public Works Director and the City Engineer prior to final design of the proposed improvements. It shall be the Developer's responsibility to provide the City Engineer with base maps showing existing utilities and proposed improvements prior to the pre-design conference.

102.03 PRE-DESIGN SURVEY

102.03.A Licensed land surveyors are responsible for land surveying practiced under their supervision including conformance with all State statues pertaining to survey and land laws. This includes, but not limited to, the following statutes:

- ORS 92 Subdivisions and Partitions
- ORS 93 Conveyancing and Recording
- ORS 209 County Surveyors
- ORS 672 Professional Engineers, Land Surveyors, Geologists

102.03.B All public improvement project designs shall be based on a complete design survey. All surveys shall comply with and ORS 209.140-150, which define the requirements for protection of existing survey monuments during any construction and setting new survey monuments following construction.

102.03.C All elevations on design plans and record drawings shall be based on NAVD88 Datum. Each page of the plans and drawings shall state the benchmark datum information.

102.03.D Horizontal datum shall be based on the Stayton local datum or Oregon State Plain Coordinate System (NAD 83).

102.03.E The design survey shall include, but not be limited to the following information:

- Surface features
- Subsurface features.
- Existing utilities (public and private).
- Property lines/monuments.
- Right-of-way lines & centerline monuments.

102.04 ACCURACY OF CITY MAPS AND PLANS NOT GUARANTEED

102.04.A From time to time the City may provide property owners, engineers, Contractors, and other members of the public with information from the City's archives. The City cannot guarantee and makes no representation that it has verified the accuracy of the measurements, locations, or other information on such maps and plans.

102.05 PUBLIC WORKS IMPROVEMENTS DESIGN

102.05.A GENERAL

1. All public and private public works improvements within a private development shall be designed and constructed to the City of Stayton Public Works Standards plus the requirements of the Stayton Municipal Code. Prior to construction, the Developers' Design Engineer shall submit engineered construction plans for City Engineer or Public Works Department approval of all public improvements. All engineered construction plans must comply with the City of Stayton Public Works Standards, the Stayton Municipal Code, conditions of approval, and the requirements of the City Engineer.

2. All engineered design plans shall be prepared in accordance with the plan development requirements shown in Division 2 of these Design Standards.

3. The Design Engineer shall design the public improvements in accordance with standard engineering practices and applicable Divisions of these Design Standards.

    a. Street and Alleys, including pedestrian and bicycle facilities, street lights and signals, shall be designed in accordance with Division 3 or the Design Standards, the Standard Drawings, be in conformance with the approved tentative plat, City master planning and ordinances, applicable Oregon Revised Statues and Oregon Administrative Rules, and others as noted in Division 3 of these Design Standards.

    b. Water Distribution systems shall be designed in accordance with Division 4 of these Design Standards, the Standard Drawings, City master planning and ordinances, Oregon Department of Human Services-Drinking Water Programs, applicable Oregon Revised Statues and Oregon Administrative Rules, and others as noted in Division 4 of these Design Standards.

    c. Sanitary Sewer systems shall be designed in accordance with Division 5 of these Design Standards, the Standard Drawings, City master planning and ordinances, Oregon Department of Environmental Quality, applicable Oregon Revised Statues and Oregon Administrative Rules, and others as noted in Division 5 of these Design Standards.

    d. Storm drains and other stormwater management facilities shall be designed in accordance with Division 6 of these Design Standards, the Standard Drawings, the City of Portland Stormwater Management Manual, ODOT Erosion Control Manual, City master planning and ordinances, Oregon Department of Environmental Quality, applicable Oregon Revised Statues and Oregon Administrative Rules, and others as noted in Division 6 of these Design Standards.

4. Where the Public Works Standards are silent, the Marion County Public Works Standards shall apply, followed by the ODOT/APWA Oregon Standards, unless otherwise directed by the City Engineer.

5. The Developer shall be responsible for securing approval and permits from all County, State, and Federal agencies having jurisdiction over the Work. These agencies may include, but not limited to, Marion County, ODOT, DEQ, DHS, 1200-C or CN, etc.

102.05.B STRUCTURES

1. GENERAL

   a. Structures in public rights-of-way and easements shall be designed, constructed, inspected and tested in accordance with the requirements of the ODOT and ACI, as applicable, and the additional or exclusionary requirements contained in these Design Standards. In cases of conflict or disagreement, the most stringent requirements among them, as determined by the City Engineer, shall take precedence. These requirements are contained in ODOT's Manual of Field Test Procedures, Bridge Design Manual and accompanying Standard Drawings, Oregon Standard Specifications for Construction and Oregon Standard Drawings, AASHTO's Roadside Design Guide, and AASHTO's Load and Resistance Factor Design (LRFD) Bridge Specifications, which are incorporated herein by reference. The latest editions of International Building Code (IBC), the "ACI Manual of Concrete Practice," "ACI Manual of Concrete Inspection," and the "ACI Guide for Concrete Inspection," or other ACI codes, specifications, and guidelines, at the discretion of the City Engineer, shall govern those structures and characteristics of structures not addressed by the aforementioned standards.

   b. For purposes of these Design Standards, the following structures are not considered major structures: curb, curb and gutter, sidewalks, driveways, catch basins, street inlets and other drainage inlets connected to storm drain pipes 21-inches in diameter or smaller, manholes, and other structures shown in the Standard Drawings. These structures shall conform to the Public Works Standards and the ODOT/APWA Oregon Standard Specifications for Construction, as specifically referenced.

   c. Unless otherwise provided herein, major concrete and steel structures shall conform to the ODOT/APWA Oregon Standard Drawings. Major concrete structures not addressed by these Standards, and the characteristics of major concrete structures not fully addressed by these Standards, shall conform to the design criteria in the latest editions of the International Building Code (IBC), the "ACI Manual of Concrete Practice," "ACI Manual of Concrete Inspection," and the "ACI Guide for Concrete Inspection," or other ACI codes, standards, specifications, and guidelines, at the discretion of the City Engineer.

2. RETAINING WALLS

   a. Roadside retaining walls shall be designed to avoid conflicts with the maintenance of utilities and their appurtenances. Utility lines shall not be located under retaining wall tie-backs. Water lines within ten (10) feet or less of the tie-backs shall be encased in approved steel pipe casings.

   b. Retaining walls in public easements shall be designed for maintenance traffic loads in the easement at the top of the wall. The entity responsible for maintenance of each retaining wall and its subsurface drain piping shall be noted on subdivision plats and on the construction plans for the walls.

c. A building permit may be required by the IBC depending upon the height of the wall. Retaining walls requiring a building permit under the IBC shall be designed by a professional civil or structural engineer in accordance with the IBC design criteria.

d. Retaining walls with an exposed face of greater than 30 inches shall be provided with an approved handrail or fence on top conforming to the applicable ODOT/APWA standards as determined by the City Engineer.

102.06 FUTURE DEVELOPMENT

102.06.A All public improvements shall be designed as a logical part of the development of the surrounding area.

102.06.B Utilities and street improvements shall be extended to the boundaries of the development to provide for future extensions to the adjoining areas and prevent adjoining properties from becoming landlocked. In the case of utilities, this shall include extension to the far side of streets fronting or adjacent to the development as required to avoid work within or under these streets in the future.

102.06.C Storm drain systems and sanitary sewers shall be sized to accommodate the entire drainage basin which they will ultimately serve.

102.06.D The City may require over-sizing of water systems and other utilities, in accordance with applicable master plans or as deemed necessary by the City, to accommodate future growth.

102.06.E Where existing public utility lines do not adjoin the proposed development or the capacity of existing lines is inadequate, the Developer will be required to extend new utility lines to the development as necessary, and extend them to provide for service to adjacent properties.

102.06.F Where existing street improvements do not extend to the proposed development or the existing streets to the proposed development are not adequate to serve the development, the Developer may be required to improve the streets to the development.

102.07 UTILITY LOCATIONS

102.07.A The Standard Drawings indicate the general required location for each utility within the public right-of-way.

102.07.B Installation of private utilities in a common trench with water, sanitary sewer or storm drain mainlines is prohibited. A minimum of 3-feet of horizontal separation must be maintained between public and private utilities except at crossings.

102.07.C Utility service companies proposing to install major utility systems larger than typically required to serve local users and which cannot conveniently be relocated in the future will be required to prepare detailed drawings showing how the proposed system can be installed within the right-of-way without conflicting with existing or proposed City utilities. Drawing requirements may include but not be limited to plan and profile of proposed systems based on a detailed topographic survey.

102.08 ACCESS AND UTILITY EASEMENTS

102.08.A Where an access and utility easement is needed, the following guidelines and requirements will govern the requirements for, and the use of, access and utility easements:

1. Easements will only be permitted when it has been shown to be impractical or unfeasible to locate the needed public improvement within the public right-of-way. Utilities in the right-of-way shall be located as shown in the Standard Drawings. Easements require specific approval of the City Engineer.

2. All easements shall be exclusive to a single City utility unless otherwise approved by the City Engineer.

3. The conditions of the easement shall be such that the easement shall not be used for any purpose that would interfere with the unrestricted operation and maintenance of the utility. Under no circumstances shall a building or any other structure be placed over a utility or utility easement. This shall include overhanging structures with footings located outside the easement.

4. No trees or landscape features that are large or heavy shall be planted within the easement that could make operation of maintenance equipment difficult. Small shrubs, grass, bark mulch, or gravel may be used on easements. Fences shall be installed within the easement, unless otherwise approved by the City Engineer.

5. Public utilities located on private property shall be located at the center of a permanent easement. The easement for a single utility shall be 15-feet in width and 20-feet in width for two (2) utility lines. If two (2) or more utilities are located within the same easement, the easement width shall be increased based on the separation distance between the lines. Any variation in easement widths shall vary in 5-foot increments.

6. If a utility is deeper than 10-feet or has a diameter greater than 24-inches, a wider easement may be required. In such cases, a slope of one horizontal to one vertical from the bottom of the pipe will be used to determine the width of the easement, after taking into account the width of the pipe trench itself.

7. At the terminus of all public lines, the easement shall be extended a minimum of 10-feet past the end of the line, manhole, or cleanout.

8. Easements shall be granted to the City on Standard Forms provided by the City, unless otherwise approved. Easements shall consist of four (4) separate 8.5 by 11-inch exhibits as follows:

    a. Exhibit A shall provide the easement's legal description, as prepared by a registered Oregon professional land surveyor.

    b. Exhibit B shall provide a sketch (site and vicinity survey drawing) of the final easement configuration, also prepared by a registered Oregon professional land surveyor.

    c. Exhibit C shall provide a copy of the County tax assessor’s map with the subject property highlighted.

d. Exhibit D shall provide an Ownership Disclosure and Affidavit, if determined by the City to be necessary.

9. Public easements within master planned developments, manufactured home parks, apartment complexes, or commercial/industrial developments shall be located in parking lots, private drives, or similar open areas that permit unobstructed vehicle access for maintenance and inspection purposes.

10. Except with approval of the City Engineer, easements shall be placed on a single property, not centered on property lines. The utility shall be centered in the easement. If an easement centered along a property line is approved by the City Engineer, the utility shall be offset 18-inches clear from the property line.

11. Easements shall be furnished to the City for review and approval prior to recording. All easements shall be according to the City's standards.

12. Easement location, purpose, width, and description shall be shown on the City-approved Plans.

13. Costs for mailing, processing, recording, etc. of easements created by private development shall be borne by the Developer, unless specifically agreed to by the City.

102.08.B When required by the Stayton Municipal Code and/or as directed by the City Engineer, a 10-foot wide public utility easement (PUE) shall be provided for electrical, telephone, cable, gas and other franchise utilities. See Standard Drawings for typical underground utility locations.

102.09 PLAN REVIEW SUBMITTAL REQUIREMENTS

102.09.A Engineered construction plans for all public works improvements (including privately financed public improvements) shall be submitted to the Public Works Department. The Public Works Department will coordinate the plan review with the City Engineer., The City's review of the public works improvements is for general conformance with applicable public works portions of the City of Stayton Municipal Code (SMC), Public Works Design Standards (PWDS), and any relative master plans, The City's review does not include a review of any other agencies permits or any architectural, structural, or building designs covered under any building, plumbing, mechanical, electrical, fire, or other building codes/permits. The Developer will be required to obtain any and all required reviews and permits required by the Planning Conditions of Approval, SMC, PWDS, and any other agencies having jurisdiction over the work. The Developer shall coordinate with the City, building official, and/or other agencies as necessary.

102.09.B Plan submittals shall include the plan development information required in Division 2 of these Design Standards along with all other project information requested by the City Engineer. This information is to include, but not be limited to, Design Engineer's construction cost estimates, easement documents, right-of-way dedications, executed agreements, and a plan check and inspection fee. All submittals will be reviewed by the City for completeness and the Design Engineer will be notified if any required information is missing. Incomplete submittals will be returned without review. Submittals should be made in a timely manner, as lack of information to the City may impede the review process.

102.09.C Three (3) sets of complete construction plans shall be submitted to the City for preliminary review for all single-family and multi-family residential developments and for all commercial and industrial developments, unless required otherwise by the City Engineer.

102.09.D A plan check fee must be paid before a plan review will be initiated. The amount of the fee will be established by resolution of the City Council.

102.09.E Upon completion of the preliminary review, the City will return either one (1) set of red-lined construction plans or review memorandum outlining the required revisions. In order to be entitled to further review, the applicant's Design Engineer must respond to each comment of the prior review. All submittals and responses to comments must appear throughout to be a bona fide attempt to result in complete drawings. Resubmittals shall consist of a minimum of three (3) sets of construction plans for all development types.

102.09.F Once the preliminary review has been completed and required revisions made, the Developer shall circulate the construction plans to all utility service companies within the City and other agencies as required.

102.09.G Prior to final approval of the construction plans, all proposed drawings from utility service companies must be received and approved by the City. Approvals from other agencies with jurisdiction must also be received, including but not limited to the Oregon Department of Human Services – Drinking Water Program (DHS-DWP), Department of Environmental Quality (DEQ), Department of Transportation (ODOT), Marion County and railroads wherein each has jurisdiction. The Developer is responsible for the coordination with the various utilities and agencies during design and construction. The utilities and agencies may include those shown in Appendix B.

102.09.H Upon final review of the construction plans, five (5) original complete sets of the final construction plans shall be submitted to the City to be signed and stamped approved for construction. The final approved construction plans will have the City Engineer or Public Work Director's signature and date within the approval block on the cover sheet and an approved stamp (or similar acknowledgement) on the remaining plan sheets. Final approved sets will be kept by the City Public Works Director, the City Engineer, the City Inspector, the Developer and the Design Engineer.

102.09.I Prior to City issuance of any public works permits, the Developer shall provide the City with the following:

1. Copy of an approved (by City Attorney) Developer-Engineer-City Agreement signed and notarized by the Developer and the Design Engineer.

2. Other submittals specific to the project, including approvals from applicable state agencies, such as DEQ (sewer & erosion control), DHS-DWP (water), DSL, etc.

3. Stormwater Management Facility O&M Plan and Agreement.

4. Any required Construction Deferral and Waiver of Rights of Remonstrance Agreements.

5. Recorded copies of all required easements and right-of-way dedications. Off-site easements shall be recorded and delivered to the City prior to issuance of a construction permit for that work. For subdivisions or partitions where all public utilities will be constructed prior to the recording of a final plat, the execution and recording of the easement documents and right-of-way dedications can be done in conjunction with the final plat. All easements documents shall use the City's standard form, and shall include an exhibit map in addition to any legal descriptions. Legal descriptions and exhibit maps shall be submitted for City review and approval prior to recording.

6. Any required permit fees.

7. Proposed Construction Schedule

8. Contractor's Indemnity Agreement

9. Certificates of insurance, with minimum insurance limits as outlined in the Standard Construction Specifications. The City of Stayton, its consultants, officers, employees and agents shall be named as additional insured.

10. Evidence of Workman's Compensation coverage from Contractor performing the work.

11. Required performance bond.

12. Others as required by the City.

102.09.J Approval of plans by the City Engineer or Public Works for issuance of a public works permit does not relieve the Developer, Design Engineer, or Contractor from obtaining any and all reviews and permits required by other agencies or for any architectural, structural, or building designs covered under any building, plumbing, mechanical, electrical, fire, or other building codes/permits. The Developer will be required to obtain any and all required reviews and permits required by the Planning Conditions of Approval, SMC, PWDS, and any other agencies having jurisdiction over the work.

102.09.K Once the plans are approved and the public works permit issued, the Design Engineer shall be responsible for performing or providing all surveying services necessary to stake the project and prepare the Record Drawings when the project is complete.

102.10 SUPPORTING INFORMATION

102.10.A The Design Engineer shall submit sufficient supporting information to justify the proposed design. Such supporting information is further summarized in each Division of these Design Standards and shall include, but not be limited to, the following:

1. Design calculations.

2. Alternate materials specifications including manufacturer's design application recommendation.

3. For storm drains, hydrology and hydraulic calculations with basin maps.

4. Grading plan support information to include as appropriate:
   - ❖ Soils Engineering Report.
   - ❖ Hydrology Drainage Report.
   - ❖ Engineering Geology Report.

5. A narrative of the stormwater facility, including its intended function, and an explanation of how the outlet(s) function to meet peak discharge control and water quality treatment control requirements.

6. A downstream drainage analysis to determine the potential impacts from the project on the downstream system. Refer to Section 603.01, for more information regarding downstream analysis.

7. For waterline systems, water model/calculations.

8. When designing sanitary sewer or stormwater facilities, a facility plan shall be submitted with the construction plans when required by the City Engineer. This plan shall be used to identify and analyze the proposed extension of facilities. The topographic plan shall show all upstream and tributary areas within at least 200-feet of the proposed development.

9. The facility plan shall include existing contours at 2-foot intervals, or as approved by the City, including location of existing structures and public and private utilities.

10. An operation and maintenance plan shall be submitted for City review and approval for all privately financed private detention, retention, and water quality facilities. The plan shall include types and frequencies of maintenance activity required. Refer to Sections 607.05 and 608.04.

103 CONSTRUCTION PROCEDURES AND REQUIREMENTS FOR PRIVATELY FINANCED PUBLIC IMPROVEMENTS

103.01 CONSTRUCTION PLAN APPROVAL

103.01.A GENERAL

1. Engineered construction plans and specifications shall be reviewed and signed approved by the City Engineer, prior to construction. No construction work on privately financed public improvement projects may commence until the City issues a public works permit.

2. Privately financed public improvement projects shall obtain a public works permit within six (6 months) from the date construction plans are signed approved by the City Engineer, unless otherwise approved. If a public works permit is not obtained within this period, the approval of the construction plans shall become null and void. Renewal of the approval for the construction plans may result in additional conditions to meet new standards, changed conditions, or new information discovered since the original approval.

103.01.B PHASED CONSTRUCTION

1. A development that has been approved by the City to be constructed in phases, the construction plans for each phase shall be capable of standing alone and City approval of one phase shall be independent of the approval for all other phases. Approval of the construction plans by the City and the time by which construction must begin shall apply to each phase independently.

103.02 REQUIRED PUBLIC WORKS PERMITS

103.02.A Public works permits shall be issued on all public improvement projects within public rights-of-way, or easements, which will eventually be maintained and operated by the City of Stayton. Any permits required by federal, state, and local governments shall be obtained by the applicant proposing the improvements. Public improvement projects requiring permits from the City of Stayton shall include, but not necessarily be limited to, improvements or upgrades to streets, sidewalks, curbs, driveway approaches, water systems, sanitary sewer systems, and storm drainage systems. Projects that also require plan review and public works permits include all private storm drainage, sanitary sewer, and water systems that will be connected to or that will discharge into a system under the jurisdictional control of the City of Stayton.

103.02.B A public works permit for privately financed public improvement projects shall not be issued unless the subject development, and any other development of the Developer within the City of Stayton, is in substantial compliance with applicable federal, state, and local laws, rules, regulations, permits, and the approved plans relating to such developments. Developer is responsible for ensuring compliance; however, if there is a material violation of any such requirement prior to issuance of a permit, the City may elect to withhold the permit for privately financed public improvement projects until such time as the violation has been resolved to the satisfaction of the City.

103.02.C The construction, repair, or replacement of all other utilities located within a public right-of-way or public easement, including, but not exclusively, power, telephone, gas, and cable television, shall be required to submit plans for review and approval and obtain a public works permit.

103.02.D The following is a list of pertinent Public Works Permits issued by the Public Works Department:

1. Right-of-Way Permit – This permit covers the construction of utilities, streets, alleys, sidewalks, driveway approaches, curbs and gutters and other site improvement projects within the City of Stayton public rights-of-way and/or easements. All work is required to conform to the Stayton Municipal Code, Public Works Standards, applicable permits, laws, regulations, and is subject to the general terms and conditions shown on the back of the permit.

2. Site Development Permit – This permit covers the construction of privately financed public improvement projects and other development projects. All work is required to conform to the Stayton Municipal Code, Public Works Standards, applicable permits, laws, regulations, and is subject to the general terms and conditions shown on the back of the permit.

103.03 CONSTRUCTION PERIOD

103.03.A Privately financed public improvement projects shall begin construction, as deemed acceptable by the City, within six (6) months from the date a public works permit has been issued. If construction does not begin within this period, the approvals of both the construction plans and the public works permit will become null and void. Renewal of the approval for the construction plans and public works permit may result in additional conditions to meet new standards, changed conditions, or new information discovered since the original approval.

103.03.B Privately financed public improvement projects shall be completed within two (2) years of the issuance of the public works permit unless the City extends the completion date. The City Engineer may require additional bonding and impose other conditions before granting such an extension.

103.04 APPLICABLITY OF STANDARD CONSTRUCTION SPECIFICATIONS

103.04.A The Public Works Standards are applicable to all public improvements constructed within the City of Stayton, including privately financed public improvement projects.

103.04.B The Standard Construction Specifications contains provisions relating to offers and contracts with the City for publicly financed public improvement projects. These provisions are not applicable to privately financed public improvement projects and are noted as such in each Section. The remaining provisions of the Standards are applicable to privately financed public improvement projects. If a Section or Subsection of the Standard Construction Specifications is not applicable in its entirety to privately financed public improvements, it is so noted in the title of the Section or Subsection. If not noted in the title as ("Not applicable to privately financed public improvements"), the Section or Subsection is applicable to privately financed public improvements except as specifically stated in the Subsection.

103.05 BONDING REQUIREMENTS

103.05.A GENERAL

1. All bonds signed on behalf of the Surety shall be accompanied by a certified copy of the authority to act. Surety shall be licensed to conduct the business of surety in the State of Oregon and named in the current list of approved sureties published by the U. S. Treasury Circular 570. If the Surety on any bond furnished by the Contractor is declared bankrupt or becomes insolvent, or its right to do business is terminated in the State of Oregon, or it ceases to meet the requirements and be listed as an approved surety, Contractor shall within five (5) days thereafter, substitute another Bond and Surety, both of which shall be acceptable to City.

103.05.B PERFORMANCE BOND (PERFORMANCE GUARANTEE)

1. Where public improvements are required, a performance guarantee is required to be in place, prior to issuance of a public works permit for privately financed public improvement projects. A performance guarantee is a financial commitment that warrants that certain required public improvements will be constructed in accordance with the plans and specifications approved by the City. The Developer shall provide a Performance Bond, or other form of performance guarantee acceptable to the City Administrator and City Attorney, in the amount of one-hundred and twenty-five percent (125%) of the estimated cost of construction.

2. The estimated cost of construction shall be determined by the Design Engineer's estimate, the tabulation of bids, or other method acceptable to the City Engineer. The Performance Bond shall be conditioned upon compliance with and fulfillment of all terms and provisions of the Stayton Municipal Code, the approved plans and specifications, and any agreement relating to the construction of the public improvements.

3. Double bonding will not be required on elements of the project where Marion County or ODOT requires Performance Bonding.

103.05.C WARRANTY BOND (QUALITY ASSURANCE GUARANTEE)

1. A warranty bond is a financial commitment that warrants that the improvements were made according to the approved plans and specifications and that the workmanship and materials used in constructed public improvement project will satisfactorily perform for a warranty period of not less than one (1) year.

2. Record Drawings shall comply with the requirements outlined in Section 202 of the Design Standards and shall be submitted prior to issuance of the Notice of Final Completion, initiating the one (1) year warranty period.

3. After the project is deemed complete, the Developer shall provide the one (1) year warranty bond, or other form acceptable to the City Administrator and City Attorney, in the amount of thirty percent (30%) of the Performance Bond. The one (1) year warranty period begins on the date of construction approval on the Notice of Final Completion. Warranty bond shall continue in force until released by written release from the City (bond may extend beyond one (1) year if Contractor corrections are outstanding).

4. If no defects are found by the end of the one (1) year warranty period, the City will make final acceptance of the work for ownership and operation and the warranty bond will be released.

103.06 INSURANCE AND INDEMNIFICATION

103.06.A The Developer shall indemnify and hold harmless the City and the City Engineer, their officers, employees, and consultants, from and against all claims, demands, penalties, damages, losses, expenses, including attorney's fees, and causes of action of any kind or character, including the cost of defense thereof, arising or alleged to have risen in favor of any person on account of personal injury, death, or damage to property arising out of or resulting from, or alleged to have risen out of or resulted from, in whole or in part, any act or omission of the Developer, the Developer's Design Engineer, the Developer's Contractor, or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable. See Subsection 108.11 of the Standard Construction Specifications.

103.06.B The City may require additional assurances from the Developer including, but not limited to, Certificates of Insurance from insurance companies or entities acceptable to the City and authorized to issue insurance in the State of Oregon. When required, the Certificate shall specify all of the parties who are named additional insured. At minimum, the City of Stayton and City Engineer shall be named additional insured. The Developer shall be responsible for paying all deductibles, self-insured retentions and/or self-insurance included under these provisions. See Subsection 108.12 of the Standard Construction Specifications.

103.07 PREQUALIFICATION OF CONTRACTORS

103.07.A Contractor's need not be prequalified for privately financed public improvements.

103.08 PRE-CONSTRUCTION CONFERENCE

103.08.A A pre-construction conference, as required in Subsection 109.02 of the Standard Construction Specifications, shall be scheduled before commencement of construction. The meeting is to include the City Engineer, the Developer's representative, Design Engineer, Contractor, Marion County and/or ODOT representative (as applicable), and all affected utility companies. The purpose of the conference is to discuss the construction schedule and times of the work which require special coordination.

103.08.B The Developer shall be responsible for notifying ODOT, Marion County, and all private utility companies of the time and location of the preconstruction conference, and requesting that a representative be present. The Developer may be required to submit proof of notification to the City prior to the pre-construction conference. Copies of notification letters sent by the Developer or Design Engineer are acceptable.

103.09 CONSTRUCTION REQUIREMENTS

103.09.A GENERAL

1. During the construction period, the City will maintain three (3) sets of approved plans and specifications. The Contractor shall retain at minimum one (1) set of approved, stamped, and signed plans and specifications at the construction site at all times.

103.09.B CONSTRUCTION SURVEYING

1. EXISTING SURVEY MONUMENTS

   a. Before beginning any construction activity, the applicant's engineer/surveyor shall adequately reference all permanent survey monuments, property corners, stakes, or benchmarks on the subject site, or markers that may be subject to disturbance in the construction area or during the construction of any off-site improvements. It shall be the responsibility of the Contractor to protect survey monuments throughout the construction process. The Contractor shall not disturb permanent survey monuments without written consent from the City's authorized representative.

   b. If any survey monument is disturbed, moved, relocated, or destroyed as a result of construction activity, the Contractor shall, at Contractor's cost, retain the services of a Professional Land Surveyor registered in the State of Oregon to restore the monument to its original condition and shall file all documentation required by Oregon law. A copy of the recorded documentation shall be submitted to the City Engineer.

   c. In accordance with ORS 209.150, any person or public agency removing, disturbing or destroying any survey monument of record in the office of the County Surveyor shall cause a registered Professional Land Surveyor to file a reference with the County Surveyor and replace the monument within ninety (90) days of the removal, disturbance, or destruction. Failure to comply with this provision is subject to penalty according to ORS 209.990.

2. NEW SURVEY MONUMENTS

   a. Street centerline monumentation shall be in accordance with ORS 92.060 (2). The centerlines of all street right-of-way shall be monumented before the City shall accept a street improvement. Monuments shall be set under the direction of a registered Professional Land Surveyor. A record of survey must then be filed in compliance with ORS 209.250 and any additional requirements set forth by the City.

   b. All centerline monuments shall be placed in a monument box in accordance with the Standard Drawings. Monument boxes shall be of a type approved by the City before installation and the top of the box shall be set at design finished grade.

   c. All sanitary and storm sewers shall be placed in positions that do not interfere with centerline monumentation.

103.09.C RAILROAD CROSSINGS

1. Crossings of railroad rights-of-way shall be done in a manner that conforms to the requirements of the railroad having jurisdiction. If any bonds or certificates of insurance protection are required, they shall be furnished by the Contractor or Developer to the railroad company concerned, with the City and City Engineer as an additionally named insured.

2. Permits or easements for such crossings shall be obtained by the Developer. All the terms of such permits or easement shall be met by the Developer and Contractor.

103.09.D STREAM CROSSINGS

1. Stream crossings shall be avoided whenever possible, whether by roads, utilities, or other development. If streams must be crossed, impacts shall be minimized by preferring bridges to culverts, and by designing bridges and culverts to pass at least the 100-year flood and meet the Oregon Department of Fish and Wildlife (ODFW) Fish Passage Criteria, or latest edition.

2. The Contractor shall comply with the regulatory requirements of the Oregon Department of State Lands, ODFW, U.S. Fish and Wildlife Department, U.S. Army Corps of Engineers, National Marine Fisheries Service, and any other state and federal agencies having jurisdiction.

3. Before any work may be performed in any stream, the method of operation and the schedule of such work shall be approved in writing by the City Engineer. The timing of in-water work shall comply with the guidelines established by the jurisdictional agency. Mechanized equipment shall enter streams only when necessary and only within the immediate work area.

103.09.E OBSERVATIONS, INSPECTIONS, AND TESTING OF CONSTRUCTION.

1. GENERAL

   a. All public construction falling under the jurisdiction of the City of Stayton shall be inspected by a State of Oregon registered engineer, or a qualified individual under the supervision of a State of Oregon registered engineer. The City will not authorize work to begin on public improvements without designation of the Design Engineer's Inspector by the Owner or Developer. In addition, the Owner, Developer (if different than Owner), and the Design Engineer shall sign the City's Developer-City Agreement form before construction can begin.

   b. The Developer, directly through service contract or agreements, shall pay for required testing and all inspection costs, including costs for the City's authorized representative and City Engineer's time. The City will require inspection costs to be included in the contract surety.

   c. The Developer shall be responsible for providing the name of a compaction-testing firm that will be paid by the Developer and that will supply the City Inspector with the compaction tests needed to certify that the soils, aggregate, and surface materials meet the minimum requirements of these Standards. The testing firm hired by the Developer shall be required to be under the direct supervision of a professional engineer registered in the State of Oregon whose area of expertise is geotechnical engineering.

   d. The Developer shall also be responsible for providing the name of a materials-testing firm that will be paid by the Developer and that will supply the City Inspector with the concrete-strength tests and other materials tests as required to certify that the materials meet the minimum requirements of these Standards. The testing firm hired by the Developer shall be required to be under the direct supervision of a professional engineer registered in the State of Oregon.

   e. An engineer whose firm, or any member of the firm, has any form of real property interest in the development for which the improvements are required cannot be designated Design Engineer's Inspector. The Design Engineer's Inspector's relationship to the project must be solely that of a professional service nature.

f. The City will not provide full-time construction observation services for work in progress on privately financed public improvement projects. The City will, however, perform limited site observations as part of the Public Works Permit process (see appropriate permit general conditions).

g. The Contractor shall not make connections between existing work and new work until completing necessary inspection and testing on the new work. This new work must conform in all respects to the requirements of the plans and specifications.

h. The Design Engineer (or his/her designated Inspector) shall visit the job site and make contact with the Contractor as necessary to verify that materials and construction are meeting specifications. Amount of time spent at job site depends on the size, complexity of project, and cooperation and reliability of contractor. If the City determines the Design Engineer is not keeping adequate control of the job, or is not spending enough time at the job site, the City representative may issue a stop work order for the project until the Design Engineer's Inspector provides adequate inspection/ observation. The Design Engineer is responsible to monitor all construction and testing.

2. CITY'S CONSTRUCTION OBSERVATION OF WORK IN PROGRESS ACTIVITIES

a. Construction observation of work in progress provided by the City Inspector will typically include the following activities:

- Act as a liaison between the Design Engineer and/or Design Engineer's Inspector and the City;
- Monitor both the work in progress and the required performance tests, as deemed desirable by the City Engineer;
- Issue stop work orders upon notifying the Design Engineer's Inspector of the City's intention to do so. If the City Inspector cannot contact the Design Engineer's Inspector verbally, then the City Inspector shall send a written notification.
- Inform the City Engineer of all proposed plan changes, material changes, stop work orders, or errors or omissions in the approved plans or specifications as soon as practical. Revisions to the approved plans must be under the direction of the Design Engineer. The Design Engineer shall submit three (3) copies of the proposed revision for approval; no work affected by the revision shall be done until approved by the City Engineer.
- Operate or coordinate operation of all valves, including fire hydrants, on existing waterlines.

b. The City Inspector shall at all times have access to the project and will make routine observations of work in progress. Should any observation of work in progress or test results reveal that the construction of the improvements is not proceeding according to the approved plans and the specifications in this document, the City Engineer may order all work stopped, all defective work removed, or both.

c. The Contractor shall give the City Inspector a minimum of 48 hours (two working days) advance notice before a required "milestone" test or inspection. It is the responsibility of the permit holder or Contractor to obtain inspections and approvals for all work installed.

d. Construction observation of the work in progress for the "milestone" tests and inspections shown below is to be witnessed by the City Inspector. The Contractor and/or Design Engineer's Inspector shall coordinate with the City Inspector as necessary during construction.

e. The following list of minimum "milestone" tests and inspections are required.

1) STREETS

- ❖ Curb inspection
- ❖ Subgrade testing or proof rolls
- ❖ Aggregate base rock proof rolls and testing
- ❖ AC pavement placement and testing
- ❖ Sidewalk/Handicap Ramp installation

2) WATER

- ❖ All installation requiring chlorine swabbing
- ❖ Filling of water system
- ❖ Mainline or Hydrant Blowoff operations
- ❖ Pressure and leakage tests
- ❖ Disinfection

3) SANITARY SEWERS

- ❖ Air testing of sanitary sewer mains and laterals
- ❖ Hydrostatic or vacuum testing of manholes

4) STORM DRAINS

- ❖ Air or Hydrostatic testing as required

f. Failure to give advance notice to the City Inspector for required inspections, receive adequate inspections, or violation of other regulations, ordinances, resolutions, rules, and City Codes as outlined in these Standards can result in one or more of the following, as determined by the City:

- ❖ Uncovering or removal of work not inspected
- ❖ Stoppage of work until problem is resolved
- ❖ Suspension of future inspections
- ❖ Withholding certification of projects as complete, which is required to begin warranty period and eventual City acceptance for maintenance and operation
- ❖ Citation for violation of the Stayton Municipal Code and its penalties and provisions

3. DESIGN ENGINEER'S INSPECTOR ACTIVITIES

a. The following minimum activities are required of the Design Engineer or his/her designated Inspector (Design Engineer's Inspector). The Design Engineer must personally perform all activities marked below by an (*), and must supervise all individuals performing delegated activities. A recognized testing firm or another registered engineer must accomplish material testing not performed by the Design Engineer.

1) * Execute Developer-City Agreement form to provide engineering services including construction staking, construction inspection/observation, and Record Drawing preparation.

2) Maintain a project log that contains at least the following information.

- ❖ Job number, name of Design Engineer's Inspector and designee(s);
- ❖ Date and time of site visits, including arrival and departure times;
- ❖ Weather conditions, including temperature;
- ❖ A description of construction activities;
- ❖ Statements of directions to change plans, specification, stop work, reject materials or other work quality actions;
- ❖ Public agency contacts;
- ❖ Perceived problems and action taken;
- ❖ General remarks related to construction activities;
- ❖ Final and "milestone" inspections;
- ❖ Record all material, soil and compaction tests; and
- ❖ Citizen contact or complaints;

NOTE: If requested by the City Engineer, all active site development projects shall be required to turn in daily inspection/observation reports to the City on a weekly basis containing information as outlined above. Upon the City's request for the daily inspection/observation reports, if the compiled reports become more than two (2) weeks in arrears, the City representative may post a stop work order on the project site.

3) Obtain and use a copy of City-approved construction plans and specifications;

4) Review and approve all installed erosion control measures prior to any site clearing or ground-disturbing activities by the Contractor.

5) Review and approve all pipe, aggregate, concrete, asphaltic concrete, and other materials to ensure their compliance with City standards;

6) * Approve all plan or specification changes in writing and obtain City approval (See City Activities above). All changes shall be with the approval of the City before the commencement of work affected by the revision;

7) Monitor construction activities to ensure end products meet City specifications;

8) * Perform (or have performed) material, composition and other tests required to ensure City specifications are met;

9) Periodically check that curb, sanitary sewer work, storm sewer work, and pavement grades are in accordance with adopted plans;

10) Periodically certify to the City the amount of work completed to enable release of monies or a reduction of assurance amount;

11) File a completion report that contains:

- ❖ The original of the project completion certification;
- ❖ A complete copy of the log, signed by the Design Engineer and/or Design Engineer's Inspector, compiled from the contractor's, Design Engineer's Inspector, and City inspector's records;
- ❖ A complete set of as-built/record drawing plans compiled from the contractor's, Design Engineer's Inspector, and City inspector's records;
- ❖ The results of materiel tests, compaction tests, and soil analysis as detailed in the log.

12) Call to the City's attention, by the end of that workday, all plan changes, material changes, stop work orders, or errors or omissions in the approved plans or specifications.

13) Observe and record as-built/record drawing information on job site at: time of construction. The Design Engineer's Inspector should observe, approve, and document any minor deviations from plans and specifications not requiring City approval. This could include minor changing of manhole elevations, correcting unforeseen field conditions, and so forth.

14) Ensure that contractor notifies police, fire, school bus, public transportation officials, and local affected residences and businesses of proposed utility outages, street closures, or traffic detouring or disruption.

15) Verify that traffic control signing is in place before the start of construction, and in compliance with City-approved traffic control plan and construction sign plan.

4. MAJOR INSPECTION CHECKLIST – The following is the responsibility of the Design Engineer or his/her designated Inspector (Design Engineer's Inspector).

a. SANITARY SEWERS -

- ❖ Be present at initial opening of trench to verify grade and alignment and answer any questions.
- ❖ Verify grade and alignment of sewer a minimum of once for each run between manholes. If alignment and grade does not check, additional checks shall be made to ensure grade and alignment are achieved.
- ❖ Verify materials and construction meets specifications including bedding, pipe, pipe zone, tracer wire, warning tape, backfill, manholes, etc.
- ❖ Be present at air test and supply City with copy of air test results.
- ❖ Be present at compaction testing of trenches and supply City with copy of results.
- ❖ Be present at pavement patching of trenches. Verify that tack coat has been applied before paving and that all trench joints are sand-sealed following paving.
- ❖ Be present periodically when traffic is being detoured or streets are closed to monitor traffic control measures.
- ❖ Notify City when line is ready for CCTV inspection. Monitor CCTV inspections.
- ❖ Verify that manhole tops are at proper finish elevation with correct amount of grade rings.
- ❖ Be present at manhole testing. Test manhole for acceptance only after completion of surface restoration including paving and final adjustment to grade. DEQ's manhole test record form or equivalent shall be used to record the test.
- ❖ Attend final inspection of project.

b. WATER LINES -

- Be present at initial opening of trench to verify line, grade, and connection to existing water line meets specifications.
- Verify materials and construction meets specifications including bedding, pipe, pipe zone, warning tape, backfill, etc.
- Verify that a minimum of three feet (3') of cover from finish street grade is maintained. Grade stakes shall be required when water line is installed before coring of street. When water line varies from standard cover of three feet (3'), water line depths shall be recorded at grade breaks and every 100 lineal feet and referenced to final grade.
- Verify valve, fitting, and blowoff installation as per plan and location. Inspect materials before installation for compliance with plans and specifications.
- Verify joint restraint and thrust blocking as per the Standard Drawings.
- Verify service lines are proper size and material, and meter stop is at correct horizontal and vertical location.
- Verify fire hydrants meet specifications at correct horizontal and vertical location.
- Monitor water line pressure and leakage test. Notify City Inspector of time of test. Provide all test results to the City.
- Monitor water line flushing and chlorination.
    - Method of introducing chlorine to waterline must meet City and State requirements.
    - Design Engineer's Inspector to coordinate with City Inspector for water samples for bacteriological test of water purity. City Inspector will report results to Design Engineer.
    - The Design Engineer shall ensure the bacteriological tests passed and obtain approval from the City Inspector before connecting the new water system to the existing water system.
    - Discharging of the highly chlorinated water used for disinfection shall not be discharged into surface waters. The Design Engineer shall ensure Contractor disposes of flushed chlorinated water in accordance with applicable federal state and local regulations concerning said discharge.
- Be present at compaction testing of trenches and supply City with copy of results. Verify proper bedding and backfill process.
- Be present at pavement patching of trenches. Verify that tack coat has been applied prior to paving and that all trench joints are sand-sealed following paving.
- Notify Public Works ((503) 769-2919) two (2) working days before any required public water shutdown.
- Periodically be present to observe when traffic is being detoured or streets are closed to monitor traffic control measures.
- Attend final inspection of project.

c. STORMWATER SYSTEMS -

- Verify erosion and sediment control provisions are properly installed and maintained throughout the project.
- Be present at initial opening of trench to verify grade and alignment and answer any questions.
- Verify grade and alignment of storm drains a minimum of once for each run between manholes. Number of checks depends on quality of work being done by contractor.
- Verify materials and construction meets specifications including bedding, pipe, pipe zone, tracer wire, warning tape, backfill, manholes, etc.

- ❖ Be present at compaction testing of trenches and supply City Inspector with copy of results.
- ❖ Be present at pavement patching of trenches. Verify that tack coat has been applied before paving and that all trench joints are sand-sealed following paving.
- ❖ Periodically be present when traffic is being detoured or streets are closed to monitor traffic control measures.
- ❖ Verify that manhole tops are at proper finish elevation with correct amount of grade rings.
- ❖ Verify catch basin inlet installation per specifications at proper grade and location.
- ❖ Verify stormwater quantity and quality facilities are constructed in accordance with the plans and specifications.
- ❖ Attend final inspection of project.

d. STREET CONSTRUCTION -

- ❖ Monitor and document subgrade, grade elevation, and compaction testing. Observe subgrade for soft spots and unsuitable materials. Document corrective actions.
- ❖ Verify subbase rock meets specifications and grade elevation. Monitor compaction testing.
- ❖ Monitor curb alignment and elevation per survey stakes. Verify curbs meet specification requirements and that drainage blockouts, wheelchair ramps, and driveway cuts (where required) are placed correctly.
- ❖ Notify City Inspector so he/she may be present during proof rolling of subgrade, rock placement, and before paving.
- ❖ Verify installation of survey monuments at street intersections.
- ❖ Monitor asphalt placement:
  - Submit ready-to-pave notice to City for approval.
  - Apply tack coat and saw cut existing pavement.
  - Tack-coat existing curbs, manholes, and pavement before paving.
  - Test asphalt temperature against specifications.
  - Ensure depth of asphalt meets specifications.
  - Ensure class of asphalt meets specifications.
  - Ensure compaction and procedures meet specifications. Monitor compaction testing where required.
  - Provide supplier's certification showing rock gradation and asphalt content of materials.
- ❖ Be present periodically when traffic is being detoured or streets are closed to monitor traffic control measures.

103.10 COMPLETION

103.10.A NOTICE OF SUBSTANTIAL COMPLETION

1. When the improvements are sufficiently and substantially complete, as determined by the City Engineer, the City will inspect the improvements and create a list of any deficient items (punch list). Punch list items shall be completed within a specified period of time provided in the Notice of Substantial Completion prior to the City's construction approval of the public improvements.

103.10.B NOTICE OF FINAL COMPLETION

1. Public improvements and public utilities required for a Partition or Subdivision shall be fully constructed and a Notice of Final Completion provided by the City Engineer prior to the recording of the final plat and prior to any building permit applications being accepted or issued, unless the required improvements are deferred under a non-remonstrance or other agreement approved and signed by the City Administrator and City Attorney. Submission of Record Drawings is required prior to receiving a Notice of Final Completion.

2. Public improvements and public utilities required for issuance of a Building Permit shall be fully constructed and a Notice of Final Completion provided by the City prior to the issuance of a Certificate of Occupancy.

103.11 RECORD DRAWINGS (AS-BUILTS)

103.11.A For all public works improvements the Design Engineer shall submit certified as-built record drawings and electronic CD for all approved plans within three (3) months of the completion of construction. As-built record drawings shall comply with the Record Drawing requirements of Section 109.24 of the Standard Construction Specifications and Record Drawing plan development requirements specified in Section 202 of the Design Standards. All submittals of the Record Drawings shall be of archival quality.

103.12 WARRANTY RELEASE AND FINAL ACCEPTANCE BY THE CITY

103.12.A The City will inspect the project approximately one (1) month prior to conclusion of the warranty period and notify the Developer in writing of any deficiencies which need to be corrected. The Developer shall be responsible for correcting any deficiencies prior to the warranty expiration. The City will not authorize the release of the Warranty Bond and the privately financed public improvements will not be accepted by the City for ownership and operation until all requirements have been completed to the satisfaction of the City, and all fees and charges have been paid.

103.12.B Upon successful correction any noted deficiencies and upon payment of all fees and charges to the City, the City Engineer will authorize the release of the warranty and issue a Notice of Final Acceptance stating that the City accepts the public improvements for ownership and operation.

END OF DIVISION

DIVISION 2 – GENERAL TECHNICAL REQUIREMENTS

DIVISION 2

GENERAL TECHNICAL REQUIREMENTS

201 PLAN DEVELOPMENT REQUIREMENTS

201.01 GENERAL

201.01.A These requirements have been established to facilitate producing engineered preliminary plans, construction plans, and record drawings that are consistent in appearance and presentation. These standards will address many of those routine questions that arise during the design and drafting stages of developments within the corporate limits of the City.

201.01.B Adherence to these standards will aid the City in maintaining accurate and readily readable records. It will also aid in the efficient review and turnaround of construction plans.

201.01.C These standards are to be followed by Design Engineers, Contractors, consultants, and sub-consultants who are involved in producing engineered plans for both publicly and privately financed public improvement projects. Exceptions will be made only after a request has been submitted and approved by the City Engineer. If any situation occurs that is not specifically addressed, application of good professional engineering judgment is appropriate.

201.02 CITY POLICY REGARDING ENGINEERING

201.02.A It will be the policy of the City to require compliance with Oregon Revised Statute 672 for Professional Engineers.

201.02.B Engineering plans, reports, or documents shall be prepared by a registered Professional Engineer or by a subordinate employee under the Design Engineer's direction, and shall be signed by the Design Engineer and stamped with the Design Engineer's seal to indicate responsibility for them. The Design Engineer shall maintain complete responsibility for the design of the project. The Design Engineer shall review any proposed public facility extension, modification, or other change with the City prior to engineering or other proposed design work to determine if there are any special requirements or whether the proposal is permissible.

201.02.C City approval of plans or any other engineering document produced by the Design Engineer does not in any way relieve the Design Engineer of responsibility for the design, or their responsibility to meet applicable City, County, State, and Federal requirements, or their obligation to protect life, health, and property of the public. The plan for any project shall be revised or supplemented at any time it is determined that the project requirements have not been met. It is also required that at any time a revision to the design is required; the Design Engineer shall maintain responsibility to redesign according to these Design Standards per the City's approval. It is therefore necessary for the Design Engineer to be available during construction should timely changes be required. If the Engineer of Record leaves the acting consulting firm then a new registered engineer will have to submit an updated Engineer of Record form to the City prior to work commencing.

201.03 REQUIRED PLAN SIZE AND SEQUENCE

201.03.A Drawing sizes shall comply with ANSI-defined standards for page width and height. Plan review drawings shall be submitted at full-size 22" x 34" (ANSI D-size sheet). Bidding and construction documents may also be printed at half-size when submitted under the same half-size requirements. Official seals and signatures on the plans shall comply with OAR 820-010-0620.

201.03.B The following plan sequence with applicable sheets for the Plan development is recommended:

- Title Sheet with Vicinity and Project Site Plan
- Legends and Abbreviations (may be included on Title Sheet)
- General Construction Notes (may be included on Title Sheet)
- Traffic Control Plan, if required
- Grading and Erosion & Sediment Control Plan (ESCP, if 1200-C or CN Permit is not needed)
- Grading and ESCP Details and Notes (ESCP, if 1200-C or CN Permit is not needed.)
- Overall Site Plan
- Composite Utility Site Plan
- Street Plan and Profile
- Storm Drain Plan and Profile
- Storm Water Facility Plan
- Water Plan and Profile
- Sanitary Sewer Plan and Profile
- Street Light Plan (may be included on composite utility plan)
- Signing and Striping Plan
- Typical Cross sections
- Typical Details
- Standard Drawings

201.04 REQUIRED PLAN INFORMATION

201.04.A TITLE SHEET

1. All projects shall include a title sheet. This requirement may be waved if the project consists of only one plan sheet. If a title sheet is not used for a single sheet project, a vicinity map must be included on the single sheet. One title sheet may be used when constructing more than one facility (sewer, storm drain, etc.); however, all requirements for the title sheet must be met. The following information shall be included on all title sheets:

    - Vicinity Map to a scale of not less than 1" = 800' showing the project location.
    - Project Site Map of the entire project, showing street right-of-way and/or subdivision layout to a scale of not less than 1" = 100'. A smaller scale may be used on large projects upon approval of the City Engineer. The site map shall be a composite plan showing all complete properties to be served by the improvements and properties adjacent to and within 100-feet of those served. A North arrow shall be included on the title sheet and shall be oriented to the top of the sheet.
    - Design Engineer's name, address, and phone number.
    - Owner and Developer's name, address, and phone number for privately financed public improvements.
    - Index of Drawings.
    - Complete legends and abbreviations (may be a separate sheet).
    - Permanent bench marks including their descriptions (may be on the Overall Site Plan).
    - Standard construction notes and special notes relating to construction methods (may be a separate sheet(s)).

- A statement referencing the City of Stayton Standard Construction Specifications.
- Contact phone number for all affected utility companies and pertinent City personnel.
- Utility locate information and call number.
- Tax lot numbers or lot and block designations.
- "APPROVED FOR CONSTRUCTION" standard approval block (see below).

APPROVED FOR CONSTRUCTION

_____ _____

City Engineer or authorized representative **Date**

These Plans are approved for construction subject to the required revisions, if any, as noted. Design and construction shall be in conformance with the City of Stayton Public Works Standards, the Stayton Municipal Code, and applicable State and Federal regulations. City approval of these Plans does not relieve the Engineer of Record of responsibility for the design or the Contractor from any obligation to perform the work in strict compliance with applicable permits, codes, and regulations.

201.04.B PLAN AND PROFILE SHEETS

1. PLAN SHEETS

a. Plan sheets shall be laid out and organized in a fashion that facilitates easy plan reading and interpretation. Other than for the composite utility plan, all proposed utility improvements shall be laid out on individual plan sheets. For example, street, sewer, water, and storm drain plans shall each be on their own designated plan sheet. Do not combine utilities and street plans on the same plan sheet unless otherwise directed by the City Engineer. Where approved, storm drain improvements associated directly with street improvements can be combined on the street plan sheets.

b. Plan sheets shall show all existing improvements within the boundary of the project and within 250-feet of the terminus of the proposed improvements that can be extended. Items that should be included are:

1) *Natural Features* – Identify all relevant features, including ditches, swales, channels, streams, trees, etc. All trees with 8-inch and larger diameters shall be shown on the plans. The plan shall identify the location, caliper, and species of the tree and shall indicate if the tree is proposed to remain or to be removed. Existing and proposed topography contours shall cover the entire site and, whenever practicable, a minimum of 50-feet beyond the site boundary. Existing topography should be screened.

a) Topography contour intervals shall be shown at the following maximum intervals. Alternative intervals may be used with prior approval of the City Engineer.

- 1-foot, for slopes less then 10%.
- 2-foot, for slopes between 10% and 40%.
- 5-foot, for slopes greater than 40%.

b) At the Design Engineer's discretion, contours may be partially removed or clipped out as necessary to keep the drawing clear and uncluttered.

c) Recommended indexing of contours shall be as follows:

Contour Interval	Indexed Interval
1’	5’
2’	10’
10’	50’
20’	100’

d) Contour cross sections are generally to be created with the same vertical and horizontal scale factors. Grid spacing is to be developed such that grid lines appear every 0.25-inch in the horizontal direction with labels every 0.5-inch. Vertical grid spacing may be as often as necessary to convey the needed information.

2) *Transportation Improvements* – Show all existing edge of pavement/curbs, bridges, alleys, driveways, and sidewalks that are adjacent to or abutting the project. Include the location of curb cuts and wheel chair ramps. Show all lights, signs, signals, signal loops, boxes, etc. Show all railroad lines and crossings. Show existing slopes and grades of improvements.

3) *Public Utilities* – Show all water, sewer, and storm drain lines, including service laterals. Identify manholes, drainage inlets and outlets, valve and meter locations, hydrant locations, and all other appurtenances. Indicate elevations of each feature at match points with the appropriate slope, grade, or direction of flow indicated. Abandoned utilities shall also be shown where known.

4) *Franchise Utilities* – Show franchise utilities, including underground and overhead lines, vaults, poles, and all appurtenances, located within or adjacent to the project, or that would be affected by the project.

5) *Private Improvements* – Show all property and right-of-way lines, easements, and found survey monuments. Show all relevant existing improvements within or adjacent to the project, such as railroads, private streets and walks, landscaping, fences, walls, trees, buildings or structures, wells, private utility lines and appurtenances, and any other existing feature that would impact or be impacted by the project.

6) *Hydrology* – Location of water courses, streams, ditches, and swales that will be impacted or affected by the project. All water course crossings must show the 100-year floodplains.

NOTE: The Design Engineer shall perform field investigations to determine the most accurate depiction of existing utilities. This shall be done to assure the project can be built as designed and to prevent potential conflicts that will significantly alter the construction of the improvements from the approved plans. City as-built drawings are only to be used as aids to the Design Engineer when field verifying the existing facilities.

2. PROFILES

   a. Profiles for the improvements shall be to the same horizontal scale on the same sheet and drawn immediately below the corresponding plan view, and shall be required in the following instances:

      1) All street, water, sewer, and storm drain improvements. Profiles shall show all utility, railroad, and culvert crossings, ditch or stream crossings (with elevations of the ditch or stream bed), the 100-year flood elevation profile and casing details.

201.04.C EROSION AND SEDIMENT CONTROL PLANS

1. Erosion and sediment control measures are required by the City for all developments, regardless of project size, and shall be shown in the submitted plan review sets. Construction projects which disturb one or more acres of land through clearing, grading, excavating, or stockpiling of fill material, or less than one acre that is part of a larger common plan of development or sale that ultimately disturbs one acre or more is required to obtain a DEQ NPDES 1200-C or CN permit. A DEQ approved 1200-C or CN permit will be required to be submitted to the City prior to final plan approval.

2. Construction projects anticipating construction activity between October 1st and May 31st (Wet Weather Construction Season) will be required to submit a plan addressing "wet weather" measures as outlined in the ODOT Erosion Control Manual. Construction activity is assumed as "active" until permanent vegetation and/or erosion protection is established.

3. The plan shall include existing contours, location of erosion control facilities (e.g., silt fence, straw mulch, sediment ponds, etc.); inlet and outlet structures (e.g., catch basins, culverts, creeks, etc.); and existing public and private utilities.

4. See Section 611 for erosion and sediment control plan requirements.

201.04.D ADDITIONAL PLAN REQUIREMENTS

In addition to the standard information that must be provided on all plans, there are some specific information and guidelines required on plans for each type of improvement.

1. STREET IMPROVEMENTS

   - Standard cross section with structural sections for each street. Cross sections shall extend a minimum of 2-feet beyond the existing or proposed right-of-way. In steeper areas, cross sections shall be shown to catch points. Cross sections shall be developed for all areas where improvement dimensions are different and for all locations where the adjacent property's topography changes.
   - Dimensions shall be shown on each plan sheet indicating right-of-way width, street width, distance from centerline to face of curb, width of the landscape strip, and sidewalk width.
   - Show the construction centerline for each street, with stationing labeled at 50-foot intervals, beginning and ending points, centerline intersections, and changes in horizontal alignment. The future horizontal alignment of dead-end streets shall be shown 250-feet beyond the proposed termination point. Stationing shall be established so that stationing is a positive number (no negative stationing).

- For each horizontal curve, show stationing labels for Point of Curvature (PC), Point of Reverse Curvature (PRC), and Point of Tangency (PT). In a table on the plan sheet, show the centerline curve data including the tangent length, curve length, long chord distance, delta angle, and centerline radius distance.
- Show face of curb alignment throughout the project, labeling alignment changes with street stationing. The beginning or end of curb returns at intersections shall be labeled with the appropriate street station, with curb return data listed in a table on the plan sheet. The table shall show the total length of the return, delta angle, curb radius distance, and elevations of the beginning, 1/4-delta, 1/2-delta, 3/4-delta, and end of the return.
- The profile information for each street design shall be to the same horizontal scale, on the same plan sheet, and drawn immediately below the corresponding plan view. The profile grid shall clearly show elevations along the left and right sides of the grid and label stations every 50-feet along either the top or bottom of the grid.
- Show the existing ground and finish grade profiles at the top face of curb (or at edge of pavement if curb is not being constructed), road centerline, and right of way line (light lined). The proposed future vertical alignment of dead-end streets shall be shown 250-feet beyond the proposed termination point, and the vertical alignment of existing side streets shall be shown at least 40-feet beyond the curb return. This is to insure that the street grade is set low enough to enable the adjacent properties to drain to the street. On each plan sheet, the street and curb grades shall be labeled on the profile for each tangent section near grade breaks or vertical transitions.
- For each vertical curve, label the station and elevation for the Vertical Point of Curvature and Vertical Point of Tangency on the profile. At a convenient location on the profile, list the station and elevation for the Vertical Point of Intersection, Turning Point, and length of the vertical curve.

2. WATER SYSTEM IMPROVEMENTS

- Detailed Plans shall be included for all water system appurtenances and connections to existing water lines. Type and connection configuration of all proposed fittings, valves, and appurtenances. All connection and detail information shall be shown on the plan view and not the profile view.
- Type of material and class of pipe between fittings.
- Type and location of internal restraint where required. Pipe with internal restraint shall be shown as a heavier/different line type than pipe without internal restraint.
- Backfill material of the trench.
- All water system components not specifically covered by the Standard Drawings shall be identified on the construction plans. Components shall be identified as to type and connection configuration, i.e. flange, mechanical joint, etc.

3. SANITARY SEWER IMPROVEMENTS

- Type of material and class of pipe between manholes.
- Backfill material of the trench.
- Invert elevations, direction, and diameter of all pipes at manholes.
- Rim elevations of all manholes (and ground elevation if different than rim elevation).
- Pipe slopes.
- Pipe full-flow capacity and velocity.
- All sewer system components not specifically covered by the Standard Drawings shall be identified on the construction plans.

4. STORM DRAIN IMPROVEMENTS

- All areas improved or unimproved lying upstream and draining to or through the proposed development.
- Show contours at a minimum of 2-feet contour intervals, or as approved by the City Engineer with the location of existing buildings, structures, and public and private utilities on the property. Slopes over 10% may use 5-foot intervals; extend contours a minimum of 100-feet beyond property.
- Locations of all subsurface water outlets (e.g., springs).
- Location of any existing building, structure, or parking lot on adjacent property that is within 15-feet of a proposed public drainage facility.
- Arrows indicating drainage direction in all public and private property and for all hydraulic conveyance systems. Identify the route used in determining the post-developed time of concentration.
- Type of material and class of pipe between manholes and inlets.
- Backfill material of the trench.
- Invert elevations, direction, and diameter of all pipes at manholes.
- Rim elevations of all manholes (and ground elevation if different than rim elevation).
- Pipe slopes.
- Pipe full-flow capacity and velocity.
- Inlet and outlet details, including grate details.
- All storm drain system components not specifically covered by the Standard Drawings shall be identified on the construction plans.

5. EROSION CONTROL/GRADING PLANS

- Proposed full erosion control plan including, sediment fences, interceptor ditches (channels), velocity check dams, matting, areas of proposed reseeding, and any other proposed erosion control measures and details. All erosion control plans shall comply with the ODOT Erosion Control Manual for projects smaller than one acre and DEQ 1200-C or CN permit requirements for larger projects.
- Location of all existing drainage facilities and water courses, including wetlands and floodplain areas.
- Location of proposed drainage facilities that transport surface water across or from the site; including, artificial channels, under drain pipes, and culverts.
- Boundaries of all areas that will be paved or otherwise altered, in a manner that will increase surface water runoff and boundaries of all areas to remain in an existing or natural condition.
- Open channel invert and top of bank slopes. High and mean water surface elevations shall also be shown on the plans where appropriate. Cross sections shall be shown for each section of open channel. The cross sections shall have invert, top of bank, high, and mean water surface elevations labeled on them.
- Identify Cut/fill areas; structural fill placement areas; erosion prevention and sedimentation control methods; reseeding areas
- Show contours at a minimum of 2-feet contour intervals, or as approved by the City Engineer with the location of existing buildings, structures, and public and private utilities on the property. Slopes over 10% may use 5-foot intervals; extend contours a minimum of 100-feet beyond property.
- Identify the direction of flow for all ditches and creeks and water surface elevations.
- Identify drainage direction and drainage basin boundaries.
- Provide cross sections or profile plans to show existing and final grading.

201.05 PARTIAL PLANS, SECTIONS, AND DETAILS

201.05.A PARTIAL PLANS

1. Plans that do not show entire structure, areas, or the like, shall be titled "Partial Plan." Do not abbreviate "Partial."

2. Plans shown within a structure shall have the elevation as part of the title. Such a title would read: "PLAN AT ELEVATION 94.00." The elevation indicated shall be the high-point elevations of the bottom slab.

201.05.B SECTIONS

1. Sections shall be called out alphabetically within a series of drawings, with the section letter used only for one section in that series. When the sections are so numerous that the alphabet is used up, start with AA, AB, AC, etc. The letters I, O, or Q should not be used.

2. Section cuts and the views they indicate may be shown either on the same drawing or on a different drawing. If a drawing shows only sections, details, and so on, sections take precedence, and are shown in sequential order from the drawings top left corner.

3. Show a section cut on the drawing with a cutting-plane line terminating at both ends. Where space is limited, use an arrowhead on one end. In the balloon's top half, enter the sequential cutting plane letter for that drawing; in the bottom half, the sheet number where the section drawing appears.

201.05.C DETAILS

1. Details shall be called out numerically within a series of drawings, with the detail number used only for one detail in that series. Call out a detail with a sequential number, slash, and drawing reference. Drawing number(s) use the same format as for section balloons, but use sequential number in the top half. As with sections, details may be shown on the same drawing or different drawings depending on their size.

201.06 TITLE BLOCKS

201.06.A Standard title blocks shall be used unless otherwise specified. The preferred location for the title block is vertically on the right-hand side of the drawing.

201.06.B Upon creation or revision of a drawing, the information/attributes inserted into the title block of the drawing shall be revised. All information relevant to finding the file, plotting the file, and dating the plot shall be listed in the appropriate portion of the title block.

201.06.C Regardless of the title block location and or size, the title block shall contain the following at a minimum:

- Date, time, and file name.
- Sheet title.
- Owner and Project name.
- Design Engineer's contact information – name, address, telephone numbers, e-mail address, logo, etc.
- Design Engineer's stamp and signature.

- ❖ Review stamp (if applicable) - When plans are submitted to the City for review and comment, the plans shall be clearly marked "PRELIMINARY or NOT FOR CONSTRUCTION" over the engineering stamp and signature.
- ❖ Date of last edit of drawing.
- ❖ Revision block including area for revision number, description, date, and name.

201.07 PLAN SCALES

201.07.A All construction plans are to have the scale clearly indicated. When the drawing contains only one (1) view, detail, or section, the scale is to be noted prominently on the drawing. When the drawing contains multiple views, and/or details, and/or sections, the scale is to be noted as part of each individual component's title. When all views and/or details and/or sections on a single drawing are the same scale, the scale should be noted in the appropriate space on the drawing.

201.07.B The preferred scale for plan and profile drawings shall be 1" = 20'. However, scale must be selected with the following requirements in mind:

1. Maintain clarity when notes and dimensions are added to the drawings.

2. Maintain legibility when drawings are reduced to half size.

3. The use of distorted scales (different horizontal and vertical scales) is acceptable for profile drawings. For example, for plan and profile views, the vertical and horizontal scales should have a 1:10 ratio where possible. That is, if the vertical scale is 1-inch = 2-feet, then the horizontal scale should be 1-inch = 20-feet. Similarly, a 1-inch = 10-feet vertical scale would correspond to a 1-inch = 100-feet horizontal scale, and so on.

201.07.C A graphic scale is required on all drawings, maps and graphics. The graphic scale shall be 2-inches long on ANSI D-sized sheets and 1-inch long on ANSI B-sized sheets. It shall have a minimum of three (3) labels, with the leftmost label being zero (0) and the middle and rightmost labels displaying the appropriate distances respectively.

201.08 ORIENTATION

201.08.A General plans such as maps and site plans must always include a north arrow. If possible the north arrow should point to the top on all drawings. However, the north arrow should be oriented to allow project stationing to increase from left to right and from bottom to top of page. However, North should not be oriented to the bottom of the page.

201.08.B North arrow locations on construction plans are preferred in the upper right or left corner. Exceptions may be made, but consistency should be maintained throughout the drawing set.

201.08.C For ANSI B-size, the size of the North arrow should be 1.0-inch from top to bottom. For D-size drawings, the size of the North arrow should be 2-inches from top to bottom.

201.09 TEXT

201.09.A All text shall be legible on full- and half-sized plans.

201.09.B Uppercase lettering shall be used for all text.

201.09.C Whenever text and linework conflict, the text should be relocated if possible. If this is not possible, the linework can be broken at the drafter's discretion.

201.09.D For mapping projects, the drafting standards shall be applied wherever possible unless specific presentation needs require the use of special fonts. The use of special fonts should be minimized and font sizes, placement, and location should be consistent throughout the project. Arial font is recommended.

201.10 DIMENSIONS

201.10.A Dimensions less than 12-inches shall be shown as inches with an inch label (i.e., 11"). Dimensions 12-inches and larger shall be shown in feet and tenths of feet. Decimal fractions shall be rounded off to the nearest hundredth. Horizontal dimensions shall be shown on plan views only unless used on other views when needed for clarity. Vertical dimensions shall be shown on sections, elevations, and details only unless used on other views when needed for clarity. Dimensional repetition shall be avoided.

201.10.B Dimensions referring to structure size, wall thickness, wall penetrations, and the like shall be shown on structural drawings only, unless required on other drawings for clarity. Dimensions locating equipment, clearance between equipment or between piping shall be shown on mechanical drawings only.

201.10.C Dimensions shall be set as follows:

- All dimensions and leader lines shall use arrows 0.125-inch long.
- All text shall be centered above the dimension.
- All dimensions shall force interior lines.
- Text shall be parallel with the dimension line.

201.11 LEADER LINES

201.11.A Avoid leader lines that are the following:

- Horizontal or vertical.
- At the same angle as cross-hatching.
- At very small angles to the terminating surface.
- Parallel to extension or dimension lines.
- Curved.
- Crossed.
- Too long.

201.11.B Crossing dimensions and leaders are generally to be avoided. When necessary, the leader lines are to be broken so that the lines will not physically cross on the paper.

201.12 USE OF ABBREVIATIONS

201.12.A Abbreviations shall be used only when enough room is not available to spell out the word. Any abbreviations used on the drawing shall be defined on the cover sheet of the plans. If there is any question as to the meaning of an abbreviation, spell out the entire word.

201.12.B Standard abbreviations to be used for different pipe types are as follows:

- ABS – Acrylonitryle Butadiene Styrene
- ACP – Asbestos Cement Pipe

- CIP – Cast Iron Pipe
- CLDI – Cement Lined Ductile Iron
- CMP – Corrugated Metal
- CONC – Concrete
- DI – Ductile Iron
- GALV – Galvanized
- HDPE – High Density Polyethylene
- NCP – Non-Reinforced Concrete
- ODDW – Steel, Outside Diameter, Dipped and Wrapped
- PVC – Polyvinyl Chloride
- RCP – Reinforced Concrete Pipe
- STL – Steel
- VCP – Vitrified Clay Pipe

202 RECORD DRAWING DEVELOPMENT REQUIREMENTS

202.01 GENERAL

202.01.A All Record Drawing construction plans shall be submitted as specified in Subsection 109.24 of the Standard Construction Specifications. For all public works improvements the Design Engineer shall submit certified as-built drawings for all plans that were approved for construction within three (3) months of the completion of construction. For privately financed public improvements, submission of Record Drawings is required prior to final acceptance.

202.01.B All final Record Drawings shall be submitted to scale on full-size 22" x 34" high quality bond paper or 4-mil Mylar, unless approved otherwise. Drawings shall be drawn such that reduction of plans from full-size to half-size (11" x 17") can be done and maintain a true scale on the half-sized plans.

202.01.C All final Record Drawings shall be submitted to the City with the reproducible Record Drawings, a compact disc (CD) containing electronic PDFs and cad files (AutoCAD, Civil 3D or other as approved) of all public improvements constructed during and in conjunction with the project. Use only standard AutoCAD compatible line types, fonts, and shapes. If the City encounters significant problems during reproduction, the drawing shall not be accepted.

202.01.D If cross-references are used with a drawing, bind all cross-references before submission. The City will not accept drawings without proper cross-references. Purge all invisible drawing objects before submission.

202.01.E Media files submitted on the CD shall be clearly labeled with City project number, project name, file name and extension(s), AutoCAD version, and date.

202.01.F Submit information required to reproduce a hard copy from the electronic file. The electronic copy and the hard copy shall be identical with the exception of the original signature on the Design Engineer's stamp.

202.01.G Record Drawings shall accurately represent as-built construction and shall be graphically and mathematically correct, i.e., drawing shall represent changes in dimensioning during construction. Record Drawings shall be drafted in the same manner as the original plans with clear indication of all modifications (strike out old with new added beside). Actual location and depth from finish grade of any other utilities encountered during construction shall be shown and noted on both plan and profile of the Record Drawings.

202.01.H Record Drawings shall include all private and public easement information.

202.01.I The words "Record Drawing" or "As-built Drawing" shall appear as the last entry in the revision block along with the month, day, and year the Record Drawing was prepared.

202.01.J When applicable, drawing content shall include information needed to update City inventories and databases information.

202.02 REQUIRED RECORD DRAWING INFORMATION

202.02.A STREETS

1. The following minimum information shall be noted on street Record Drawings:
    - ❖ Change in horizontal alignment, curve data, and stationing of primary control points (e.g., PC, PI, PT, PRC).
    - ❖ Vertical curve or grade changes; change in location of low point in sag vertical curve.
    - ❖ Change to approved thickness for street structural section components. Show station limits where changes in structural section have occurred.
    - ❖ Change to driveway locations or widths.
    - ❖ Provide complete test results to the City Engineer.
    - ❖ Other change altering the approved plans.

202.02.B WATER

1. The following minimum information shall be noted on water Record Drawings:
    - ❖ Station and/or property line/corner to valves (not at standard location), all fittings, blow-offs, and dead-ended lines.
    - ❖ All changes from standard 36-inch depth cover; limits shall be shown on plan with annotated reason for change; actual pipe elevation (top of pipe) will be taken at every fitting that is not at standard cover.
    - ❖ Show alignment changes, grade changes, and changes in construction materials; if changed alignment results in station changes, a station equation shall be shown as appropriate at a fitting.
    - ❖ Provide manufacturer of all valves; identify types of fittings (e.g., MJ x MJ, FLG x MJ, etc.); provide information in the form of an inventory list on construction drawings.
    - ❖ Other change altering the approved plans.
    - ❖ Provide design calculations and complete test results to the City Engineer.
    - ❖ Actual location and depth, from finish grade of street, of any other utilities encountered during construction.

202.02.C SANITARY SEWERS

1. The following minimum information shall be noted on sanitary sewer Record Drawings:
    - ❖ Station of wye or tee into main line; tie end of service lateral to nearest property corner at right-of-way line and distance back from the face of curb.
    - ❖ Depth at the end of service lateral measured from existing ground to invert of pipe; invert elevations shall be noted.
    - ❖ Length of service lateral measured from centerline of sewer main to end of pipe.
    - ❖ Show alignment changes, grade changes, and changes in construction materials; if changed alignment results in station changes, a station equation shall be shown as appropriate at a manhole.

- ❖ Depth at the manholes measured from existing ground to invert of pipe; invert elevations shall be noted.
- ❖ Type of pipe, backfill material, and location.
- ❖ Provide complete test results to the City Engineer.
- ❖ Other change altering the approved plans.

202.02.D STORM DRAINS AND STORM WATER FACILITIES

1. The following minimum information shall be noted on storm drain and storm water facility Record Drawings:

   - ❖ Station of connection into main line; tie end of branch line to nearest property corner at right-of-way line and distance back from the face of curb.
   - ❖ Show alignment changes, grade changes, and changes in construction materials; if changed alignment results in station changes, a station equation shall be shown as appropriate at a manhole.
   - ❖ Type of pipe, backfill material, and location.
   - ❖ Provide complete test results to the City Engineer.
   - ❖ Other change altering the approved plans.

END OF DIVISION

DIVISION 3 – STREETS AND ALLEYS

DIVISION 3

STREETS AND ALLEYS

301 GENERAL

301.01 AUTHORITY AND PURPOSE

301.01.A These Design Standards shall apply to all improvements within existing and proposed public right-of-way and public easements, to all improvements to be maintained by the City, and to all improvements for which the City Code requires approval by the City. Most of the elements contained in these Design Standards are public works oriented and it is intended that they apply to both publicly financed public improvements under City contract and privately financed public improvements.

301.01.B Private construction firms, Developers, consulting engineers, or any other individuals or business entities engaged in the design and construction of improvement projects that ultimately will be owned, operated, or maintained by the City shall comply with these standards. Where minimum values are stated, greater values should be used whenever practical; where maximum values are stated, lesser values should be used whenever practical.

301.01.C The purpose of these Design Standards is to provide a consistent policy under which certain physical aspects of public improvements shall be implemented. All public system improvements and public works facilities shall be designed and constructed in accordance with applicable rules and regulations of the City and any City interpretations of those rules and regulations, including applicable technical guidance manuals, and in accordance with applicable federal, state, and local statutes and rules. Approval of public improvements must be made by the City Engineer or the Public Works Director before construction is permitted. An authorized representative of the City will be available for construction observation during construction of the project.

301.01.D It is important to emphasize that these Design Standards are not intended to inappropriately restrict or constrain the originality or innovativeness of the Design Engineer and his or her ability to exercise and apply professional judgment to each situation and project. The City recognizes that every public improvement project has unique characteristics and situations. These Design Standards cannot provide for all situations and are intended to assist, but not to serve as a substitute for competent work by design professionals. It is expected that the Design Engineer will bring to each project the standard of care from the Design Engineer's respective discipline.

301.01.E If the Design Engineer anticipates challenges in meeting these Design Standards, they should contact the City Engineer prior to extensive design efforts. The City Engineer will seek to work with each designer to achieve a satisfactory design and construction project that is in the best long-term interests of the City of Stayton and one that complies with applicable rules and regulations.

301.01.F These Design Standards are not intended to limit any innovative or creative effort which could result in better quality, better cost savings, or both. Any proposed departure from the Design Standards will be judged; however, on the likelihood that such variance will produce a comparable result, or long-term benefit to the City, while meeting the intended purpose of the design standard.

301.01.G Requests for alternatives to these Design Standards will be considered for approval by the City Engineer as the need arises and conditions warrant modification. Request must show that the variance meets the intent of the Design Standards and will not compromise safety, impact other properties or cause an increase in maintenance. This consideration will be on a case-by-case basis and require sufficient justification prior to approval. All requests will be in writing and be accompanied by engineered drawings and final design calculations.

301.01.H All franchise utility improvements, including telephone, electrical power, gas and cable TV shall meet the current standards of the appropriate agency as well as City Standards.

301.01.I In the case of conflicts between the text of these Design Standards and the Standard Drawings, or between the provisions of these Design Standards and the Standard Construction Specifications, the more stringent as determined by the City Engineer shall apply.

301.01.J All surveys for public works facilities shall be performed under the direction of a Professional Land Surveyor registered in the State of Oregon. All elevations shall be referenced to NAVD 88 vertical datum. Vertical benchmark locations shall be coordinated with the City.

301.01.K On completion of projects to become public works, the Design Engineer shall submit one complete set of reproducible "Record Drawings" (As-Builts), a compact disc (CD) containing electronic PDFs and cad files (AutoCAD/Civil 3D or others as approved) to the City Engineer. The drawings shall show any deviations from the original construction drawings and shall include sufficient information to accurately locate public works facilities. No bond will be released until the City Engineer receives and approves an acceptable set of reproducible Record Drawings from the Design Engineer, with his/her stamp of certification.

301.01.L For privately financed public improvements, the Design Engineer, at the completion of construction, shall submit a completion certificate to the City stating that all work has been completed in accordance with the approved project plans and specifications.

301.01.M Before the City accepts a public works project for operation and maintenance and releases the Performance Bond, a one (1) year Warranty Bond on all materials and workmanship incorporated in the project shall be provided to the City.

301.01.N The objective of these Design Standards is to develop a street system that will:

- Be consistent with the Stayton Municipal Code (SMC), Standard Construction Specifications, and applicable state and federal regulations and requirements.
- Be of adequate design to safely manage the volumes of vehicles anticipated using the improvements.
- Provide points of connection for streets by adjacent future development.
- Prevent the capacity of transportation facilities from being exceeded.
- Provide transportation improvements that meet the long-term needs for quality streets.
- Maintain or improve overall transportation quality.
- Be designed in a manner to allow economical future maintenance.
- Be designed using materials to insure a minimum practical design life of twenty (20) years.

301.02 APPLICABILITY

301.02.A These Design Standards will govern the design of all public street and alley improvements in the City of Stayton and applicable work within its service areas. This document will be routinely referred to as the Design Standards.

301.02.B Street improvements shall be provided for all property improvements within the City of Stayton per these Design Standards for the following types of development:

- ❖ Partitions and Subdivisions.
- ❖ Construction or reconstruction of public and private roadways and temporary detours.

301.03 REFERENCES

301.03.A These Design Standards are intended to be consistent with the most current provisions of the documents and requirements listed and referenced in Subsection 101.03 and others specifically listed below. Projects are expected to be consistent with the following:

1. Applicable design criteria and concepts consistent with the most recent Transportation System Plan adopted by the City of Stayton unless more restrictive criteria are identified herein. Where additional detailed information and background is required for a particular project, the Transportation System Plan shall be referred and adhered to, as applicable. Any deviations from the Transportation System Plan shall be flagged and presented to the City Engineer for consideration.

2. Applicable design guidelines published by the American Society of Civil Engineers.

3. Applicable design guidelines published by the Federal Highway Administration.

4. Applicable design guidelines published by the Oregon Department of Transportation.

301.04 SPECIAL DESIGN APPLICATIONS

301.04.A Special design applications not covered in these Design Standards require review and approval by the City. Submittal of full design calculations, supplemental drawings, and information will be required prior to any approval.

301.04.B Such design applications requiring special review and approval include, but are not limited to, the following:

- ❖ Bridges
- ❖ Roundabouts/Traffic Calming
- ❖ Traffic Signals
- ❖ Electrical/Control/Telemetry Devices

301.05 STANDARD CONSTRUCTION SPECIFICATIONS AND STANDARD DRAWINGS

301.05.A Except as otherwise provided by these Design Standards, all construction design detail, workmanship, and materials shall be in accordance with the current edition of the City of Stayton Public Works Standard Construction Specifications and Standard Drawings.

301.06 CITY POLICY REGARDING ENGINEERING

301.06.A It will be the policy of the City to require compliance with Oregon Revised Statute 672 for Professional Engineers.

301.06.B Engineering plans, reports, or documents shall be prepared by a registered Professional Engineer or by a subordinate employee under the Design Engineer's direction, and shall be signed by the Design Engineer and stamped with the Design Engineer's seal to indicate responsibility for them. The Design Engineer shall maintain complete responsibility for the design of the project. The Design Engineer shall review any proposed public facility extension, modification, or other change with the City prior to engineering or other proposed design work to determine if there are any special requirements or whether the proposal is permissible.

301.06.C City approval of plans or any other engineering document produced by the Design Engineer does not in any way relieve the Design Engineer of responsibility for the design, or their responsibility to meet applicable City, County, State, and Federal requirements, or their obligation to protect life, health, and property of the public. The plan for any project shall be revised or supplemented at any time it is determined that the project requirements have not been met. It is also required that at any time a revision to the design is required; the Design Engineer shall maintain responsibility to redesign according to these Design Standards per the City's approval. It is therefore necessary for the Design Engineer to be available during construction should timely changes be required. If the Engineer of Record leaves the acting consulting firm then a new registered engineer will have to submit an updated Engineer of Record form to the City prior to work commencing.

301.07 CONVENTIONS USED THROUGHOUT THE DESIGN STANDARDS

301.07.A See Subsection 101.07 for conventions used throughout these Design Standards.

301.08 ORGANIZATION AND CLASSIFICATION OF DIVISIONS

301.08.A See Subsection 101.08 for the organization and classification of divisions throughout these Design Standards.

301.09 CLARIFICATIONS, MODIFICATIONS, AND REVISIONS TO DESIGN STANDARDS

301.09.A These Design Standards will be periodically updated due to changes in policy or procedures, new technology, and methods of design and construction. Periodic revisions to these Design Standards will be necessary to maintain consistency in that regard. The date appearing on the title page is the date of the latest revision for each Division. Parenthetical notations at the bottom of each page indicate the most recent change. It will be the user's responsibility to obtain and maintain his/her copy of these Design Standards with the latest changes.

301.09.B See Subsection 101.09 for general policies and procedures regarding clarifications, modifications, and revisions to the Design Standards.

301.10 DEFINITIONS AND TERMS

301.10.A See Subsection 101.10 for standard definitions and terms used throughout these Design Standards.

302 GENERAL DESIGN REQUIREMENTS

302.01 PERFORMANCE STANDARDS

302.01.A Street designs shall provide for the safe and efficient travel of motorist, bicyclists, and pedestrians. Streets shall be designed to carry the recommended traffic volumes identified for each street classification. Street classifications are set forth in the Transportation System Plan (TSP) and the Stayton Municipal Code (SMC). For general guidance, a table titled Geometric Design Requirements by Street Functional Classification is shown at the end of this Division.

302.01.B Designs shall conform to the Transportation System Plan, Fire District requirements, Standard Construction Specifications, Stayton Municipal Code, and all other applicable laws and regulations. Streets shall be designed to meet or exceed minimum guidelines set forth in the "AASHTO Policy on Geometric Design of Highways and Streets" (latest edition). Traffic Control Devices shall conform to the "Manual on Uniform Traffic Control Devices for Streets and Highways," Federal Highway Administration with Oregon Supplements, and Oregon Department of Transportation (latest edition).

302.01.C Vertical and horizontal curves shall meet the guidelines of the AASHTO policy and the design speed for each street classification. Where practical, the Design Engineer shall provide the decision sight distance for the design speed based on the methodology in AASHTO, or the stopping sight distance based on the 85 percent speed as set forth in the AASHTO policy, whichever is greater. Only with the approval of the City Engineer will a lesser sight distance be permitted.

302.02 TRANSPORTATION IMPACT ANALYSIS

302.02.A A transportation impact analysis (TIA) report, as determined by the type of development and its potential impact to existing street systems, shall comply with the requirements set forth in Stayton Municipal Code (SMC) 17.26 and as determined by the City Engineer and City Traffic Engineer. The report shall be prepared by a traffic engineer licensed in the State of Oregon. The TIA provides the City with an objective assessment of the anticipated modal transportation impacts associated with a specific land use action. The TIA answers important transportation-related questions for the City that are specific to the project such as:

1. Can the existing transportation system accommodate the proposed development from a capacity and safety standpoint?

2. What transportation system improvements are necessary to accommodate the proposed development?

3. How will access to the proposed development affect the traffic operations on the existing transportation system?

4. What transportation impacts will the proposed development have on the adjacent land uses, including commercial, institutional, and residential uses?

5. Will the proposed development meet current standards for roadway design?

302.02.B Cooperation between City staff, the applicant, and the applicant's traffic engineer is encouraged to provide an efficient and effective process.

302.02.C The City Engineer may require additional study components in a TIA beyond what is outlined in SMC 17.26.

302.02.D When a Transportation Assessment Letter (TAL) is Required. If a TIA is not required, the Developer's traffic engineer shall submit a transportation assessment letter to the City indicating the proposed land use action is exempt. This letter shall outline the trip-generating characteristics of the proposed land use and verify that the site-access driveways or roadways meet City of Stayton sight-distance requirements and roadway design standards.

302.02.E The City of Stayton assumes no liability for any costs or time delays (either direct or consequential) associated with the preparation and review of a TIA or TAL.

302.03 STREET IMPROVEMENT PLANS

302.03.A Complete plans and specifications for proposed street improvement projects, including any necessary public dedications and easements, shall be submitted to the City Engineer for review. Such plans and specifications must receive City Engineer approval prior to construction permit issuance and prior to beginning of construction. Engineering documents shall be prepared by a Professional Engineer registered and licensed in the State of Oregon.

302.03.B Engineering design plans drawn to scale, showing the existing and proposed streets, shall be submitted in accordance with Division 2 of these Design Standards.

302.04 STREET JURISDICTIONAL OVERSIGHT

302.04.A Street rights-of-way within the City of Stayton are a combination of State (ODOT), County (Marion), Local (City), and privately owned. For general guidance, a map titled Street Jurisdictional Oversight Map is attached at the end of this Division to assist Developers and Design Engineers during the planning level and preliminary stages of a particular development.

302.05 STREET FUNCTIONAL CLASSIFICATION, RIGHT-OF-WAY AND PAVEMENT WIDTHS

302.05.A Streets and alleys within the City shall be as classified in the Transportation System Plan including any amendments. For general guidance, a map titled Street Functional Classification Map is shown at the end of this Division. Right-of-way and pavement widths for each classification shall comply with the Geometric Design Requirements by Street Functional Classification table also shown at the end of this Division. The classification for any street and alley not listed will be that determined by the City Engineer.

302.05.B For streets designated as a Minor Collector and lower classification, the Design Engineer may consider design modifications to conserve major trees, as applicable, in the public right-of-way. Modifications will require approval of the City Engineer. Pavement width on a Minor Collector street may be reduced to no less than 34-feet, consisting of two (2) 10-foot travel lanes and two (2) 7-foot on-street parking lanes, as approved by the City Engineer.

302.05.C Right-of-way dedication at intersections shall be sufficient to at minimum provide 1-foot clearance behind sidewalks and handicap ramps.

302.06 STREET NAMES AND TRAFFIC CONTROL SIGNAGE

302.06.A Street names for new development must be approved by the City after consultation with emergency services, prior to recording of any maps or plats. Street names and building numbers shall conform to the established grid system(s) in the City. No new street name shall be used that will duplicate or be confused with the name of existing streets in the metropolitan area.

302.06.B New signage shall be installed by the Developer. A "signage and striping plan" shall be included with plan submittals for new street construction and approved by the City Engineer.

303 STREETS

303.01 STREET IMPROVEMENTS AND RIGHT-OF-WAY DEDICATIONS

303.01.A All street improvements and right-of-way dedications shall comply with the requirements of SMC Chapter 12.04, SMC Chapter 12.08, SMC Chapter 17.26, and the Stayton Transportation System Plan,

303.01.B Extent of Street Improvements (SMC Chapter 12.04.110)

1. If a street improvement is to be constructed on a new street and the owner also owns the property on the opposite side of the street, the owner shall improve the street for its entire width and extending at least the total frontage of the lot to be improved.

2. If the opposite side of the street of a lot to be improved is in different ownership, the street improvement shall be 3/4-street improvement, as defined in Section 303.02 “Partial-Width Street Improvements” below.

303.02 PARTIAL-WIDTH STREET IMPROVEMENTS

303.02.A Partial-width street improvements will be required where the street is unimproved along the frontage to be developed and/or where an existing street is substandard unless waived or deferred in accordance with SMC Chapter 12.04 by the Public Works Director. The required rightof-way and partial-width street improvements will be as determined by the City Engineer

303.02.B A development with frontage improvements required on an unimproved or substandard street, as determined by City Engineer, will be responsible for constructing a continuous (min 27-foot), 3/4-street improvement to a connection with the nearest standard (publicly-maintained) street. 3/4-streets will also be required when the abutting or opposite frontage property is undeveloped and the full improvement will be provided with development of the abutting or opposite (upon right-of-way dedication) frontage property.

303.02.C A development with frontage improvements required on an existing street that is determined by the City Engineer to be substandard will be responsible for constructing a continuous 1/2-street improvement, unless otherwise directed by the City Engineer. If a pavement design, including an analysis of the existing pavement section, indicates that the existing pavement is adequate to provide a minimum of twenty (20) years design life, then that pavement may remain (or be overlaid if required by City Engineer). Additional improvements such as curb and pavement widening will be required. If the existing pavement analysis indicates that the existing pavement is inadequate, then either a 1/2-street or 3/4-street full length pavement section replacement, as described above, will be required.

303.02.D Where a 3/4-street improvement is required, the right-of-way and pavement width will be determined by the City Engineer. The pavement width shall be at least 3/4 of the standard street classification width, but in no case will the pavement width be less than that required to provide two (2) lanes of traffic to pass at a safe distance. For a 34-foot local street, the 3/4-street pavement width shall be 27-feet. 3/4-street improvements shall be signed "No Parking" on the improved (curb) side of the street and, if necessary, the unimproved side of the street to provide a clear-traveled way of 20-feet.

303.02.E Designs for a 3/4-street improvement shall consider the entire future street improvement so that related facilities, grades, slopes, utility stub-outs, future curb inlets, future service lines, potential conflicts, and other issues will be identified. The 3/4-street improvement shall be designed so that future completion of the street and related facilities can be easily coordinated with the initial 3/4-street improvement and minimize damage to the street structure. Construction plans shall clearly show the paving limits for the 3/4-street improvement.

303.02.F If the curb and gutter on the side of the street not being constructed is anticipated to be at different grade than the curb and gutter that will be constructed, the construction plans shall clearly show the future curb and identify all items that are to be constructed by others in the future. The profile view will include the bottom of the ditch or swale constructed on the side without curb and gutter, and shall show all culverts, drain pipes, drainage inlets, and drainage outlets.

303.03 DEAD-END STREETS

303.03.A A standard cul-de-sac shall be provided at the end of a permanent dead-end street that does not provide looped circulation, unless directed otherwise by the City Engineer. Cul-de-sacs shall be limited to service no more than 250 ADT, shall not exceed 450-feet in length to the end of the bulb, and shall meet all Stayton Municipal Code requirements. The length of a cul-de-sac shall be measured from the right-of-way line of the adjacent street to the face of curb located at the furthest end of the cul-de-sac.

303.03.B Standard local residential street cul-de-sacs shall have a minimum right of way radius of 45 feet and have a 38-foot bulb radius to the face of curb. A 60' right-of-way with a bulb radius to face of curb as determined appropriate by the Design Engineer to accommodate anticipated truck turning radii (45-foot minimum), is required for all other street classifications. Parking will not be permitted within the cul-de-sac bulb or within the reverse curve transition areas. See the Standard Drawings.

303.03.C The use of a hammer-head turnaround in lieu of a cul-de-sac is not allowed for permanent dead-end streets, unless specifically approved by the City Engineer

303.03.D Temporary dead-end streets (that will be extended in the near future), where specifically approved by the City Engineer, less than or equal to 150 feet long, shall be terminated with proper signing and installation of a street barricade, as shown in the Standard Drawings. Temporary dead-end streets over 150 feet long are required to end with a cul-de-sac, unless approved otherwise by the City Engineer.

303.04 PRIVATE STREETS

303.04.A When private streets are allowed in development, such as for condominiums and apartments, the private streets shall be built to local residential street standards and meet all Stayton Municipal Code requirements. Private streets shall comply with the Fire Code for fire apparatus access requirements.

303.04.B A hammer-head turnaround shall be provided at the end of a private street that does not provide looped circulation. Hammer-head turnarounds that are less than or equal to 150 feet long shall consist of two rectangular turnouts directly opposite each other and oriented perpendicular to the street centerline, as shown in the Standard Drawings. Hammer-head turnarounds over 150 feet long shall meet the City and Fire District access, turn-out, and turnaround requirements. "NO PARKING" signs are required within the access and easement limits of the hammer-head turnaround area.

303.04.C A "PRIVATE STREET" sign and driveway approach shall be placed at the intersection with the public street to clearly identify the private street.

303.04.D Documents defining ownership, use rights, and allocation for liability for maintenance shall be submitted to the City prior to or in conjunction with final approval. The City will have no maintenance responsibilities for private streets.

303.04.E The City will not consider any requests for private streets to become a public street under City jurisdiction.

303.05 DESIGN SPEEDS

303.05.A Design considerations for all street geometrics shall be based on the minimum design speeds shown below for each street classification. Variance from these design speeds may be required based upon topography or other considerations. Variance from these design speeds will require approval of the City Engineer.

303.05.B Design speeds for the City street classifications shall be as follows:

Street Classification	Design Speed
Principal Arterial	Posted speed plus 10 mph (min 45 mph)
Minor Arterial	Posted speed plus 10 mph (min 35 mph)
Major Collector	Posted speed plus 10 mph (min 30 mph)
Minor Collector	Posted speed plus 5 mph (min 25 mph)
Local Street	Posted speed plus 5 mph (min 25 mph)
Alleys	15 mph

303.05.C Design speed is the maximum safe speed that can be maintained over a specified section of roadway when traffic, weather, and other conditions are so favorable that the design features of the roadway govern. The City Engineer may approve a lower alternative design speed where it can be shown that the 85th percentile speed of traffic will be lower than the design speed standard during all hours. The design speed is the minimum speed that shall be used in design of safe road geometry. The design speed shall not prohibit the use of traffic calming features or signing, where appropriate, to encourage lower traffic speeds.

303.06 SIGHT DISTANCE AND CLEARANCE AREAS

303.06.A GENERAL

1. Sight distance is unobstructed distance of roadway ahead visible to the driver. There are multiple types of sight distance that include stopping sight distance, passing sight distance, decision sight distance, and intersection sight distance. It is critical that sight distances be properly developed and applied to the design of projects.

2. Sight distance shall be checked when designing slopes and retaining walls or where median barriers, structure screening or screen plantings are used. Combinations of slight horizontal curvature with crest vertical curves may seriously diminish sight distance where high curb or planting is used. Slopes, walls, and other side obstructions shall be set back from the pavement edge to provide al least minimum stopping sight distance for a driver in the traffic lane nearest the obstruction. The possibility of future conversion of shoulders to driving lanes should be considered.

3. Intersections at grade shall be provided with at least minimum stopping sight distance and intersection sight distance for the design speed. Sufficient sight distance should be provided so that the entering vehicle may cross or make a turn without significant slowing of the through traffic.

4. Sight distances shall be designed in accordance with the most current version of the AASHTO "A Policy of Geometric Design of Highways and Streets" and the Stayton Municipal Code, Title 8 and Title 17.

303.06.B STOPPING SIGHT DISTANCE

1. It is the policy of the City of Stayton to have the Design Engineer evaluate safe stopping sight distances using the principles and methods recommended by AASHTO. This policy shall apply to the design of streets and driveways, and to the placement of any object in the public right-of-way, including landscaping features.

2. The minimum stopping sight distance shall be measured from a height of 3.5 feet to a target on the roadway nominally 6 inches in height.

3. The following table is for minimum stopping sight distances:

Design Speed (mph)	Minimum Stopping Sight Distance (Feet)
25	155
30	200
35	250
40	305
45	360
50	425

Source: *SMC, Table 17.26.020.4.b*

4. No modifications or exceptions will be allowed without approval of the City Engineer.

303.06.C INTERSECTION (AND DRIVEWAY) SIGHT DISTANCE

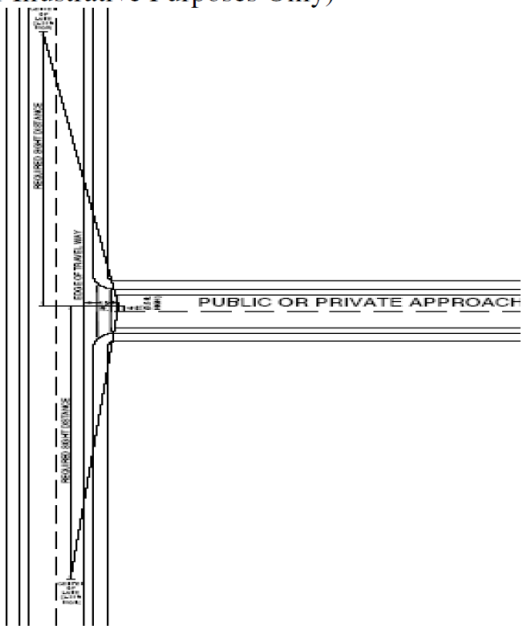
1. It is the policy of the City of Stayton to have the Design Engineer evaluate safe intersection sight distance using the principles and methods recommended by AASHTO. This policy shall apply to the design of streets and driveways, and to the placement of any object in the public right-of-way, including landscaping features.

2. Stayton Municipal Code (SMC 17.04) defines the sight distance triangle as the distance from an intersection of a public or private road to the nearest access connection, measured from the closest edge of the pavement of the intersecting road to the closest edge of the pavement of the connection along the traveled way.

3. The intersection and driveway sight distance is measured from an eye height of 3.5 feet above the controlled road at least 15 feet from the edge of the vehicle travel lane of the uncontrolled public road to an object height of 4.25 feet on the uncontrolled public road. For driveways along local access roads in urban and residential areas, the sight distance triangle is measured along the property lines of the street and along the driveway.

4. Uncontrolled intersections at local access roads in urban and rural residential areas shall have an unobstructed sight distance triangle of 30 feet along the property lines of both intersection approaches. Any vegetation within the sight distance triangle must be 24 inches in height or less. For driveways, the sight distance triangle along the driveway and property line adjacent to the public street shall be a minimum of 10 feet for each leg. Requirements regarding sight clearance areas in SMC 8.04.060 and SMC 8.04.130 shall also be met (SMC 17.26.020.4.d).

Sight Distance Triangle
(For Illustrative Purposes Only)



5. Sight distance shall be determined for each street approach to an intersection. A driver on the approach street should be able to see each vehicle on the intersecting street from the time that the vehicle is the sight distance from the intersection until the time that the vehicle reaches the intersection. Poles, trees, and similar obstructions will be allowed within the sight distance area only if it can be shown that such obstructions do not prevent the continuous view of the vehicle approaching on the intersecting street. See Subsection 303.06.D for Sight Clearance Areas.

6. In some locations, maintenance of the required sight distance may require restrictions to potential development outside the public right-of-way. If so, the Design Engineer shall demonstrate that adequate restrictions are in place (and enforceable by the City) to assure that the required sight distance can be maintained in the future.

7. The following table is for minimum intersection and driveway sight distances:

Design Speed (mph)	Minimum Intersection/Driveway Sight Distance (Feet)
20	200
25	250
30	300
35	350
40	400
45	450
50	500

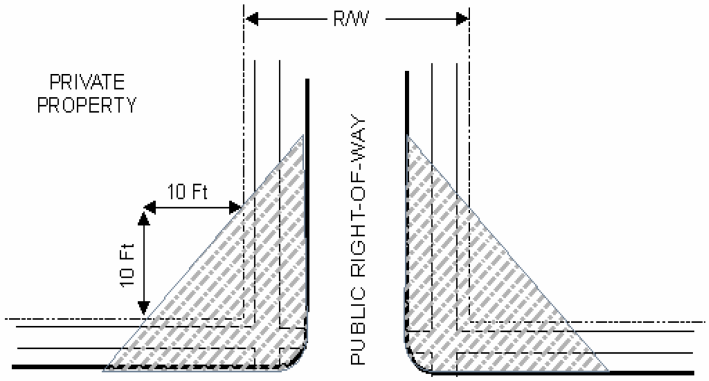
Source: *SMC, Table 17.26.020.4.c*

8. No modifications or exceptions will be allowed without approval of the City Engineer.

303.06.D SIGHT (VISION) CLEARANCE AREAS

1. Work within the public right-of-way and adjacent to public streets and multi-use paths shall not have fences, berms, walls, commercial signs, vehicles, hedges, off-street parking spaces, or other planting or structures erected, planted, placed, or maintained within a sight clearance area. If the relation of the surface of the lot to the streets is such that visibility is already obscured, nothing shall be done to reduce visibility within the sight clearance area.

2. The horizontal limits of the sight (vision) clearance area shall be a triangular area measuring 10 feet along the right-of-way or private access, as shown in the following diagram. The edge of the hard surfaced area of the private access, be it roadway, curb, or sidewalk, shall be treated as the right-of-way line in determining the sight (vision) clearance areas.



PUBLIC RIGHT-OF-WAY

3. The sight (vision) clearance areas shall not contain temporary or permanent obstructions to vision exceeding 24 inches in height above the curb level or street shoulder where there is no curb, except a supporting pillar or post not greater than 12 inches in diameter or 12 inches on the diagonal of a rectangular pillar or post; and further excepting utility poles and those posts, poles, tree trunks, street signs, street lights, and traffic control signs (SMC 8.04.060.3.b).

4. Sight (vision) clearance shall not be required at a height 7 feet or more above the curb level or 7 feet 6 inches above the shoulder of a street that does not have curbs (SMC 8.04.060.3.c).

5. No modifications or exceptions will be allowed without approval of the City Engineer.

303.07 HORIZONTAL DESIGN

303.07.A GENERAL

1. The horizontal design of streets shall produce a safe street network while also considering the need for creating livable neighborhoods. Consideration should be given to minimizing long tangent sections and other elements that might induce high speeds or other problems that may require mitigation in the future. Traffic calming measures shall be considered in the design of new streets and shall be incorporated, as required by the City Engineer.

2. Sharp horizontal curvature shall not be introduced at or near the top of a pronounced crest vertical curve. Similarly, sharp horizontal curvature shall not be introduced at or near the low point of a pronounced sag vertical curve.

303.07.B MINIMUM CURVE RADIUS

1. Horizontal curve radius (on centerline) for each street classification shall be designed according to the roadway design speed. The radius shall not be less than the following:

Design Speed (MPH)	Minimum Radius (Feet)
15	100
25	180
30	300
35	450
40	670
45	900

2. "Loop" roads and other traffic-calmed local roads that are designed to "self enforce", lower speeds may use centerline radius as low as 50-feet with the City Engineer's approval. Such roads shall be limited to low density, residential developments with a maximum number of fifty (50) dwelling units and five-hundred (500) ADT. Maximum distance between speed control points shall be 500-feet. Speed control points include horizontal curves of 50-feet to 100-feet, traffic circles, textured pavement sections, or other similar traffic calming devices. Use of speed bumps is discouraged.

303.07.C TAPER AND TRANSITION RATES

1. Criteria listed below shall be used to determine the minimum taper length to increase lane width, create a new lane, or transition traffic lanes laterally. The City Engineer may require a longer taper length. Tapers in traffic calming improvements may be shorter in order to meet traffic calming goals.

Type of Taper	40 mph or less	45 mph or greater
Merging Taper	$\frac{WS^2}{60}$	WS
Shifting Taper	$\frac{WS^2}{120}$	$\frac{WS}{2}$

Where, W = Width of offset in feet.
S = Posted speed limit or anticipated speed in mph.

303.07.D INTERSECTIONS

1. GENERAL

   a. Connecting street intersections shall be located to provide for traffic flow, safety, and turning movements as conditions warrant. Where signalized, design shall provide for optimal signal phasing. Consideration shall be given for arterial street progression, protected/permitted, and permitted left turn phasing. New signal proposals in remote locations shall first include an evaluation of alternate applications such as roundabouts.

   b. Streets shall be aligned so as to intersect at right angles (90 degrees). Angles of less than 70 degrees will not be permitted. Intersection of more than two (2) streets at one point will not be permitted.

   c. For arterials and major collector intersections, exclusive left turn lanes shall be provided; crosswalks shall be provided at all approaches; and street alignments across intersections shall be continuous.

   D. Street and intersection alignments should facilitate local circulation but avoid alignments that encourage non-local through traffic for minor collector and local street intersections.

   e. New streets shall intersect with existing street intersections so that centerlines are not offset, except as approved by City Engineer. Where existing streets adjacent to a proposed development do not align properly, conditions may be required of the development to provide for proper alignment.

2. INTERSECTION SPACING

   a. Access spacing between streets and between streets and driveways (> 50 feet) shall be measured from center-to-center of the driveway or street (SMC 17.26.020.3.h).

b. The access spacing standards for full intersection spacing shall meet the following minimum separation distance:

Street Classification	Minimum Public Intersection Centerline Spacing (Feet)
Limited Access Principal Arterial	750
Urbanized Area Principal Arterial[1]	260
Minor Arterial	600
Major Collector	260
Minor Collector	260
Local Streets	260
Local Commercial/Industrial Street	260

1. *This standard applies to 1st Avenue from Shaff/Fern Ridge Road to Ida Street.*
2. *Intersection spacing of not less than the minimum shown may be allowed on a case-by-case basis when findings presented to the City Engineer indicate that the spacing change is necessary and as determined appropriate by the City Engineer.*

303.07.E STREET CONNECTIVITY AND FORMATION OF BLOCKS

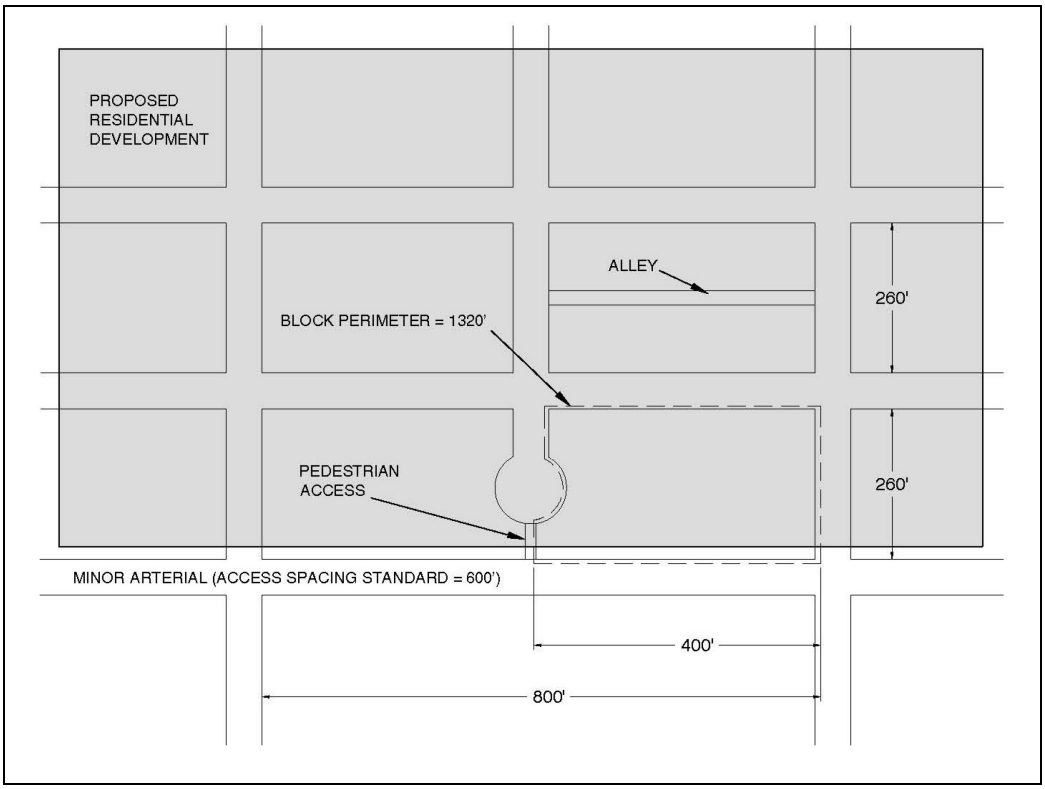
1. BLOCK LENGTH AND PERIMETER STANDARD – In order to promote efficient vehicular and pedestrian circulation throughout the City, subdivisions and site development shall be served by a connecting network of public streets and/or accessways, in accordance with the following standards (minimum and maximum distances between two streets or a street and its nearest accessway measured from right-of-way line to right-of-way line as shown in the figure below (SMC Figure 17.26. 020.5.c.)

   a. RESIDENTIAL DISTRICTS – Minimum 100-foot block length and maximum of 600-foot length; maximum 1,400 feet block perimeter;

   b. DOWNTOWN/MAIN STREETS – Minimum 100-foot block length and maximum of 400-foot length; maximum 1,200 feet block perimeter;

   c. GENERAL COMMERCIAL DISTRICTS – Minimum 100-foot block length and maximum of 600-foot length; maximum 1,400 feet block perimeter;

   d. INDUSTRIAL DISTRICTS – Not applicable.



2. If a hardship can be demonstrated in which it is not practically feasible to meet these standards due to topographical, environmental, or other significant constraints, then these conditions may be requested to be modified through the Public Works Director or his/her designee.

3. At no time shall any block length be greater than 600 feet and its maximum block perimeter 1,800 feet for roadways with urbanized area principal arterials, minor arterials, or lower classification.

303.07.F CURB RETURNS

1. Access to public right of ways shall be identified by a standard curb return with ADA accessible curb ramps. Curb returns shall not be installed on private streets or driveways unless otherwise directed or approved by the City Engineer. See Section 303.09.

2. Curb return radius at street intersections shall be designed to accommodate all expected traffic. Curb extensions and/or special crosswalk/sidewalk features designed to enhance pedestrian safety may be required to encourage pedestrian usage.

3. The minimum allowed curb return radii between intersecting streets are shown below. The minimum radii are based on the lowest classification of the two intersecting streets.

Minimum Curb Return Radii (Feet) Edge of Pavement / Face of Curb					
Street Classification	**Arterials**	**Major Collector**	**Minor Collector**	**Local Street**	**Alleys**
Arterials	35	-	-	-	-
Major Collector	30	30	-	-	-
Minor Collector	25	25	25	-	-
Local Street	25	25	20	20	-
Alleys	Radii equal to the distance from the face of curb to property line (10' min)				

4. Minor collectors or local streets with heavy truck movements may be required to install larger curb radii than shown in the table. Streets with daily transit routes shall not have curb return radii less than 25-feet to accommodate safe bus turning movements.

5. In areas zoned for industrial uses, the intersection of a minor collector or a local street with an arterial or major collector street shall be designed to accommodate a WB-50 Semitrailer Design Vehicle and the curb alignment shall be designed so that the vehicle can complete a right turn using only the vehicle lanes nearest to the curbs of the two streets. The Design Engineer shall provide direction in deciding if other areas need larger than minimum turning radii at specific intersections. When designing turning radii higher than the minimums, the Design Engineer shall identify the design vehicle to be applied.

6. If bicycle lane or on-street parking exists, or when in Special Districts, above turning radii may be reduced by 5-feet, as approved by City Engineer.

7. The minimum gutter grade, including curb returns, shall be 0.5 percent. All curb return data shall be summarized in a table on the plan sheet. The table shall show the total length of the return, delta angle, curb radius distance, and elevations of the beginning, 1/4-delta, 1/2-delta, 3/4-delta, and end of the return.

303.07.G CUT AND FILL SLOPES

1. Catch points for cut and fills shall be shown on the plans so that slope limits outside the right-of-way are identified. The plans shall show the direction of natural drainage and address the routing of runoff to prevent erosion of newly constructed slopes or blockage of the natural drainage.

2. The plans shall show existing slope easements, along with proposed slope easements and temporary construction access agreements that must be acquired to facilitate construction. Easement dimensions shall be shown on the plans.

303.08 VERTICAL DESIGN

303.08.A GENERAL

1. Beginning, ending, centerline-centerline intersections, and sharp grade breaks not exceeding a total of 1 percent shall be identified on the profile with street stations and elevations. Grade breaks over 1 percent shall utilize a vertical curve. The maximum superelevation rate permitted shall be 4 percent on local and collector streets, and 6 percent on arterial streets.

2. The profile shall show all utility appurtenances such as manholes, curb inlets, culverts, and drainage inlets and outlets. Each item shall be labeled with the station and the finish grade elevation for the rim, top of curb, and all inverts. Pipelines along the street shall be shown in profile as well as the cross section of pipes that cross the construction area.

3. These requirements are for standard conditions anticipated within the City. Areas in which topography may dictate, the City Engineer will entertain alternatives from these Design Standards.

4. When new streets are built adjacent to or crossing drainage ways, the following standards shall govern the vertical alignment:

Street Classification	Vertical Standard
Arterials	Travel lanes shall be at or above the 100-year flood elevation.
Major Collectors, Minor Collectors, and Local Streets	Travel lanes shall be at or above the 100-year flood elevation.

5. If alternate access is available for properties served by a particular local street, a design could be considered for approval by the City Engineer that would set the travel lanes at or above the 50--year flood elevation, but not lower than 6-inches below the 100-year flood event.

303.08.B LONGITUDINAL GRADES

1. Minimum longitudinal grade for all street classifications shall be 0.0050-feet per foot (0.50%). In all cases street grades shall allow for proper and adequate drainage. Cul-de-sac "bulbs" shall have a minimum slope of 0.0060-feet per foot (0.60%).

2. The maximum longitudinal grades for each street classification shall be as follows:

Street Classification	Slope (ft/ft)	Slope (%)
Principal Arterial/Minor Arterial	0.060 ft./ft.	(6%)
Major Collector	0.080 ft./ft.	(8%)
Minor Collector	0.100 ft./ft.	(10%)
Local Street	0.120 ft./ft.	(12%)
Alleys	0.120 ft./ft.	(12%)

3. For unsignalized intersections, the longitudinal grade on stop-controlled approaches shall be below 8 percent for an approach distance of 50-feet.

4. Local asphalt concrete paved streets may exceed 12 percent, as approved by the City Engineer, but in no case will they be allowed to exceed 15 percent. The City Engineer may approve a grade greater than 12 percent when all of the following conditions exist:

   a. Topographic constraints do not allow the development to be served by a street with a maximum longitudinal grade of 12 percent without causing destabilization of soils by excessive cuts and fills.

   b. There is no access to the property being developed through adjacent properties at a maximum 12 percent longitudinal grade.

   c. The section of local street being designed will not exceed a combination of length, horizontal alignment, or longitudinal grades exceeding 12 percent that will create hazardous traffic conditions.

303.08.C CROSS-SECTION SLOPE

1. GENERAL

   a. Streets shall have a cross-section slope of 2.0 percent "normal crown" in accordance with the Standard Drawings unless otherwise approved by the City Engineer.

2. ADVERSE TOPOGRAPHY

   a. When approved by the City Engineer, local streets in adverse topography may utilize an "offset" or unequal crown section when the existing ground slope exceeds 8.00 percent across the roadway section. The offset crown design shall meet the following conditions:

      - Minimum horizontal distance from "crown" to (one) face of curb is 10.00-feet.
      - Maximum cross-slope of pavement is 5.00 percent, except for horizontal curves. On horizontal curves, maximum reverse super elevation is 2 percent.
      - Maximum differential in top of curb elevation from one side to the other is 1.00-foot.

   b. The existing ground "side-slope" criteria are based on the relationship of the slope of the ground to the transverse slope of the roadway profile. This relationship shall be met for the entire length of the roadway alignment utilizing an offset crown. Other non-standard cross-sections such as "shed roof", "saw tooth", etc., may also be approved by the City Engineer.

303.08.D VERTICAL CURVES

1. Vertical curves shall be parabolic and of a minimum length computed from the formula: L = KA

   - L = Length of vertical curve in feet
   - K = Design constant (rate of vertical curvature)
   - A = Algebraic difference in grades in percent

2. Selection of K values for crest vertical curves are based on sight distance requirements, and for sag vertical curves on headlight sight distance. K is a constant for each design speed and the values to be used are listed in the table below:

Design Speed (Mph)	K Values for Vertical Curves			
	Crest Vertical Curve		Sag Vertical Curve	
	Minimum	Desirable	Minimum	Desirable
20	10	-	20	-
25	20	-	30	-
30	30	30	40	40
35	40	50	50	50
40	60	80	60	70
45	80	120	70	90

303.09 BIKEWAYS

303.09.A GENERAL

1. A bikeway is created when a road has the appropriate design treatment to accommodate bicyclists, based on motor vehicle traffic volumes and speed. The basic design treatments used to accommodate bicycle travel on the road are classified as: shared roadway, shoulder bikeway, or bike lane. Another type of facility that is separated from the roadway is multi-use paths, as discussed in Section 310.

2. The City has adopted the "Stayton Bicycle Facility Plan." This plan summarizes the City's policy and implementation strategies for bikeways within the City. The City's adopted guidelines for bikeway design, construction, and control consist of the following:

   - AASHTO, "Guide to Development of Bicycle Facilities" latest edition.
   - ODOT, "Oregon Bicycle & Pedestrian Plan" latest edition.
   - Manual on Uniform Traffic Control Devices with Oregon supplements by Oregon Transportation Commission latest edition.

3. The Geometric Street Design By Functional Classification table attached at the end of this Division outlines specific bikeway requirements for City streets.

303.09.B BIKEWAY CLASSIFICATIONS

1. BIKE LANES. Bike lanes are a portion of the roadway designated for preferential use by bicyclists. Bike lanes are required on arterials, major collectors, and other functional classifications as shown in the Geometric Street Design by Functional Classification table. Bike lanes shall be well marked to call attention to their preferential use by bicyclists.

2. BIKE PATHS. Bike paths are a designated travel-way for bicyclists that are completely separated from the vehicular travel lanes and are within independent rights-of-way.

3. SHARED BIKEWAYS (a.k.a. Bike Routes). Paved roadway shoulders on rural roadways provide a suitable area for bicycling, with few conflicts with faster moving motor vehicle traffic. Most rural bicycle travel is accommodated on shoulder bikeways.

4. SHARED ROADWAYS. On a shared roadway, bicyclists and motorists share the same travel lanes. A motorist will usually have to cross over into the adjacent travel lane to pass a bicyclist. Shared roadways are common on local and neighborhood streets and on rural roads and highways.

303.09.C BIKE LANE WIDTH

1. The standard width of a bike lane is 6-feet, as measured from the center of stripe to the face of curb or edge of pavement. This width enables cyclists to ride far enough from the curb to avoid debris and drainage grates, yet far enough from passing vehicles to avoid conflicts. If parking is permitted, the bike lane shall be placed between parking and the travel lane

2. If the standard width is not practical because of physical constraints, then a minimum width of 4-feet may be designated as a bicycle lane where approved by the City Engineer on a case-by-case basis. Bike lanes against a curb face, guardrail or other roadside barriers shall have a minimum 5-feet width or shall be minimum 4-feet from the longitudinal joint between a monolithic curb and gutter and the edge of travel lane. The minimum bike lane width between parking and the travel lane is 5-feet.

3. Bike lanes wider than 6-feet may be desirable in areas of very high use, on high-speed facilities where wider shoulders are warranted, or where they are shared with pedestrians. Care must be taken so they are not mistaken for a motor vehicle lane or parking area, with adequate marking or signing.

4. A bike lane shall be properly marked with pavement stencils and an 8-inch wide stripe in accordance with the ODOT, "Oregon Bicycle & Pedestrian Plan" latest edition, and as required by OAR 734-20-055.

303.10 ON-STREET PARKING

1. On-street parking requirements per street classification shall be in accordance with the Geometric Street Design By Functional Classification table attached at the end of this Division, unless approved otherwise by the City Engineer.

2. On-street parking will not be allowed within City right-of-ways in the areas shown below unless otherwise approved by the City Engineer. “No Parking” areas shall be clearly identified, marked, and/or signed appropriately on the plans.

   - Within 45-feet of a curb return for arterials and major collectors; and
   - Within 30-feet of curb return for local streets and minor collectors; and
   - Within the radius of cul-de-sac turnarounds; and
   - Within alleys

3. Local streets that are approved for reduced 45-foot right-of-way and 28-foot pavement section (skinny streets) are required to have one parking lane to assure that on-street parking is adequate for adjacent uses. In addition, local skinny street designs shall consider clustered parking bays adjacent to the street if needed.

303.11 DRIVEWAYS

303.11.A GENERAL

1. Access to private property shall be identified by the use of driveway curb cuts where curbs exist and with asphalt pavement connections where no curbs exist. Access to public right of ways shall be identified by a standard curb return. Commercial driveways shall not use a standard curb return without prior approval of the City Engineer.

2. Driveway access points within the street shall be the minimum necessary to provide access while not inhibiting the safe circulation and carrying capacity of the street. Driveways shall meet applicable guidelines of the Americans with Disabilities Act (ADA), Title 17 of the Stayton Municipal Code, and conform to the requirements of the transportation impact analysis for the particular development.

3. Driveways providing access into off-street, surface parking lots shall be designed in such a manner to prevent vehicles from backing into the flow of traffic on the public street or to block on-site circulation. The driveway throat approaching the public street shall have adequate queue length for exiting vehicles to queue on-site without blocking on-site circulation of other vehicles. The driveway throat approaching the public street shall also have sufficient storage for entering traffic not to back into the flow of traffic onto the public street.

4. Driveway approaches must be designed and located to provide an exiting vehicle with an unobstructed view. Construction of driveways along acceleration lanes, deceleration lanes, or tapers shall be prohibited due to the potential for vehicular weaving conflicts unless there are no other alternatives for driveway locations. Only after a transportation impact study is conducted and concludes that the driveway does not create a safety hazard along acceleration lanes, deceleration lanes, or taper shall the driveway be considered for approval. Approval of a driveway location along an acceleration lane, deceleration lane, or taper shall be based on the Public Works Director or his/her designee agreeing with the conclusions of the traffic impact study.

5. Driveway shall be shown on the plans to verify that the design meets minimum ADA requirements for sidewalks. Design elements shall consider adequate clear space for passage behind the approach ramp and/or proper slope of the depressed curb transition with curbside sidewalk.

6. Residential curb cuts shall be a minimum distance from adjacent property lines such that driveway curb wings and ramped sidewalk do not encroach on adjacent properties. Exceptions are allowed for shared driveways or when the lot is platted as a zero lot line or as an attached single-family lot.

7. Within commercial, industrial, and multi-family areas, shared driveways and internal access between similar uses are encouraged to reduce the access points to the higher classified roadways; to improve internal site circulation; and to reduce local trips or movements on the street system. Shared driveways or internal access between uses shall be established by means of common access easements at the time of development.

303.11.B NUMBER OF ALLOWED DRIVEWAYS

1. The number of allowed driveways shall comply with the requirements of SMC 17.26.020.2.

303.11.C DRIVEWAY ACCESS LOCATIONS

1. Driveway access locations shall comply with the requirements of SMC 17.26.020.3.

303.11.D DRIVEWAY SPACING

1. Access spacing standards shall be measured as defined below (SMC 17.26.020.3.h.).

   a. Access spacing between two driveways on Minor Collector, Local Residential, and Local Commercial/Industrial Streets (50 feet) shall be measured from the perpendicular near edge of the driveway to the perpendicular near edge of the driveway.

   b. Access spacing between a driveway and an arterial, collector, or local street located on a Minor Collector, Local Residential, or Local Commercial/Industrial Street (50 feet) shall be measured from the perpendicular near edge of the driveway to the start of the tangent for the intersecting street.

   c. All other access spacing between driveways and between streets and driveways (> 50 feet) shall be measured from center-to-center of the driveway or street.

2. The access spacing standards for driveway spacing shall meet the following minimum separation distance:

Street Classification	Minimum Spacing between Driveways and/or Streets and Driveways[3] (Feet)
Limited Access Principal Arterial	375
Urbanized Area Principal Arterial[1]	260
Minor Arterial	300
Major Collector	150
Minor Collector	50
Local Residential Streets	50[2]
Local Commercial/Industrial Street	50

1. *This standard applies to 1st Avenue from Shaff/Fern Ridge Road to Ida Street.*
2. *This standard only applies to a corner residential lot driveway spacing from the adjacent street and may be modified per SMC 17.26.020.3.a.*
3. *The City Engineer may permit a spacing of less than the minimum shown, when findings are made to establish that:*
   - ❖ *Without the change there could be no public street access from the parcel(s) to the existing street; or the change is necessary to support local pedestrian/bicycle circulation and access; and/or the change is necessary due to topographic constraints; and all other provisions of the street design requirements can be met.*

303.11.E DRIVEWAY WIDTH

Driveway Width (Min/Max in feet)			
Street Classification	Zoning Designation		
	Residential	Commercial	Industrial
Principal Arterial	N/A[1]	12/36	12/36
Minor Arterial	12/24[2]	12/36	12/36
Major Collector	12/24[2]	12/36	12/36
Minor Collector	12/24[2]	12/36	12/36
Local Street	12/24[2]	12/36	12/36

1. *Special conditions may warrant access, as approved by the City Engineer.*
2. *28-foot maximum with 3-car garage (3 bays wide), as approved by the City Engineer.*

303.12 SIDEWALKS

303.12.A GENERAL

1. Dimensions and spacing of sidewalks, sidewalk ramps, etc., shall be within the parameters of the Stayton Municipal Code, the Standard Construction Specifications, and the Americans with Disabilities Act (ADA). Show sidewalk ramps on the plans at each intersection curb return and other required locations to verify adequate landing and passage area. Identify sidewalk obstructions on the plans and verify adequate clear space for passage.

2. Sidewalks shall be constructed with a continuous passage of all obstructions, including poles, mailboxes, signposts, etc a minimum of 4-feet for local streets and minor collectors and 5-feet wide for major collectors and arterials. See the Standard Drawings. A 7-foot vertical clearance above the sidewalk shall be maintained.

3. Sidewalk Location.

   a. Property Line Sidewalks: Property line sidewalks shall be used unless an exception is granted by the Public Works Director. Sidewalks shall be buffered from the roadway to provide for the safety and comfort of pedestrians (property line sidewalks) and shall be installed such that the back of walk is 12-inches inside the right-of-way, except in cases where buildings abut the right-of-way in which cases the sidewalk will abut the building.

   b. Exceptions:

      1) Curbline Sidewalk: A curbline sidewalk may be used only when the property line sidewalk configuration will match the location of adjacent sidewalks and/or is appropriate for the particular situation, as determined by the Public Works Director.

      2) Meandering Sidewalks: Sidewalks may meander within the dedicated right-of-way or outside of the right-of-way within an easement if prior approval is granted by the Public Works Director.

4. Sidewalks shall have a maximum cross slope no greater than 2 percent (1V:50H).

5. Handrails, fences, and/or other approved means to protect pedestrians will be required when there is a vertical drop of 30-inches or greater adjacent to sidewalk or a grade steeper than a 1-foot vertical in a 3-foot horizontal distance.

303.12.B SIDEWALK WIDTH

1. Sidewalk width requirements per street classification shall be in accordance with the Geometric Street Design By Functional Classification table attached at the end of this Division, unless approved otherwise by the City Engineer

2. On local streets, the Public Works Director may approve the replacement of an existing 4-foot wide sidewalk and may permit construction of a 4-foot wide sidewalk to extend or in-fill an existing 4-foot sidewalk when conditions do not warrant construction of a wider sidewalk. The sidewalk shall maintain a minimum 4-foot passage without obstruction.

303.12.C SIDEWALK RAMPS

1. GENERAL

   a. New arterial and collector street intersections shall incorporate two (2) sidewalk ramps per corner, unless approved otherwise by the City Engineer. Retrofits shall incorporate ramps that line up with existing ramps, typically a single diagonal ramp, unless otherwise required by the City Engineer.

   b. Where ADA ramps are non-existent in existing sidewalks opposite ramps installed as part of new frontage construction, new ramps shall be constructed on the other side of the street in addition to the new ramps constructed as part of the frontage, unless approved otherwise by the City Engineer.

   c. Sidewalk ramps shall meet applicable guidelines of the Americans with Disabilities Act (ADA), except as noted herein.

   d. Locations of sidewalk ramps shall be designed with regard to stormwater flows, street grades, pole and fire hydrant locations, and pedestrian safety. Other factors may also dictate final sidewalk ramp location.

2. SIDEWALK RAMP CROSS SLOPES

   a. For street grades of less than 8 percent, ramp cross slopes shall not exceed 2 percent. For street grades equal to or greater than 8 percent, ramp cross slopes of up to 5 percent will be permitted if considered reasonable, as determined by the City Engineer.

   b. The City Engineer will consider the following factors in determining whether allowing a ramp cross slope greater than 2 percent is a reasonable exercise of engineering judgment. The engineering judgment shall be documented by the Design Engineer and approved by the City Engineer.

      - Street grades and width
      - Anticipated vehicle speeds
      - The nature of intersection controls
      - Alternative accessible routes

- ❖ Permitted land uses in the area
- ❖ Impact on natural resources

c. The City Engineer will not approve ramp cross slopes greater then 2 percent in advance of the submittal of construction plans. Engineered construction plans must be submitted to, reviewed, and approved by the City Engineer prior to construction.

d. There may be rare cases in which circumstances justify a ramp cross slope greater than 5 percent. Such ramp cross slopes will be permitted if considered reasonable and there are no other practical alternatives, as determined by the City Engineer. Where approved, the following will be required:

1) For ramp cross slope of greater than 5 percent, the Design Engineer shall state that every effort has been made to design a project with 5 percent ramp cross slopes. Rough plans showing 5 percent ramp cross slopes shall be submitted with additional information to identify why the plan is not a practical alternative.

2) City Engineer approval will imply the disclaimer that City approval will not act as an agreement or obligation to indemnify anyone if an ADA violation is alleged.

303.13 CONCRETE CURB AND GUTTERS

303.13.A Street improvements shall be constructed with monolithic curb and gutter, except as specifically approved by the City Engineer.

303.13.B Standard curb as shown in the Standard Drawings may only be used when the longitudinal street grade is 0.01-foot per foot (1.0 percent) or greater and where cross slope of roadway drains away from curb such as with raised median construction.

303.13.C Where a local street pavement section is designed for adverse topography in conformance with Section 303.06.C.2, curb and gutter shall be used on upper side of street to channel roof drainage or curb weeps to catch basins. This will reduce or eliminate stormwater that would tend to flow across the street resulting in slick driving and walking surfaces.

304 ALLEYS

304.01 GENERAL

304.01.A Alleys allow for efficient lot use, support front yard pedestrian orientation and landscape spaces, and reduced lot coverage by driveways. Alleys serve as a common driveway for access and deliveries.

304.01.B Alleys may be used within residential subdivisions but cannot be used in the maximum block perimeter calculation. The maximum alley length is 600 feet between ties to public streets. Midblock access(s) to alleys must align with existing or planned public streets (SMC 17.26.020.5.c).

304.01.C Design for alleys shall meet the same criteria as other public streets. Centerline radius and design speed may be the exception to those criteria when approved by the City Engineer. Generally, alleys shall be designed for one-way.

304.01.D Alleys shall be continuous from one street to a parallel or intersecting street. All lots must have frontage to a public street. If there are parking restrictions on the public street, additional parking spaces shall be provided off of the alley.

304.01.E The standard design for alleys shall consist of 15-feet of asphalt concrete pavement section within a minimum 16-foot public right-of-way and have a 2 percent normal crown to collect drainage at edges of the alley, unless approved otherwise by the City Engineer. Portland Cement Concrete (PCC) is allowed as approved by the City Engineer. See Standard Drawings for typical alley section.

304.01.F The minimum pavement structure shall be 4-inches of asphalt over 10-inches of base rock, placed over geotextile fabric, as shown in the Standard Drawings. For alleys subject to industrial or special loading considerations or if required by the City Engineer, a structural pavement design shall be calculated to determine if additional thickness is required for the anticipated loading.

304.01.G Private improvements that will be impacted including garages or other structures, stairs, vaults, fences, walls, driveways, parking lots, walkways, or other items shall be shown on the plans. Indicate existing drainage patterns and show private drainage inlets, outlets, and pipes beyond the alley right-of-way that will be impacted by the alley construction.

304.01.H For PCC pavements, the alley joints may be placed full width in one pour, with no longitudinal joints or as shown in the Standard Drawings. The alley design shall include a transverse joint pattern, shown on the plans, so that the joints are spaced to create panel lengths that is 0.75 to 1.25 times the alley width. The joint pattern will be coordinated to intersect with utility features such as poles, manholes, and catch basins. At catch basins, a transverse joint shall be placed at each end of the catch basin to control cracking at the corners of the frame.

304.01.I Alley approaches shall be constructed as commercial driveways with the PCC structural section increased to 10-inches or match the alley PCC pavement structure for which it provides access, whichever is greater. Alley approaches shall have a standard curb return radii equal to the distance from the face of curb to property line (10' min), unless approved otherwise by the City Engineer.

305 PAVEMENT DESIGN

305.01 GENERAL

305.01.A Standard pavement structures for Asphalt Concrete (AC) and Portland Cement Concrete (PCC) pavements are defined in the Standard Construction Specifications and Standard Drawings. All streets and alleys shall be constructed with AC Pavement. It is the City's policy to only allow PCC pavements in alleys and in new subdivisions with all new utilities installed prior to street construction. Design requirements and procedures are summarized in the appropriate sections below.

305.01.B The City has a standard structural section for local streets and collectors shown in the Standard Drawings. Arterial streets shall undergo a full structural section design, but shall not be less than the minimum standard shown in the Standard Drawings. Design inputs shall consider soil characteristics, traffic loading data, and structural strength coefficients of the pavement materials. The PCC structural pavement design shall apply to both street and alley pavements. The City Engineer may require a structural pavement design to be generated when it is suspected that unsuitable soil conditions, high percentage of trucks, or any other condition may require the pavement structure to be increased.

305.01.C The design shall be based on a geotechnical investigation to determine soil characteristics, structural strength coefficients for the soil, and traffic loading data approved by the City. The design shall be submitted for review with all supporting documentation and calculations for the structural design of the pavement. Any modification to the standard minimum pavement structure must be approved by the City Engineer.

305.02 SOIL CHARACTERISTICS

305.02.A The structural characteristics of existing native soils underlying the proposed street shall be assumed to be fair or may be specifically established by a geotechnical engineer. The classification of soil and corresponding ability to support the proposed street structure and anticipated loading is common to both AC and PCC pavement designs. The structural characteristics for treated or reprocessed materials used in the pavement design shall be established by a geotechnical engineer and documented in the design calculations provided by the Design Engineer.

1. NATIVE MATERIALS – If a geotechnical study is not undertaken, the native material classification shall be assumed to be fair. A soil classified as fair is typified as having values for the resilient modulus (MR) of 5,000 psi or other equivalent designation. For designs that assume fair soils, this value shall be used.

2. SUBGRADE STABILIZATION – Any part of the subgrade that is found to be inadequate shall be stabilized to establish a new subgrade structure equivalent to the native subgrade under dry summer conditions. Rock used to replace all or a portion of the subgrade shall not be used to reduce the pavement thickness.

3. EXISTING STREET STRUCTURE – Whenever a street is to be constructed to a new grade or alignment such at the new street section is built over an existing street structure, any existing pavements shall be broken up and removed, unless otherwise approved.

305.03 TRAFFIC DATA

305.03.A Traffic loading data for the pavement design shall be determined for all arterial, collector, and nonresidential local streets using current and 20-year future traffic volumes. The data shall include a vehicle classification breakdown for passenger cars, buses, and 2, 3, 4, and 5-axle trucks. The volumes shall be provided in the form of Average Daily Traffic (ADT) so that loading factors can be determined by converting to standard 18,000 pound equivalent axle loads (EAL) for each vehicle class, and summing to determine the total traffic load.

305.03.B Traffic data shall be submitted by a licensed engineer for the City's approval, or may be provided by the City if data is available. Traffic data from the City is limited to information that is readily available from existing traffic counts or based on the Transportation System Plan.

305.04 ASPHALT CONCRETE PAVEMENT

305.04.A GENERAL

1. Streets shall be constructed with asphalt concrete (AC) pavement; however, other materials such as Portland Cement Concrete (PCC), concrete paver stones, etc., may be permitted only as approved by the City Engineer.

2. Design of the AC pavement structural section shall follow the latest edition of Asphalt Pavement Association of Oregon (APAO) Asphalt Pavement Design Guide or the ODOT/APWA pavement design guide. Pavement structures shall be based on a 20-year design traffic-loading period with 90 percent reliability.

3. Street design shall take into account the topography and include subsurface drains as required.

305.04.B MINIMUM STRUCTURAL SECTIONS

1. GENERAL

   a. The following minimum structural sections may be modified if the Design Engineer performs a full structural design calculation that is acceptable to the City Engineer. The thickness of the crushed granular base rock shall not exceed 15-inches.

   b. The maximum thickness for any lift of AC pavement shall be 3-inches and the minimum thickness shall be 2-times the maximum aggregate size or 1 1/2-inches, whichever is greater. Delays of final lifts will not be allowed.

   c. The minimum structural sections assume that construction will take place during dry summer conditions. If construction takes place outside of dry summer conditions, measures shall be taken to stabilize all poor performing subgrade soils.

   d. Geotextile fabric shall be used to protect the crushed granular base rock from contamination with soil particles and preserve the structural integrity of the aggregate during the service life of the pavement. The geotextile fabric has no strength coefficient for purposes of determining the pavement structure.

2. PRIVATE STREETS

   a. The pavement section shall be designed to Local Street standards.

3. LOCAL STREETS

   a. The minimum structural section for new or reconstructed local residential streets shall consist of 4-inches of AC Pavement over 10-inches of 1-inch crushed granular base rock over stable subgrade.

   b. The pavement section shall consist of a 2-inch base lift of C-mix AC, and a 2-inch surface lift of C-mix AC.

4. COLLECTORS

   a. The minimum structural section for new or reconstructed minor and major collector streets shall consist of 5-inches of AC Pavement over 12-inches of 1-inch crushed granular base rock over stable subgrade.

   b. The pavement section shall consist of one, 3-inch base lift of C-mix AC, and a 2-inch surface lift of C-mix AC.

5. ARTERIAL STREETS

   a. The minimum structural section for new or reconstructed minor and major arterial streets shall consist of 7-inches of AC Pavement over 15-inches of 1-inch crushed granular base rock over stable subgrade.

   b. The pavement section shall consist of two, 2 1/2-inch base lifts of C-mix AC, and a 2-inch surface lift of C-mix AC.

305.04.C STRUCTURAL STRENGTH COEFFICIENTS

1. When calculating the structural strength of each layer of the pavement structure, use the following values:

   - ❖ 0.42 per inch for hot mix AC
   - ❖ 0.06 per inch for clean, crushed aggregate base

2. The minimum structural section for a local street has a Structural Number (SN) of 2.4, determined as follows:

   SN = (0.06)(12-inches) + (0.42)(4-inches) = 2.4

3. If the required SN is greater than 2.4, the Design Engineer shall increase the thickness of the AC in increments of 0.5-inch. Alternate structural materials and strength coefficients for use in the design shall be presented to the City Engineer for review.

305.04.D OVERLAYS

1. GENERAL

   a. Where an existing pavement base is determined to be structurally sound, an overlay of the pavement may be approved by the City Engineer to prevent further deterioration of the asphalt from oxidation or raveling. Pavement experiencing existing base failure through severe alligatoring or observable deflection under load shall be designed for pavement removal and replacement as required by the City Engineer.

   b. A structural overlay may be approved by the City Engineer to extend the useful life of the existing pavement structure by increasing the composite pavement Structural Number. The total structural number required for traffic loading during the design period shall be determined as described above.

   c. Overlays shall be performed using fabric to minimize reflective cracking to the overlay.

   d. Overlays shall not be feathered to match existing street pavement surfaces at paving limit lines. Taper grinding, butt grinding, or removal and reconstruction of the existing pavement will be required so the finished overlay surface will match the existing gutter or pavement grade.

2. EXISTING STRUCTURE

   a. The Structural Number of the existing pavement structure may be determined by non-destructive testing, sample pits, or both. All testing methods must be reviewed by the City Engineer prior to performing the tests.

   b. When taper or butt grinding are employed in the design, the Structural Number of the existing pavement at those locations shall be determined for the pavement thickness remaining after grinding.

3. OVERLAY THICKNESS – The required overlay thickness is determined by calculating the additional AC layer necessary to meet the value of the desired Structural Number. The minimum overlay thickness shall be 2-inches unless approved otherwise by the City Engineer.

4. PAVING FABRIC – An approved paving fabric shall be placed over the existing pavement immediately prior to the overlay, with the edge of the roll no more than 6-inches from the gutter or paving limit line. Required crack filling to support the fabric, and the fabric installation, shall be according to the manufacturer's recommendations. At no point will the pavement thickness over the fabric be less than 2-inches. The purpose of incorporating paving fabric is to create a waterproof membrane within the pavement structure to further protect the structure from water intrusion. While paving fabric may delay reflective cracking, it is not presumed to prevent it.

5. LIMITATIONS – The street must be evaluated for limiting factors that would make an overlay undesirable. Driveway approach grades shall be such that vehicles pulling trailers will be able to reasonably access the driveways without scraping or dragging. The maximum street cross slope after the overlay is placed must be determined and may not exceed 6 percent without approval of the City Engineer.

305.04.E ASPHALT COMPACTION

1. The AC pavement compaction shall be at least 91 percent based on a Rice theoretical maximum density, as determined in conformance with AASHTO T 209, as modified by ODOT/APWA. In addition, for Level 2 mix, a 50 blow Marshall (AASHTO T 245) and for Level 3 mix a 75 blow Marshall (AASHTO T 245) or Superpave Performance Testing as outlined in the ODOT Contractor Mix Design Guidelines for Asphalt Concrete shall be performed. All related test data shall be provided to the City Engineer. The minimum “Tensile Strength Ratio,” “voids filled with asphalt,” “voids in mineral aggregate,” and “air voids” shall be according to the ODOT/APWA Oregon Standard Specifications for Construction.

305.05 PORTLAND CEMENT CONCRETE

305.05.A Design of the Portland Cement Concrete (PCC) pavement structural section shall follow the Portland Cement Association (PCA) or American Concrete Pavement Association (ACPA) design guides. The design will have a 90 percent statistical reliability of adequately supporting the design traffic loading without requiring any major maintenance or repair.

305.05.B The minimum slab thickness shall be 7-inches for local streets, 8-inches for alleys and collector streets, and 9-inches for arterial streets. A leveling course of no less than 4-inches of crushed granular base rock shall be placed under all concrete street sections.

305.05.C JOINTS

1. A typical joint pattern shall be specified and shown on the plans so that the joints are spaced to create panel length to width ratios that are 1.00 to 1.25.

2. The transverse joint pattern shall be slightly skewed in relation to the direction of traffic and be coordinated to match with all curb joints. The spacing of transverse joints will generally not be greater than 15-feet.

3. A longitudinal joint shall be sawcut along the street centerline. Supplemental longitudinal joints shall be specified if the resulting half-street panel width exceeds 18-feet.

305.06 SPECIALTY PAVEMENT TREATMENTS

305.06.A Specialty pavement treatments proposed to alter color, surface texture, or surface material shall be submitted by the Design Engineer and are subject to review and approval by the City Engineer. These materials and treatments may include colored concrete, stamped patterns, inlayed materials, interlocking pavers, or any other alternative treatments or materials.

306 STRIPING AND PAVEMENT MARKING PLANS

306.01 STRIPING PLAN

306.01.A A striping plan shall be provided for review and approval by the City Engineer prior to the application of any permanent pavement markings. All striping and pavement marking design shall comply with the standards contained in the current version of the Manual on Uniform Traffic Control Devices. Striping plans are not required for local residential streets unless required otherwise by the City Engineer.

306.02 STRIPING MATERIALS

306.02.A GENERAL

1. Permanent striping for new and re-constructed streets shall consist of paint, unless otherwise approved by City Engineer. Hot inlay tape consisting of rolls or pre-cut sheets placed on the fresh AC mat during the final compaction process may be used as approved by City Engineer. The City Engineer may approve the use of thermally fused markings for striping on existing asphalt or concrete street surfaces.

306.02.B APPLICATION

1. PAINT - Painted pavement markings shall consist of a minimum of two (2) coats of paint that conforms to the current ODOT/APWA Oregon Standard Specifications for Construction for White and Yellow Traffic Line Bead Binder Paint.

2. THERMALLY FUSED MARKINGS - Thermally fused marking material shall be Premark manufactured by Flint Trading Company or an approved equal.

3. RAISED PAVEMENT MARKERS

    a. For collector and arterial streets, raised pavement markers shall be shown on the striping plans and shall be reflectorized and match the color of the strip they are complementing. Blue markers shall be placed near the center of the street at fire hydrant locations, offset 8-inches toward the hydrant. Markers shall comply with the Standard Construction Specifications.

    b. Pavement markers shall be ground in, unless otherwise approved.

307 TRAFFIC SIGNALS

307.01 GENERAL

307.01.A A licensed traffic engineer registered in the State of Oregon shall design and stamp plans for traffic signals. All documentation of traffic studies, field data, and recommendations shall be coordinated with the City Engineer. All plans and specifications shall be in accordance with Oregon Department of Transportation (ODOT) and MUTCD requirements or as modified by the traffic engineer. The final design of the traffic signal is to be approved and accepted by the City Engineer or City Traffic Engineer.

308 ILLUMINATION

308.01 GENERAL

308.01.A Streetlights shall be the responsibility of the Developer and shall be constructed as part of the required improvements at the Developer's expense. Streetlights and any required pedestrian multi-use paths shall be provided with adequate lighting which conforms to public works standards. A complete street lighting system shall be shown on the plans for review by the City Engineer.

308.01.B When decorative dark sky friendly lighting is proposed or required for a particular development, the lighting shall be designed and submitted to the City Engineer for review. Decorative lighting may be required in the downtown districts. Decorative lighting shall comply with Pacific Power and Light requirements.

308.01.C Streetlight poles shall be grey or brown fiberglass with dark sky friendly fixtures conforming to the Standard Drawings and Standard Construction Specifications. Infill development may utilize existing utility poles where approved by the City Engineer.

308.01.D For all projects that include the installation of luminaires, the Design Engineer must contact the electric utility early in the design process to coordinate providing service to the modified street network. The City and the electric utility shall approve luminaire and service point locations prior to approval of the improvement plans and issuance of a Construction Permit. Luminaires must be installed and operational prior to City acceptance of public improvements.

308.01.E Illumination systems shall conform to IESNA RP-8 (Illuminating Engineering Society of North America) American National Standard Practice for Roadway Lighting and shall conform to the minimum requirements shown below, accepted engineering practices, and electric utility guidelines.

308.02 AVERAGE MAINTAINED HORIZONTAL ILLUMINATION

308.02.A MINIMUM AVERAGE FOOT-CANDLE REQUIREMENTS

ROADWAY SEGMENTS		
Street Classification	**Residential**	**Commercial or Industrial**
Local	---	0.9 fc
Collector	0.6 fc	1.2 fc
Arterial	0.9 fc	1.6 fc

Source: *IES RP-8, American National Standard Practice for Roadway Lighting, Illuminating Engineering Society of North America.*

Notes: *Collector and arterial streets shall have a minimum weak point foot candle measurement of 0.2 fc.*

ROADWAY INTERSECTIONS							
Street Classification		**Residential**			**Commercial or Industrial**		
		Local	**Collector**	**Arterial**	**Local**	**Collector**	**Arterial**
Residential	Collector	1.0 fc	1.2 fc				
	Arterial	1.3 fc	1.5 fc	1.8 fc			
Commercial or Industrial	Local	1.3 fc	1.5 fc	1.8 fc	1.8 fc		
	Collector	1.6 fc	1.8 fc	2.1 fc	2.1 fc	2.4 fc	
	Arterial	2.0 fc	2.2 fc	2.5 fc	2.5 fc	2.8 fc	3.2 fc

Source: *IES RP-8, American National Standard Practice for Roadway Lighting, Illuminating Engineering Society of North America.*

Notes: *Collector and arterial streets shall have a minimum weak point foot candle measurement of 0.2 fc.*

308.02.B MINIMUM AVERAGE UNIFORMITY RATIO

STREET CLASSIFICATION	MINIMUM AVERAGE UNIFORMITY RATIO
Local	6:1
Collector	4:1
Arterial	3:1

Source: *IES RP-8, American National Standard Practice for Roadway Lighting, Illuminating Engineering Society of North America.*

308.02.C LUMINAIRE TYPES

BRAND	MODEL	WATTAGE	LIGHT SOURCE	LENS TYPE	DISTRIBUTION
General Electric	M-250R2	70W	HPS	Acrylic. Refracting	M-S-II
	M-250R2	100W	HPS	Acrylic. Refracting	M-S-II
	M-400R2	200W	HPS	Glass, Flat	M-C-III
		400W			

308.02.D AVERAGE MAINTAINED LUMENS

LUMINAIRE TYPE	INITIAL LUMEN VALUE	DEPRECIATION FACTOR	MAINTAINED LUMEN VALUE
70W HPS (M-S-II)	5,800	0.84	4,872
100W HPS (M-S-II)	9,500	0.84	7,980
200W HPS (M-C-III)	22,000	0.84	18,480
400W HPS (M-C-III)	50,000	0.84	42,000

Source: *Pacific Power and Light Company.*
Notes: *Maintained Lumen Value = Initial Lumen Value x Depreciation Factor.*

308.03 LOCATION

308.03.A Luminaire locations shall be subject to the approval of the City Engineer. Luminaries shall be located at property lines and curb returns where possible. A minimum of one (1) luminaire shall be located at each residential local street intersection, each 3-legged intersection (all classifications), and at the end of each cul-de-sac or permanent dead-end street. A minimum of two (2) or more luminaires shall be located at all other street intersections.

308.03.B Luminaire locations shall be as shown in the following table (those not specified shall be determined by the City Engineer):

MAXIMUM LUMINAIRE SPACING TABLE					
Street Width	**Pole Configuration**	**Pole Height (above finish grade)**	**Mast Arm Length**	**Luminaire Type**	**Max. Spacing**
Local Streets – Residential					
Varies	Staggered	25’	6’ Property Line walks 8’ Curbline walks	70W HPS (M-S-II)	300’
Varies	Min one (1) per intersection	25’	6’ Property Line walks 8’ Curbline walks	100W HPS (M-S-II)	Intersections
Local Streets – Commercial or Industrial					
40’	Staggered	25’	6’ Property Line walks 8’ Curbline walks	200W HPS (M-C-III)	210’
Minor Collector Streets – Residential					
34’-36’	Staggered	25’	6’ Property Line walks 8’ Curbline walks	100W HPS (M-S-II)	150’
Minor Collector Streets – Commercial or Industrial					
34’-36’	Staggered	25’	6’ Property Line walks 8’ Curbline walks	200W HPS (M-C-III)	170’
Major Collector and Arterial Streets – Residential, Commercial, or Industrial					
36’-74’	Opposite Across	30’	8’ Property Line walks 14’ Curbline walks	As approved	As approved

Source of Calculations: *ALADAN II, A Lighting Application Design & Analysis Computer Program, Rev. 2.00, GE Company, 1992.*
Notes: *Street widths that vary from those listed above can either use maximum luminaire spacing of next higher width street, or require separate calculation.*

309 STREETSCAPE APPURTENANCES

309.01 GENERAL

309.01.A All public and private items that currently exist or will be placed in the right-of-way that will impact the sidewalk and/or the landscape strip shall be shown on the plans. Such items include but are not limited to fire hydrants, street lights, bus shelters, street signs, street trees, mail boxes, poles, vaults, and various utility appurtenances. Identify obstructions that would encroach into sidewalks and verify minimum clear space for passage exists or show how the impact will be mitigated.

309.01.B Permanent private signs will not be permitted in the public right-of-way. See Subsection 303.03 for private streets.

309.02 STREET SIGNS

309.02.A Street signs shall meet MUTCD, Standard Highway Sign and City requirements. See Standard Drawings. The type and location of the signs shall be shown or described on the plans.

309.02.B Street sign sizes and placement locations will be reviewed by the City Engineer. Street signs shall have high intensity reflective diamond grade or high prismatic surface. Standard STOP and warning sign sizes are 30-inch x 30-inch, but larger sizes may be required at specific locations. Other regulatory and informational signs shall follow standard size and content as described in the MUTCD or as directed by the City Engineer.

309.02.C Street name signs shall be as shown in the Standard Drawings.

309.03 BUS SHELTERS

309.03.A Bus shelters shall be installed as directed by the City Engineer. Coordinate with the City Engineer and City Planner to determine location and orientation of the shelters. Specifications for the concrete pad and bus shelter structure shall be as approved by the City Engineer.

309.03.B The shelters may be located in the landscape strip if adequate room exists or behind the sidewalk within the right-of-way or in an easement for that purpose. In no case shall the shelter be placed within the designated sidewalk area as an obstruction that would require a pedestrian to maneuver around the shelter.

309.04 MAILBOXES

309.04.A Final locations for mailboxes shall be coordinated with the U.S. Postal Service (USPS). The Design Engineer shall work with the USPS to ensure that mailboxes are installed according to the Standard Construction Specifications, meet ADA requirements, and will be acceptable to the United States Postal Service. Mailbox locations shall be identified on the plans.

309.05 STREET TREES

309.05.A The Design Engineer shall coordinate with the City Engineer and City Planner for appropriate tree species, location, and spacing. New trees shall not be planted in sight clearance areas or otherwise interfere with required sight distances, including but not limited to, intersections and railroad crossings. See also Section 303.06. Final plans and specifications for street trees and related vegetation or appurtenances will be reviewed by the City Engineer.

309.05.B Street trees in the public right-of-way, or within the setback and/or buffer area immediately adjacent to the right-of-way, will be required of all developments. The particular species will be reviewed and approved as part of overall project submittals. A deposit for street trees to assure installation of the trees prior to occupancy will be required at the time of building permit issuance.

309.05.C Minimum caliper of street trees shall be 2-inches, as measured 6-inches above ground level in accordance with the American Standard for Nursery Stock. Street tress shall be supplied with an approved root guard and shall be installed in accordance with the Standard Drawings. Newly-planted trees shall be securely staked for the first 2-years after planting and shall be replaced if they die or are destroyed. Street trees must be healthy at the end of the warrant period.

309.05.D TREE SPACING

Tree Spacing	
Minor Collectors and Local Streets	
Residential	30-feet (2 min per lot, 3 min if corner lot)
Commercial	20-feet (2 min per lot, 3 min if corner lot)
Industrial	20-feet
Arterials and Major Collectors	30-feet

Notes:

1. *Spacing required may vary depending on sight distance and clearance area requirements and site and/or topography constraints. Distances include linear section of cul-de-sacs.*
2. *Street trees shall be located at least 15 feet from streetlights and stormwater catch basins, at least 10 feet from fire hydrants and utility poles, and at least 5 feet from driveway cuts and underground utilities, unless approved otherwise by the City Engineer.*
3. *Street tress shall not be located where the City determines the trees may be a hazard to the public interest or general welfare or under overhead power lines, if tree height at mature age exceeds the height of the power line.*

309.05.E APPROVED STREET TREE LIST

Common Name	Latin Name	Planting Strip Width					
		Overhead Power			No Overhead Power		
		4'- 5.5'	6'- 7.5'	8' plus	4'- 5.5'	6'- 7.5'	8' plus
Hedge Maple	*Acer campestre*		X	X			
Rocky Mtn. Glow Maple	*Acer grandidentatum* 'Schmidt'		X	X			
Big Leaf Maple	*Acer macrophyllum*						X
State Street Maple	*Acer miyabei* 'Morton'					X	X
Columnar Norway Maple	*Acer platanoides* 'Columnar'				X	X	
Crimson King Maple	*Acer platanoides* 'Crimson King'						X
Crimson Sentry Maple	*Acer platanoides* 'Crimson Sentry'	X	X				
Deborah Maple	*Acer platanoides* 'Deborah'						X
Emerald Queen Maple	*Acer platanoides* 'Emerald Queen'						X
Emerald Lustre Maple	*Acer platanoides* 'Pond'						X
Sycamore Maple	*Acer pseudoplatuanus*					X	X

APPROVED STREET TREE LIST (continued)

Common Name	Latin Name	Planting Strip Width					
		Overhead Power			No Overhead Power		
		4'- 5.5'	6'- 7.5'	8' plus	4'- 5.5'	6'- 7.5'	8' plus
Bowhall Maple	*Acer rumbrum* 'Bowhall'				X	X	
Red Sunset Maple	*Acer rumbrum* 'Franksred'						X
October Glory Maple	*Acer rumbrum* 'October Glory'						X
Scanlon Maple	*Acer rumbrum* 'Scanlon'				X	X	
Scarlet Sentinel Maple	*Acer rumbrum* 'Scarsen'				X	X	
Jacquemontii Birch	*Betula jacquemontii*					X	X
Pyramidal European Hornbeam	*Carpinus betulus* 'Fastigiata'					X	X
Golden Catalpa	*Catalpa bignonioides* 'Aurea'						X
Katsura Tree	*Cercidiphyllum japonicum*						X
Eastern Redbud	*Cercis canadensis*		X	X			
Pacific Dogwood	*Cornus nuttallii*			X			
Lavalle Hawthorn	*Crataegus* x *lavellei*	X	X				
European Beech	*Fagus sylvatica*					X	X
Dawyck Purple Beech	*Fagus sylvatica* 'Dawyck Purple'				X	X	
Autumn Purple Ash	*Fraxinus americana* 'Junginger'					X	X
Golden Desert Ash	*Fraxinus excelsior* 'Aureafolia'	X	X				
Flame Ash	*Fraxinus oxycarpa* 'Flame'				X	X	
Raywood Ash	*Fraxinus oxycarpa* 'Raywood'				X	X	
Marshall Ash	*Fraxinus pannsylvanica* 'Marshall'					X	X
Summit Ash	*Fraxinus pannsylvanica* 'Summit'				X	X	
Sunburst Honeylocust	*Gleditsia triacanthos* var. *inermis* 'Suncole'						X
Arnold Tulip Tree	*Liriodendron tulipifera* 'Fastigiatum'				X	X	
Kobus Magnolia	*Magnolia kobus*					X	X
Bloodgood London Planetree	*Platanus* x *acerfolia* 'Bloodgood'						X
Thundercloud Plum	*Prunus cerasifera* 'Thundercloud'		X	X			
Kwanzan Cherry	*Prunus serrulata* 'Kwanzan'		X	X			
Chanticleer Pear	*Pyrus calleryana* 'Glen's Form'				X	X	
Swamp White Oak	*Quercus bicolor*						X
Scarlet Oak	*Quercus coccinea*						X
Oregon White Oak	*Quercus garryana*						X
Pin Oak	*Quercus palustris*						X
Skyrocket Oak	*Quercus robur* 'Fastigiata'				X	X	
Red Oak	*Quercus rubra*					X	X

APPROVED STREET TREE LIST (continued)

Common Name	Latin Name	Planting Strip Width					
		Overhead Power			No Overhead Power		
		4'- 5.5'	6'- 7.5'	8' plus	4'- 5.5'	6'- 7.5'	8' plus
Shumard Oak	*Quercus shumardii*						X
Globe Locust	*Robinia pseudoacacia* 'Inermis'		X	X			
Red Cascade Mountain Ash	*Sorbus americana* 'Dwarfcrown'	X	X				
Cardinal Royal Mountain Ash	*Sorbus aucuparia* 'Michred'				X	X	
Greenspire Linden	*Tilia cordata* 'Greenspire'					X	X
Salem Linden	*Tilia cordata* 'Salem'					X	
Allee Elm	*Ulmus parvifolia* 'Emer II'					X	X
Halka Zelkova	*Zelkova serrata* 'Halka'					X	X
Green Vase Zelkova	*Zelkova serrata* 'Green Vase'					X	X

Source: City of Salem.

310 RUSTIC TRAILS AND MULTI-USE PATHS

310.01 RUSTIC TRAILS

310.01.A GENERAL

1. Rustic trails shall be provided by Developers in locations designated by the City's adopted parks plan, trails program, and as required by land use decisions.

2. A rustic trail is a facility separated from motor vehicle traffic by an open space or barrier, either within the street right-of-way or within an independent right-of-way or easement. These are typically used by joggers and hikers as two-way facilities. Rustic trails are appropriate in corridors not well served by multi-use paths to create short cuts that link destination and origin points as elements of the City's trail plan.

3. Rustic trails shall not provide access or support any vehicle traffic. Rustic trails shall be assumed as for pedestrian use only with a minimum vertical clearance of 7-feet to overhead obstructions. Proposed modifications due to physical constraints or other circumstances must be approved by the City Engineer.

4. Rustic trails shall be a minimum of 4-feet wide with 1-foot wide shoulders.

5. Rustic trail right-of-way or easement width shall be a minimum of 20-feet or as required by the City Engineer. In order to protect natural riparian vegetation or other sensitive areas, rustic trails shall be located a minimum of 20-feet, or as required by the City Engineer, from the top of bank of rivers, streams, or other sensitive areas. Where required, the design of the rustic trails shall be interrupted by periodic points of access to permit viewing the waterway from the bank.

6. Rights-of-way for rustic trails shall be dedicated to the City for public use or may be approved as public access easements on private property. Rustic trails shall be maintained as part of the public right-of-way or by the underlying landowner if constructed as public easements over private land.

310.01.B GRADE

1. Where the rustic trail grade would exceed 18 percent slope, a rustic trail will be constructed as stairs for pedestrians. Based on local conditions, the City Engineer may approve alternatives to stairs, including the use of switchbacks and alternative materials. If stairways are needed, they shall be at least 5-feet wide with handrails on both sides.

310.01.C LIGHTING

1. Complete illumination of the trail is not required; however, adequate lighting shall be provided to fully illuminate the entrances to the rustic trail unless otherwise required by the City Engineer.

310.01.D STRUCTURAL SECTION

1. Rustic trails shall be constructed with asphalt concrete pavement unless specifically defined below or otherwise approved by the City Engineer. Asphalt pavement or approved equivalent shall be required in locations where the supporting soils are wet and boggy such as near a river, stream, or wetland. The minimum structural pavement section shall be minimum 2-inches of class “C” asphalt concrete pavement over 3-inches of 3/4" or 1” crushed aggregate base.

    a. Where rustic trails are required to blend with the sidewalk system in public right-of-way, the trail shall be constructed with Portland Cement Concrete to sidewalk standards.

    b. Where the rustic trail is located within a natural rural setting as determined by the City Engineer, a softer surface such as shredded bark may be allowed.

2. Rustic trails shoulders shall be 1-foot wide and be constructed of native backfill material unless otherwise required by the City Engineer.

310.02 MULTI-USE PATHS

310.02.A GENERAL

1. Multi-use paths shall be provided by Developers in locations designated by the City’s adopted parks plan, trails program, and as required by land use decisions.

2. A multi-use path (also known as “Bike Path” or “Accessway”) is a facility separated from motor vehicle traffic by an open space or barrier, either within the street right-of-way or within an independent right-of-way or easement. These are typically used by pedestrians, joggers, skaters and bicyclists as two-way facilities. Multi-use paths are appropriate in corridors not well served by streets to create short cuts that link destination and origin points.

3. Multi-use paths shall be assumed as shared use with a minimum vertical clearance of 10-feet to overhead obstructions. Proposed modifications due to physical constraints or other circumstances must be approved by the City Engineer.

4. Multi-use paths for pedestrian and bicyclists shall be 8-feet wide with 2-feet wide shoulders. Multi-use paths that will also provide secondary fire and/or utility maintenance vehicle access shall be a minimum of 12-feet wide with 2-feet wide shoulders.

5. Multi-use path right-of-way or easement width shall be a minimum of 20-feet or as required by the City Engineer. In order to protect natural riparian vegetation or other sensitive areas, multi-use paths shall be located a minimum of 20-feet, or as required by the City Engineer, from the top of bank of rivers, streams, or other sensitive areas. Where required, the design of the multi-use paths shall be interrupted by periodic points of access to permit viewing the waterway from the bank.

6. Rights-of-way for multi-use paths shall be dedicated to the City for public use or may be approved as public access easements on private property. Multi-use paths shall be maintained as part of the public right-of-way or by the underlying landowner if constructed as public easements over private land.

7. Multi-use paths shall be constructed for two different situations where 1) no vehicular use will occur and 2) where heavy maintenance or emergency vehicle access use will occur. In both cases, subgrade preparation will require removal of existing organic material in accordance with roadway construction. Multi-use paths shall prohibit the use of unauthorized motor vehicle traffic by installing removable bollards as shown in the Standard Drawings.

8. Multi-use paths connected to public streets shall be straight enough at both ends to be visible from the public street. On-street parking shall be prohibited within 15-feet of the intersection of a multi-use path and a public street to preserve safe sight distance. A clear-vision triangle shall be provided at the ends of the multi-use path.

310.02.B GRADE

1. Where the multi-use path grade would exceed 15 percent slope, a multi-use path shall be constructed as stairs for pedestrians. Based on local conditions, the City Engineer may approve other alternatives, including the use of switchbacks and alternative materials. If stairways are needed, they shall be at least 5-feet wide with handrails on both sides and approved by the City Engineer. Adequate signing and pavement markings shall be provided in locations not allowing safe maneuvering of fire and/or utility maintenance vehicles. Parking and adequate hammerhead turn-around shall also be provided.

310.02.C LIGHTING

1. Adequate lighting shall be provided to fully illuminate the entire length of a pedestrian or multi-use path unless otherwise approved by the City Engineer.

310.02.D STRUCTURAL SECTION

1. Multi-use paths shall be constructed with PCC pavement. The minimum structural PCC pavement section shall be 4-inches of PCC pavement over 4-inches of 3/4" or 1” crushed aggregate base. If the path is intended to support utility maintenance trucks, the PCC thickness shall be increased to 8-inches minimum or as necessary to adequately support the anticipated vehicle traffic loads.

2. Multi-use path shoulders shall be 2-feet wide or a minimum of 1-foot wide when adjacent to drainage ditches and constructed of 3/4" or 1” crushed aggregate unless otherwise approved by the City Engineer.

310.03 DRAINAGE

310.03.A Where a path or trail is constructed on a hillside or along an unimproved hillside roadway, a ditch of suitable dimensions shall be placed on the uphill side to intercept the hillside runoff. The ditch centerline shall be at least 5-feet from the edge of the pavement and additional right-of-way or easement width may be required. Ditch side slope adjacent to the edge of the pavement shall be no steeper than 2:1 when measuring the horizontal distance to the vertical distance. There shall be a minimum 1-foot shoulder between the edge of the pavement and the top of ditch.

310.03.B Where possible, ditch inlets and catch basins shall be installed to intercept the runoff water and carry it under the path or trail. Drainage grates and manholes shall be located outside the traveled way of the pedestrian and bicyclists with the slits of the drainage grates placed perpendicular to the path or trail.

310.03.C When a culvert is used to cross a path or trail, the ends of the pipe shall be no closer than 5-feet from the edge of the pavement.

310.03.D Where possible, natural ground cover should be included in the design to prevent erosion on cut and fill slopes.

310.04 FENCING AND SCREENING

310.04.A When required by the City Engineer for buffering, paths or trails shall be fenced and screened along adjacent right-of-way or easement lines. The fencing centerline shall be at least 7-feet from the edge of the pavement unless otherwise approved by the City Engineer. Additional right-of-way or easement width may be required. The area between the path or trail and fences shall be planted with a combination of groundcover or low-growing shrubs that will reach no more than 2-feet high at maturity.

311 BRIDGES AND SPECIAL STRUCTURES

311.01 GENERAL

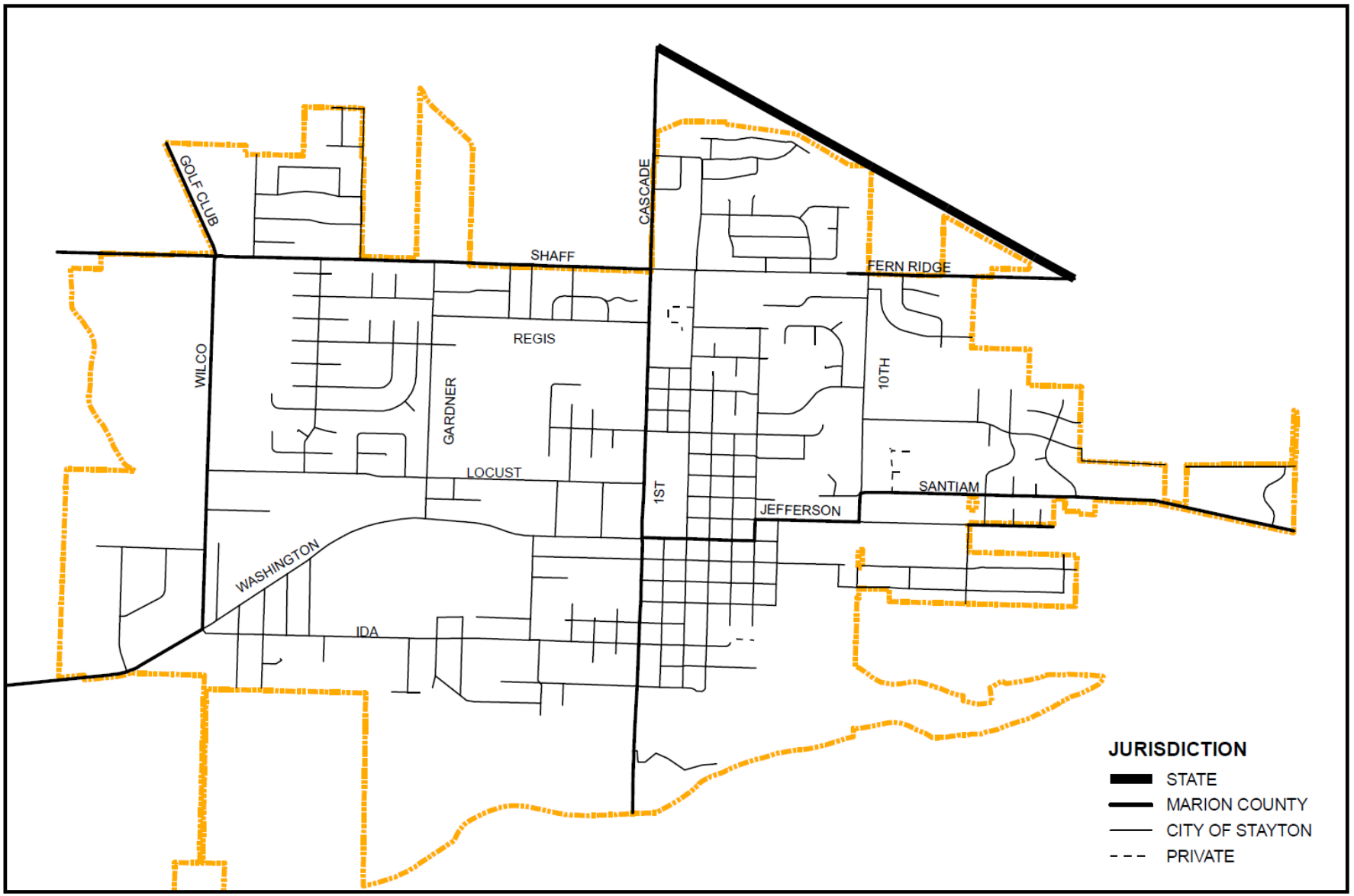
311.01.A Structures not included in the Standard Drawings shall be designed by a licensed professional engineer, registered in the State of Oregon, in accordance with the requirements of the Structural Design Section of ODOT and MUTCD. These Standards are referenced in ODOT's Bridge Design Manual and accompanying Standard Details, ODOT/APWA Standard Specifications for Highway Construction, and ODOT/APWA Standard Drawings for Design and Construction. The final structural design shall be reviewed by the City Engineer and approved by all jurisdictional agencies.

311.01.B All documentation of hydrological and soil studies, field data, and recommendations shall be coordinated with the City Engineer.

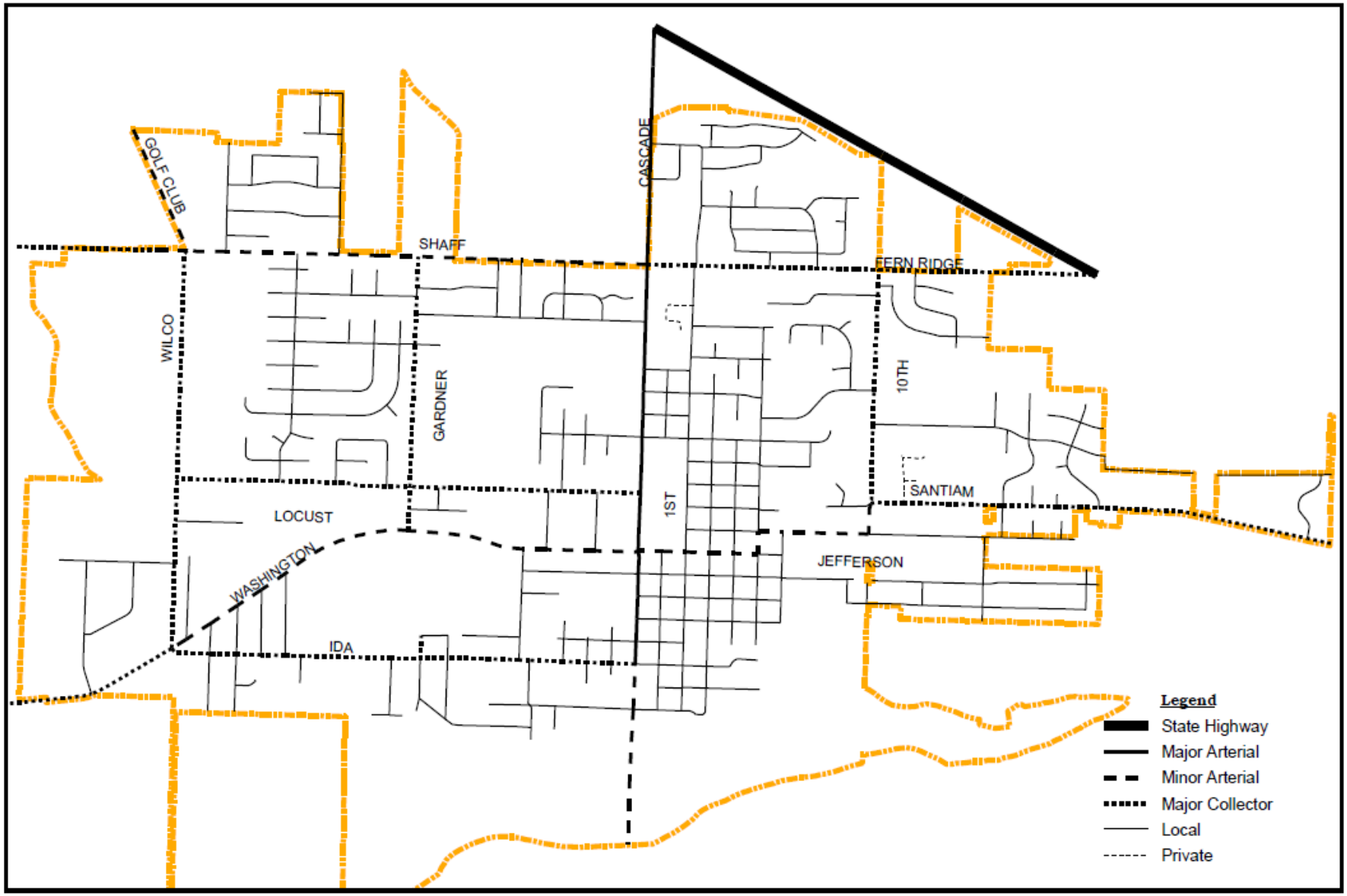
312 DESIGN ATTACHMENTS

END OF DIVISION

STREET JURISDICTIONAL OVERSIGHT MAP



STREET FUNCTIONAL CLASSIFICATION MAP



GEOMETRIC DESIGN REQUIREMENTS BY STREET FUNCTIONAL CLASSIFICATION*

Right-of-way Width (ft)	Improvement Width (ft) (curb - curb)	Number & Size Lanes (No. / Width)	Bicycle Lanes (No. / Width)	On-street Parking (No. / Width)	Sidewalk Alignment	Sidewalk Width (ft)	Landscape Area Width (ft)	Street where the Standard is to Apply		At Major Intersections		Roadway Jurisdiction
								Specific Street	Where Standard will Apply	Lanes **	Intersection Locations	
Major (Principal) Arterial										** Lanes 100' + taper (add right-of-way each side)		
Variable	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**Highway 22**	Along northern Stayton UGB	N/A	Varies	ODOT
100'	74'	4/12' + 14'	2/6'	No	Property line	6'	6	**Cascade Highway**	Highway 22 to Regis Street (TSP shows 5 lanes)	5 lanes	Shaff	Marion Co.
Minor Arterial												
100'	74'	4/12' + 14'	2/6'	No	Property line	6'	6'	**Golf Club Road** [1]	Highway 22 to Shaff Road	5 lanes	Shaff	Marion Co.
80'	50'	2/12' + 14'	2/6'	No	Property line	8'	6'	**Shaff Road** [2]	Wilco Road to 1st Avenue	5 lanes	1st Avenue & Wilco	Marion Co.
60' up to 70'	40'	2/12'	2/6'	No	Property line	6' - 8' varies	5' - 8' varies	**W. Washington Street** [3]	Wilco Road to 1st Ave. (City R/W per TSP)	3 lanes	1st, Gardner & Wilco	City
60'	46' (1st- to 3rd)	2/11' + 12'	2/6'	No	Curb line	6' - north 8' - south	0'	**E. Washington Street** [4]	1st Avenue to 3rd Avenue	3 lanes	1st Avenue	Marion Co.
60'	40' (3rd to 10th)	2/12'	2/6'	No	Property line	6'	6'	**E. Washington St. / 6th / Jefferson St. / 10th** [5]	3rd Avenue to E. Santiam Street	3 lanes	Varies	Marion Co.
60' to 80'	50'	2/12' + 14'	2/6'	No	Curb line	8'	0'	**1st Avenue** [6]	Regis Street to Washington Street	3 lanes	Varies	Marion Co.

[1] Golf Club Road: The Stayton TSP calls for a 100' R/W & 5-lane section. The City of Stayton and Marion County have not yet completed a conceptual design plan for Golf Club Road (Hwy 22 to Shaff/Wilco Road Intersection). Until a conceptual design plan is approved by the City and Marion County for Golf Club Road, the City will review each development fronting Golf Club Road on a case-by-case basis to determine R/W dedications, pavement widths, # of lanes, and frontage improvement (curb, sidewalk, storm) requirements. Until a Golf Club Road Conceptual Plan is approved, the City will require any new developments, and/or substantial changes to existing development, to comply with the typical section shown in the Wilco Road Conceptual Design. See Footnote 9 below.

[2] Shaff Road: Existing R/W varies. R/W dedications to 80' are required -- 40' from centerline unless otherwise required. See also Footnote 9 below for Golf Club/Shaff/Wilco Road intersection.

[3] W. Washington Street:

a. (1st Avenue to Wilco Road): This section is improved curb-to-curb. R/W and pavement widths vary. Use existing curbs to plan for SW & bike lanes.
b. (1st Avenue to Evergreen): Existing R/W varies from 45' to 55'. R/W dedications to 60' are required -- 30' from centerline. 8' sidewalk on north side from 1st to Gardner Avenue.
c. (Evergreen to Wilco Road): Existing R/W is 60'Width. No R/W dedication is anticipated, unless needed to allow for sidewalk widening and bike lane improvements.
d. (Intersections @ 1st, Gardner & Wilco): R/W dedications will be required near 1st Avenue and Wilco Road intersections.

[4] E. Washington Street:

a. (1st Avenue to 3rd Avenue): This two block section from 1st Avenue to 3rd Avenue is part of the Downtown core area.
b. (1st Avenue intersection): Existing R/W is 60'+. Pavement width is 50' @ intersection. R/W dedication is anticipated for turn lanes.
c. (E. Washington Street: 1st to 3rd Avenue): Existing R/W is 60'. Pavement width narrows from 50' @ 1st Avenue to 44' at 3rd Ave. R/W dedication is anticipated at corners.

[5] E. Washington Street:

a. (3rd Avenue to 10th Avenue): This corridor from 1st Avenue to 10th Avenue is improved from curb-to-curb. Pavement width is typically 40', with a few exceptions.
b. (E. Washington: 3rd to 6th Avenue): Existing R/W is 60'. Pavement width varies from 44' @ 3rd to 40' @ 6th. R/W dedication is anticipated at corners
c. (6th:Avenue / Washington to Jefferson Street): Existing R/W is 60'. Pavement width is 40'. R/W dedication is anticipated at corners.
d. (Jefferson Street: 6th to 10th Avenue): Existing R/W is 60'. Pavement width is 40'. R/W dedication is anticipated at corners.
e. (10th Avenue / Jefferson to E. Santiam Street): Existing R/W is 60'. Pavement width is 50'+/-. NO R/W dedication is anticipated.

[6] 1st Avenue:

a. (Regis Street to Washington Street): The Stayton TSP calls for an 80' R/W & 3-lane section from Regis Street to the North Santiam River. R/W widths vary. Existing pavement width is 40+/- with 2 travel lanes and a center turn lane, but no bike lanes. Measure R/W from center section line of Section 10. In lieu of full R/W, City can accept 60' R/W + a 10' wide PUE/SW easement where approved.
b. (Regis Street to Cedar): Existing R/W is 50'. Minimum R/W dedication to 60' is required – 30' from centerline + a 10' wide PUE/SW easement.
c. (Cedar Street to Hollister Street): Existing R/W varies from 55' to 60'. Minimum R/W dedication to 60' is required – 30' from centerline + a 10' wide PUE/SW easement.
d. (Hollister Street to Washington Street): Existing R/W varies from 45' to 60'. Minimum R/W dedication to 60' is required – 30' from centerline + a 10' wide PUE/SW easement.
e. (1st Avenue / Washington Street Intersection): Additional R/W is anticipated at the 1st Avenue & Washington Street intersection.

Right-of-way Width (ft)	Improvement Width (ft) (curb - curb)	Number & Size Lanes (No. / Width)	Bicycle Lanes (No. / Width)	On-street Parking (No. / Width)	Sidewalk Alignment	Sidewalk Width (ft)	Landscape Area Width (ft)	Street where the Standard is to Apply		At Major Intersections		Roadway Jurisdiction
								Specific Street	Where Standard will Apply	Lanes **	Intersection Locations	
Minor Arterial *(continued)*												
60' or 80'	50'	2/12' + 14'	2/6'	No	Curb line	8'	6'	**1st Avenue** [7]	Washington St. to Water St.	4 lanes	Ida	Marion Co.
80'	50' to 36'	2/12' + 14'	2/6'	No	Property line	8'	6'	**1st Avenue** [8]	S. of Water St. (taper out turn lane by bridge)	3 lanes	Water	Marion Co.
Major Collector												
80'	50'	2/12' + 14'	2/6'	No	Property line	6'	8'	**Designated yellow in TSP**	(Designated yellow in TSP or by PW Director)	Variable	Varies	City
80'	50'	2/12' + 14'	2/6'	No	Property line	6'	8'	**Wilco Road** [9]	Shaff Road (Signalized) to Ida Street (All Way Stop)	5 lanes	Shaff	Marion Co.
80'	50'	2/12' + 14' w/	2/6'	No	Property line	6'	8'	**Washington – W. Stayton Road / Shaff Road** [10]	West of Wilco Road Taper to 2 lanes @ UGB	3 lanes	Wilco	Marion Co.
80'	50'	2/12' + 14'	2/6'	No	Property line	6'	8'	**Fern Ridge Road** [11]	1st Avenue to Hwy 22	5 lanes	1st Avenue	Marion Co.
60'	36'	2/12'	2/6'	No	Property line	6'	5'	**Locust Street** [12]	Wilco Road to 1st Avenue	3 lanes	1st Avenue	City
60'	36'	2/12'	2/6'	No	Property line	6'	5'	**Gardner Avenue** [13]	Shaff Road to Washington Street	3 lanes	Shaff & Washington	City
60'	36'	2/11'	Shared	2/7'	Property line	6'	5'	**Ida Street** [14]	Wilco Road to 1st Avenue	3 lanes	1st Avenue	City
60'	36'	2/12'	2/6'	No	Property line	6'	5'	**10th Avenue** [15]	Fern Ridge Road to E. Santiam Street (3 lanes @ Hospital)	3 lanes	Ends & Hospital	City
Minor Collector												
60'	34' & 36'	2/10' & 2/11'	No	2/7'	Property line	5'	4.5' & 5.5'	**Designated green in TSP**	Designated by green line on TSP map	2 lanes	Varies	City

[7] 1st Avenue:

a. (Washington Street to Ida Street): The Stayton TSP calls for an 80' R/W & 3-lane section from Regis Street to the North Santiam River. R/W widths vary. Existing pavement width is 40+/- with two travel lanes and a center turn lane, but no bike lanes. Measure R/W from center section line of Section 10. In lieu of full R/W, City can accept 60' R/W + a 10' wide PUE/SW easement where approved.
b. (Washington Street to Ida Street): Existing R/W varies from 40' to 55'. Minimum R/W dedication to 60' is required – 30' from centerline. See Barker research on 1st Avenue R/W lines for this section of roadway and City GIS concept plan.
c. (Ida Street to Water Street): Existing R/W varies from 56' to 59'. Minimum R/W dedication to 60' is required – 30' from center section line of Section 10.

[8] 1st Avenue (Water Street to North Santiam River): The Stayton TSP calls for an 80' R/W & 3-lane section from Regis Street to the North Santiam River. Existing R/W varies from 65' to 80'. Existing pavement width is 40+/- with two travel lanes, plus a taper to a 3 lane section at Water Street. Minimum R/W dedication to 80' is required south of Water Street – 40' from centerline.

[9] Wilco Road Conceptual Design: In 2014, the City of Stayton and Marion County agreed on a conceptual design plan for Wilco Road (Shaff Road to Ida / Washington Street). The conceptual plan includes recommended R/W widths, pavement cross-sections, sidewalk widths and locations, and various water quality swale locations. New developments and substantial changes to existing development are to comply with the conceptual design plan unless otherwise approved by the City and Marion County.

[10] W. Washington Street & W. Stayton Road / Shaff Road: See Footnote 9 above.

[11] Fern Ridge Road: Existing R/W varies from 60' to 80'. Minimum R/W dedication to 80' is required – 40' from centerline. Match north R/W & curb lines near 10th Avenue at end of Sylvan Springs subdivision.

[12] Locust Street: Existing R/W varies from 50' to 60'. Minimum R/W dedication to 60' is required – 30' from centerline. Match north R/W line. Only R/W dedication required between 1st Avenue & Birch on south side.

[13] Gardner Avenue: Existing R/W is 60'. Only R/W dedication required is radius at Shaff Road / Gardner Avenue intersection.

[14] Ida Street: Existing R/W is 60', except at NW corner of Evergreen. Minimum R/W dedication to 60' is required – 30' from centerline. R/W dedication required at corner of Evergreen.

[15] 10th Avenue: Existing R/W varies 60' to 70'. R/W dedication, sidewalk and or slope easement is required for east side sidewalks north of E. Fir Street.

Right-of-way Width (ft)	Improvement Width (ft) (curb - curb)	Number & Size Lanes (No. / Width)	Bicycle Lanes (No. / Width)	On-street Parking (No. / Width)	Sidewalk Alignment	Sidewalk Width (ft)	Landscape Area Width (ft)	Street where the Standard is to Apply		At Major Intersections		Roadway Jurisdiction
								Specific Street	Where Standard will Apply	Lanes **	Intersection Locations	
Local Streets												
60’	34’	2/10'	No	2/7'	Property line	5'	7.5’	**Standard residential street**	Residential streets throughout the city	2 lanes	Varies	City
60’	34’	2/10'	No	2/7'	Property line	5'	7.5’	**Long Cul-de-sacs**	200' to 450’ to end of bulb	2 lanes	Varies	City
50’	30’	2/11’	No	1/8'	Property line	5'	4.5’	**Short Cul-de-sacs**	Less than 200' to end of bulb	2 lanes	Varies	City
45’	28’	2/10'	No	1/8'	Property line	5'	3.5’	**Skinny Street (as approved)**	Hillsides (or with PW Approval)	2 lanes	Varies	City
45' radius	38' radius		No	No	Curb line	5'	0’	**Turnaround bulb**	at end of cul-de-sacs	N/A		City
Downtown Commercial Streets												
60’	40’	2/13’	No	2/7'	Property line	9.5’	0’	**Downtown Area**	1st Avenue to 4th Avenue Washington Street to Water Street	2 lanes	Varies	City
60’	36’	2/11’	No	2/7'	Property line	12’	0’	**3rd Avenue**	Redevelopment: Water Street to Burnett Street per Downtown Plan	2 lanes	Varies	City
Industrial Streets												
80’ (Industrial)	40’	2/13'	No	2/7'	Property line	5'	14’	**Industrial low use parking**	Sidewalks per Public Works	2 lanes	Varies	City
60' radius (Industrial)	TBD (45’ min)	TBD	No	2/7'	Property line	5'	14	**Industrial turnaround bulb**	At end of cul-de-sacs	N/A	Varies	City
Roundabouts[16]												
200' dia.	170' dia.	1 circular	No	No	Property line	6'	8’	**Wilco Rd. / Ida St. / Washington St.**	5-way intersection	N/A	Varies	Marion Co.
130’ dia.	110’ dia.	1 circular	No	No	Property line	6'	8’	**Washington St. / 6th / Jefferson St. / 10th**	Total of 4 between 1st Avenue to & E. Santiam Street	N/A	Varies	Marion Co.
Alleys												
16’	15’	N/A	N/A	No	N/A	N/A	N/A	**Alleys (as approved by Public Works)**	As approved by Public Works	N/A	Varies	City

Streets and Alley requirements shown above are for general guidance. Specific requirement for each development shall be confirmed and coordinated with the City Engineer.

[16] Roundabouts: Marion County has not adopted the TSP recommendation for roundabouts at various intersections. No roundabout is required unless approved by the City of Stayton and Marion County. At the time the City reviews any new development or substantial change to a development near each of these intersections, the City and Marion County will review and agree on the intersection design.

DIVISION 4 – WATER DISTRIBUTION

DIVISION 4

WATER DISTRIBUTION

401 GENERAL

401.01 AUTHORITY AND PURPOSE

401.01.A These Design Standards shall apply to all improvements within existing and proposed public right-of-way and public easements, to all improvements to be maintained by the City, and to all improvements for which the City Code requires approval by the City. Most of the elements contained in these Design Standards are public works oriented and it is intended that they apply to both publicly financed public improvements under City contract and privately financed public improvements.

401.01.B Private construction firms, Developers, consulting engineers, or any other individuals or business entities engaged in the design and construction of improvement projects that ultimately will be owned, operated, or maintained by the City shall comply with these standards. Where minimum values are stated, greater values should be used whenever practical; where maximum values are stated, lesser values should be used whenever practical.

401.01.C The purpose of these Design Standards is to provide a consistent policy under which certain physical aspects of public improvements shall be implemented. All public system improvements and public works facilities shall be designed and constructed in accordance with applicable rules and regulations of the City and any City interpretations of those rules and regulations, including applicable technical guidance manuals, and in accordance with applicable federal, state, and local statutes and rules. Approval of public improvements must be made by the City Engineer or the Public Works Director before construction is permitted. An authorized representative of the City will be available for construction observation during construction of the project.

401.01.D It is important to emphasize that these Design Standards are not intended to inappropriately restrict or constrain the originality or innovativeness of the Design Engineer and his or her ability to exercise and apply professional judgment to each situation and project. The City recognizes that every public improvement project has unique characteristics and situations. These Design Standards cannot provide for all situations and are intended to assist, but not to serve as a substitute for competent work by design professionals. It is expected that the Design Engineer will bring to each project the standard of care from the Design Engineer's respective discipline.

401.01.E If the Design Engineer anticipates challenges in meeting these Design Standards, they should contact the City Engineer prior to extensive design efforts. The City Engineer will seek to work with each designer to achieve a satisfactory design and construction project that is in the best long-term interests of the City of Stayton and one that complies with applicable rules and regulations.

401.01.F These Design Standards are not intended to limit any innovative or creative effort which could result in better quality, better cost savings, or both. Any proposed departure from the Design Standards will be judged; however, on the likelihood that such variance will produce a comparable result, or long-term benefit to the City, while meeting the intended purpose of the design standard.

401.01.G Requests for alternatives to these Design Standards will be considered for approval by the City Engineer as the need arises and conditions warrant modification. Request must show that the variance meets the intent of the Design Standards and will not compromise safety, impact other properties or cause an increase in maintenance. This consideration will be on a case-by-case basis and require sufficient justification prior to approval. All requests will be in writing and be accompanied by engineered drawings and final design calculations.

401.01.H All franchise utility improvements, including telephone, electrical power, gas and cable TV shall meet the current standards of the appropriate agency as well as City Standards.

401.01.I In the case of conflicts between the text of these Design Standards and the Standard Drawings, or between the provisions of these Design Standards and the Standard Construction Specifications, the more stringent as determined by the City Engineer shall apply.

401.01.J All surveys for public works facilities shall be performed under the direction of a Professional Land Surveyor registered in the State of Oregon. All elevations shall be referenced to NAVD 88 vertical datum. Vertical benchmark locations shall be coordinated with the City.

401.01.K On completion of projects to become public works, the Design Engineer shall submit one complete set of reproducible "Record Drawings" (As-Builts), a compact disc (CD) containing electronic PDFs and cad files (AutoCAD or others as approved) to the City Engineer. The drawings shall show any deviations from the original construction drawings and shall include sufficient information to accurately locate public works facilities. No bond will be released until the City Engineer receives and approves an acceptable set of reproducible Record Drawings from the Design Engineer, with his/her stamp of certification.

401.01.L For privately financed public improvements, the Design Engineer, at the completion of construction, shall submit a completion certificate to the City stating that all work has been completed in accordance with the approved project plans and specifications.

401.01.M Before the City accepts a public works project for operation and maintenance and releases the Performance Bond, a one (1) year Warranty Bond on all materials and workmanship incorporated in the project shall be provided to the City.

401.01.N The objective of these Design Standards is to develop a water distribution system that will:

- ❖ Be consistent with the adopted Water Master Plan.
- ❖ Be of materials strong enough to resist all expected loads, both internal and external, and able to preserve the potability of the water supply.
- ❖ Provide a water distribution system that is consistent and predictable.
- ❖ Be economical and safe to build and maintain.

401.02 APPLICABILITY

401.02.A These Design Standards will govern the design of permanent water distribution facilities serving properties within the City of Stayton and applicable work within its service areas. This document will be routinely referred to as the Design Standards.

401.03 REFERENCES

401.03.A These Design Standards are intended to be consistent with the most current provisions of the documents and requirements listed and referenced in Subsection 101.03 and others specifically listed below. Projects are expected to be consistent with the following:

1. Applicable design criteria and concepts consistent with the most recent Water Master Plan adopted by the City of Stayton unless more restrictive criteria are identified herein. Where additional detailed information and background is required for a particular project, the Water Master Plan shall be referred and adhered to, as applicable. Any deviations from the Water Master Plan shall be flagged and presented to the City Engineer for consideration.

2. Applicable design criteria and concepts in accordance with the rules and regulations of the Oregon Department of Human Services – Drinking Water Program (DHS-DWP) as established in the Oregon Administrative Rules, Chapter 333, Division 61.

3. State of Oregon Plumbing Specialty Code.

4. Applicable design guidelines published by the American Water Works Association.

5. Applicable design guidelines published by the American Society of Civil Engineers.

401.04 SPECIAL DESIGN APPLICATIONS

401.04.A Special design applications not covered in these Design Standards require review and approval by the City. Additional review and approval by the Department of Humans Services – Drinking Water Program (DHS-DWP) may also be required. Submittal of full design calculations, supplemental drawings, and information will be required prior to any approval.

401.04.B Such design applications requiring special review and approval include, but are not limited to, the following:

- Water Distribution Pump Stations
- Reservoirs
- Relining of Existing Water Mains
- Treatment Plants
- Pressure Regulating Devices
- Flow Measurement/Monitoring/Controls/Telemetry Devices

401.05 STANDARD CONSTRUCTION SPECIFICATIONS AND STANDARD DRAWINGS

401.05.A Except as otherwise provided by these Design Standards, all construction design detail, workmanship, and materials shall be in accordance with the current edition of the City of Stayton Public Works Standard Construction Specifications and Standard Drawings.

401.06 CITY POLICY REGARDING ENGINEERING

401.06.A It will be the policy of the City to require compliance with Oregon Revised Statute 672 for Professional Engineers.

401.06.B Engineering plans, reports, or documents shall be prepared by a registered Professional Engineer or by a subordinate employee under the Design Engineer's direction, and shall be signed by the Design Engineer and stamped with the Design Engineer's seal to indicate responsibility for them. The Design Engineer shall maintain complete responsibility for the design of the project. The Design Engineer shall review any proposed public facility extension, modification, or other change with the City prior to engineering or other proposed design work to determine if there are any special requirements or whether the proposal is permissible.

401.06.C City approval of plans or any other engineering document produced by the Design Engineer does not in any way relieve the Design Engineer of responsibility for the design, or their responsibility to meet applicable City, County, State, and Federal requirements, or their obligation to protect life, health, and property of the public. The plan for any project shall be revised or supplemented at any time it is determined that the project requirements have not been met. It is also required that at any time a revision to the design is required; the Design Engineer shall maintain responsibility to redesign according to these Design Standards per the City's approval. It is therefore necessary for the Design Engineer to be available during construction should timely changes be required. If the Engineer of Record leaves the acting consulting firm then a new registered engineer will have to submit an updated Engineer of Record form to the City prior to work commencing.

401.07 CONVENTIONS USED THROUGHOUT THE DESIGN STANDARDS

401.07.A See Subsection 101.07 for conventions used throughout these Design Standards.

401.08 ORGANIZATION AND CLASSIFICATION OF DIVISIONS

401.08.A See Subsection 101.08 for the organization and classification of divisions throughout these Design Standards.

401.09 CLARIFICATIONS, MODIFICATIONS, AND REVISIONS TO DESIGN STANDARDS

401.09.A These Design Standards will be periodically updated due to changes in policy or procedures, new technology, and methods of design and construction. Periodic revisions to these Design Standards will be necessary to maintain consistency in that regard. The date appearing on the title page is the date of the latest revision for each Division. Parenthetical notations at the bottom of each page indicate the most recent change. It will be the user's responsibility to obtain and maintain his/her copy of these Design Standards with the latest changes.

401.09.B See Subsection 101.09 for general policies and procedures regarding clarifications, modifications, and revisions to the Design Standards.

401.10 DEFINITIONS AND TERMS

401.10.A See Subsection 101.10 for standard definitions and terms used throughout these Design Standards.

402 GENERAL DESIGN REQUIREMENTS

402.01 PERFORMANCE STANDARDS

402.01.A Water distribution systems shall be designed to meet Oregon Administrative Rules (including ORS448), AWWA Standards, and guidelines of the current Water Master Plan and its updates.

402.01.B The water system shall have sufficient capacity to maintain 40 psi at the building side of the meter for one and two family dwellings. For other developments a minimum pressure of 35 psi will be provided at the building side of the meter during periods of maximum day demand. The system shall have adequate flow during expected maximum daily demand plus fire flows while maintaining a minimum 20 psi operating pressure. Normal working pressure in the distribution system should be approximately 60 psi with a range of 40 psi to 80 psi. Any isolated locations with pressure above 80 psi require a Pressure Reducing Valve (PRV) on the customer side of the meter. NOTE: A pump shall not be used on a service line to provide adequate pressure to a subdivision lot or property located above the pressure level of the supply main.

402.01.C Water system design shall meet distribution needs for projected maximum daily demand within a given service area. New water systems shall allow for future extensions beyond present development that are consistent with the Water Master Plan. New water systems shall be sized according to the current zoning area fire flow needs, velocity, standards, and water modeling determinations.

402.01.D Water distribution systems shall be designed to accommodate maximum development of the service area with recognition of possible urban renewal, industrial expansion, etc. Systems shall be designed to provide for future extension with minimal disruption of existing service.

402.01.E As a condition of water service, developments shall provide public water mains of sufficient size for consumption and fire protection to adjacent parcels. This will include the extension of water mains along the street frontages of the property to adjoining properties when the main is located in the street right-of-way and across the property to adjoining properties when the main is located in easements. Property with multiple frontages shall extend water along all frontages. Service lines or laterals, as required, shall be extended to vacant lots if street overlays or reconstruction is contemplated.

402.01.F When a waterline improvement creates parallel water mains within the same street or roadway, the existing waterlines shall be abandoned along the entire path of new waterline construction. In addition to abandonment, all existing services and hydrants shall be transferred of to the new waterline.

402.01.G All waterlines shall be located within the public right-of-way or as directed and approved by the City Engineer. These lines are placed in the public right-of-way for ease of maintenance and access, control of the facility, operation of the facility, and to permit required replacement and/or repair. The City Engineer, under special conditions, may allow a public waterline to be located within a public water easement as referenced in Subsection 102.08.

402.02 WATERLINE PLANS

402.02.A Complete plans and specifications for proposed water distribution system projects, including any necessary public dedications and easements, shall be submitted to the City Engineer for review. Such plans and specifications must receive City Engineer approval prior to construction permit issuance and prior to beginning of construction. Engineering documents shall be prepared by a Professional Engineer registered and licensed in the State of Oregon.

402.02.B Engineering design plans drawn to scale, showing the existing and proposed water system, shall be submitted in accordance with Division 2 of these Design Standards. The proposed plan shall show profile and plan view of the proposed improvements.

402.03 PIPE MATERIALS AND SIZE

402.03.A All public water distribution systems shall be constructed with ductile iron pipe, minimum thickness Class 52. All such pipe shall be cement mortar-lined pipe with push-on or mechanical type joints.

402.03.B When a potential corrosive condition is encountered, all ductile iron pipe and fittings will be polyethylene encased with an 8-mil tubing meeting manufacturer and AWWA Standards. Where an active cathodic protection system is encountered as a result of other utilities, a deviation from the normal pipe design/material/installation practice may be required by the City Engineer.

Standard pipe sizes for distribution and transmission mains will be 8-inch, 12-inch, 16-inch, 20-inch, 24-inch, and 30-inch. Smaller diameter lines may be acceptable in some situations if approved by the City Engineer. For example, a 6-inch line may be approved for dead-end streets that will serve not more than twelve (12) residents and a fire hydrant is not required on the line being installed. Designs requiring pipe sizes larger than 30-inch will be reviewed on a case-by-case basis.

402.03.C The pipe material, size, and typical applications are as shown in the following Table:

MINIMUM PIPE SIZE	CRITERIA
1-inch and 2-inch Copper	For services only. 1-inch is minimum size for domestic services and is used for 3/4-inch x 1-inch and 1-inch meters. 2-inch services are minimum size for 1.5-inch and 2-inch meters.
4-inch and 6-inch Ductile Iron	Dead-end streets; No contemplated extension of the water main; Serving 12 or less residential properties; Maximum distance of 450-feet or less for looped or 200-feet or less for dead-ends; No requirement for fire hydrants
6-inch Ductile Iron	Fire hydrant laterals served by minimum 8-inch distribution lines.
8-inch Ductile Iron	Residential zoning distribution water mains for a grid (looped) system, not to exceed an unsupported length of 600-feet and will not be permanently dead-ended. Looping of the distribution grid will be at least every 600-feet.
12-inch Ductile Iron	Commercial, multi-family, and industrial zoning.
16-inch Ductile Iron and larger	As required for specific development demands or transmission mains.

402.03.D Where system static pressures allow and field flow measurement or system modeling shows adequacy, velocities in distribution mains may be designed but shall not exceed 8-feet per second for combined fire, domestic, and irrigation flows. Velocity in service lines shall be designed not to exceed 10-feet per second.

402.03.E For portions of the water system with mid-range to low-static pressures, required flows may not be achievable while still maintaining a minimum system residual of 20 psi. Oversizing of waterlines may be required to achieve the required flows.

402.04 WATER SYSTEM CLASSIFICATION

402.04.A DISTRIBUTION MAINS (12-INCHES AND SMALLER). Mains that are used for servicing consumers.

402.04.B TRANSMISSION MAINS (16-INCHES AND LARGER). Mains used for transporting water from the source of supply and storage reservoirs to the distribution system and distribution reservoirs. Some transmission lines serve a dual purpose as distribution lines also to avoid the need for multiple lines in one location.

403 MINIMUM DESIGN CRITERIA

403.01 VELOCITY AND SLOPE

403.01.A Velocities shall meet the requirements outlined in the following Table.

LINE TYPE	MAX. VELOCITY (FT./SEC)
Distribution	8
Transmission	5

403.01.B All water systems shall be laid on a consistent and uniform grade. When shown on the plans or designated by the City Engineer, combination air/vacuum valves, per the Standard Drawings, shall be installed on transmission and distribution lines at all high points in grade and at other points as determined appropriate by the City Engineer.

403.01.C All water systems laid on slopes greater than 15 percent, or as recommended by pipe manufacturer for slopes 15 percent and less, shall be secured by anchor walls in accordance with the Standard Drawings. Anchor walls located at the middle of pipe runs of less than 200 feet between manholes are generally adequate, but for spans greater than 200 feet, anchor walls shall not exceed a spacing of 100 feet.

403.02 HYDRAULIC DESIGN

403.02.A Design capacities shall meet requirements of the current Water Master Plan and its system model and shall be determined by consideration of the following factors and assumptions:

- Area to be served, both immediate and adjacent
- Current and projected population within the areas to be served
- Current and projected land use within the areas to be served
- Commercial, industrial, or institutional users to be served
- Changes in any of the above factors that are likely to occur within a foreseeable time period

403.02.B Head loss shall be determined by the Hazen-Williams equation.

$$h_L = \frac{4.726 * Q^{1.852} * L}{C^{1.852} * d^{4.87}}$$

Where:

h_L = head loss for pipe length L in feet
Q = Flow in cubic feet per second
C = Hazen-Williams roughness coefficient
d = Inside diameter of pipe in feet
L = Length of pipe in feet

403.02.C The Table below provides the "C" values that are to be used on various pipe diameters for in-service mains.

Pipe Diameter	C Value
8 Inches and Less	100
10 to 12 Inches	110
Greater than 12 inches	120

403.02.D Velocities and head loss shall meet the requirements outlined in the following Table.

LINE TYPE	MAX. VELOCITY (FT./SEC)	MAX. HEAD LOSS (FT./1000 FT.)
Distribution	8	10
Transmission	5	3

403.02.E A 20 psi residual pressure under fire flow conditions shall be maintained in the distribution system.

403.02.F In the absence of consumption data or other reliable information, the following factors are assumptions that shall be used to calculate demands:

PEAK HOUR DEMANDS	
RESIDENTIAL DEVELOPMENT	
Single Family Residence	0.75 gpm
Residential	0.25 gpm per person
COMMERCIAL DEVELOPMENT	
Light	4,500 gal/ac/day
General	7,500 gal/ac/day
Central Business District	6,250 gal/ac/day
INDUSTRIAL DEVELOPMENT	
Park	3,000 gal/ac/day
Light	3,250 gal/ac/day
Heavy	6,300 gal/ac/day

403.02.G Demand for unique commercial installations, industrial users, master planned developments, multiple, and institutional facilities will be reviewed by the City Engineer on an individual basis.

403.02.H FIRE FLOWS

1. The minimum fire flow in single-family residential areas shall be 1,000 GPM at 20 psi residual pressure, except in areas where homes exceed 3,600-square feet or areas of mixed use, in which case the fire flow will be as determined by the Fire Code and the Fire Marshall.

2. Fire flow for commercial and industrial areas shall be as required by the Fire Code and the Fire Marshall.

3. The recommended minimum fire flows, at 20 psi residual pressure, shall be as shown in the following Table, unless a more stringent minimum fire flow is required by the Fire Marshall and/or Fire Code.

LAND USE	RECOMMENDED MINIMUM FIRE FLOWS (GPM)	RECOMMENDED DURATION (HR.)
Industrial	5,000	4
Downtown	3,500	3
Commercial	2,500	2
Multiple Family	3,500	3
Single Family	1,000	2
Mixed Use	3,500	3
Schools	5,000	4
Institutional	3,500	3

403.03 THRUST RESTRAINT

403.03.A In applications requiring thrust restraint, new water mains shall be constructed of ductile iron with an internal, push-on joint restraint system. In addition, any unrestrained joints shall be properly restrained to adequately distribute anticipated thrust loading in accordance with the Standard Drawings. New water mains shall not be restrained externally with concrete reaction blocking without specific approval of the City Engineer (see Standard Construction Specifications).

403.03.B Calculations for determining restrained lengths of pipe to protect specified bends and other assemblies shall be based on the following general parameters:

1. Minimum 2:1 safety margin.
2. Minimum 150 psi test pressure.
3. 3-feet of cover.
4. Marginal trench and backfill conditions.

403.04 WATER MAIN CONFIGURATION

403.04.A The distribution system mains shall be looped at all possible locations. Developments will be required to extend mains across existing or proposed streets for future extensions of other developments. Terminations shall be planned and located such that new or existing pavement will not have to be cut in the future when the main is extended.

403.04.B Tie-ins to existing, non-standard water mains (as to size and material) shall be configured for future extension with minimal impact on local water service (see Standard Construction Specifications). Tie-ins to existing water mains not contemplated for replacement shall be made with 22.5 degree or 45 degree bends. 90 degree bends shall not be used, unless otherwise approved by the City Engineer.

403.05 DEAD-END MAINS

403.05.A Dead-end mains that are permanent or that will be extended in the future shall be provided with a properly sized blow-off, as shown in the Standard Drawings, and located in areas approved by the City Engineer.

403.05.B The installation of permanent or long-term water mains will not be permitted for dead-end mains greater than 250-feet upon which fire protection depends, or for single mains serving relatively large areas, unless otherwise approved by the City Engineer.

403.05.C No more than twenty (20) single-family residences shall be temporarily served from an un-looped waterline during a phased construction, unless approved by the City Engineer.

404 ALIGNMENT AND COVER

404.01 RIGHT-OF-WAY LOCATION

404.01.A Where waterlines are located within narrow rights-of-way (less than 50-feet), location of waterline will be reviewed by the City Engineer on a case-by-case basis.

404.01.B In general, water systems shall be located south or west from the right-of-way centerline or as approved by the City Engineer. Except as provided in Subsection 404.06, all waterlines shall be in the public right-of-way.

404.01.C Curved alignment for waterlines or mains is permitted and shall be parallel to the street centerline when practical. The minimum allowed radius will be based on allowable pipe deflection for the pipe diameter and the pipe laying length. All abrupt changes in vertical or horizontal alignment shall be made with a fitting and adequate thrust restraint. In all cases, when push-on or mechanical joint pipe is to be laid on a curve or abrupt angle either in the horizontal or vertical plane, the amount of deflection shall not exceed the maximum limits recommended by the pipe and fitting manufacturer or by the restrained retainer gland manufacturer, whichever is less.

404.02 MINIMUM COVER

404.02.A The standard minimum cover over buried water mains within the right-of-way shall be 36-inches from finish grade. The minimum cover for water mains in areas without a hard surfacing shall be 48-inches from finish grade, unless approved otherwise by the City Engineer. Finish grade will normally mean the existing or proposed pavement elevation. Where the main is located in the cut or fill side slope or where mains are located in easements, finish grade will mean final ground elevation at the water main alignment.

404.02.B The standard typical trench section shall be utilized for all waterline construction. Refer to the Standard Drawings.

404.02.C Deviation from the above standards will be considered on a case-by-case basis by the City Engineer when the following exists:

1. When there is underlying rock strata that prohibits placement of the water main 36-inches below finish grade. In this situation, a written request must be submitted to the City Engineer that includes a soils report with a plan and profile certifying that bedrock exists less than 3-feet below the undisturbed ground surface.

2. Substantial utilities exist at an elevation that will conflict with the waterline at 36-inches below finished grade; and installation of the waterline below such utility would cause the new waterline to be at an unreasonably deep elevation below finished grade.

3. Where the water main or service must be installed at a depth less than 30-inches below finished grade.

404.03 SEPARATION WITH SEWER LINES

404.03.A Water mains and services shall be installed a minimum clear distance of 10-feet horizontally from gravity sanitary sewer mains and laterals, and shall be installed to go over the top of such sewers with a minimum of 18-inches of clearance at intersections of these pipes (in accordance with the requirements of OAR Chapter 333, Public Water Systems). Separation from sanitary sewer force mains will be reviewed on a case-by-case basis. Exceptions will require the approval of the City Engineer. In all instances, the distances shall be measured edge to edge.

404.04 SEPARATION WITH UTILITIES

404.04.A Unless otherwise approved by City Engineer, the minimum spacing between water mains and storm drains, gas lines, and other underground utilities (except sanitary sewers), shall be 5-feet horizontally when the standard utility location cannot be maintained. This separation also applies to water service and utility service lines.

404.04.B Where water mains are being designed for installation parallel with other water mains, utility pipe, or conduit lines, the vertical separation shall be 12-inches below or in such a manner that will permit future side connections of mains, hydrants, or services, and avoid conflicts with parallel utilities without abrupt changes in vertical grade of the above mentioned main, hydrant, or service. Where crossing of utilities are required, the minimum vertical clearance shall be 6-inches.

404.04.C Water mains shall not be installed in alleys, unless otherwise approved by the City Engineer. Wherever possible, mains will be installed on a particular street at a constant distance from the curb. On curved streets, mains may be laid on a curve concentric with the street centerline with deflections no greater than the manufacturer's specifications, or mains may be laid in straight lines along the tangent between selected angle points to avoid conflicts with other utilities. The angle point and tangent section shall not be less than 3-feet in front of the curb face.

404.05 EASEMENTS

404.05.A Easements shall meet the requirements of Subsection 102.08, except as noted below.

404.05.B Any water main placed within a water main easement shall be permanently marked with blue plastic marker signs at all angle points, and no less than every 200-feet. In addition, marker signs shall be placed where the waterline intersects the public right-of-way at the easement location. A monument cap set in the pavement of parking lots, driveways, etc. will be an acceptable alternative to the sign.

404.06 RELATION TO WATERCOURSES

404.06.A Surface water crossings of mains shall be in accordance with Oregon Administrative Rule (OAR) 333 and the following:

1. New water mains may cross under existing streams, rivers, or other bodies of water.

2. Mains crossing stream or drainage channels shall be designed to cross as nearly perpendicular to the channel as possible.

3. Valves and service connections shall be provided at both ends of the water crossing so that the section can be isolated for testing or repair. The valves shall be easily accessible and not subject to flooding.

4. ABOVE WATER CROSSINGS – The pipe shall be designed by the Design Engineer to provide support, anchorage, and protection from freezing and damage, yet shall remain accessible for repair and maintenance. All above water crossings will require review and approval by the City Engineer.

5. UNDERWATER CROSSINGS

   a. The following surface water crossings will be treated on a case-by-case basis:

      1) Stream or drainage channel crossing for pipes 12-inches inside diameter and greater.

      2) River or creek crossings requiring special approval from the Division of State Lands.

      3) Canal crossings requiring special approval from the North Santiam Water Control District.

   b. The minimum cover from the bottom of the surface water to the top of pipe shall be 36-inches. Concrete encasement along the waterline will be required when the cover from the top of the pipe to the bottom of the surface water is 36-inches or less, unless otherwise approved by the City Engineer. The concrete encasement shall extend to a point where a one-to-one slope begins at the top of the bank and slopes down from the bank away from the surface water centerline and intersects the top of the pipe.

405 APPURTENANCES

405.01 VALVES

405.01.A In general, valves shall be the same size as the pipes in which they are installed. Valve types and materials shall conform to the City of Stayton Construction Standard Specifications. Gate valves will be used for applications 8-inch and smaller and butterfly valves for 10-inch and larger.

405.01.B Gate valves shall be resilient seated conforming to AWWA C-509 and shall be pressure rated for 200 psi. Butterfly valves shall be short-bodied conforming to AWWA C-504 and be pressure rated for 150 psi. All ductile iron mechanical joint fittings shall be pressure rated at 350psi. Flanged fittings and cast iron mechanical joint fittings shall be pressure rated at 250psi and shall be factory cement mortar lined and coated.

405.01.C In general, a tee-intersection shall be valved in two (2) branches and a cross-intersection shall be valved in three (3) branches. Transmission and distribution water mains shall have valves at not more than 500-foot spacing. Hazardous crossings such as creeks and freeway crossings shall be valved on each side. Valves shall be accessible at all times and shall be restrained and located far enough away from the casing such that the pipe in the casing can be removed and replaced between the valves.

405.01.D When a hydrant tee, or a tee branching to a cul-de-sac blow-off is installed in a sloped waterline, install a main line valve on the up hill run of the tee to allow for release of air from hydrant or blow-off. An additional main line valve may be needed on the down hill run of the tee for other operational purposes.

405.01.E Distribution tees and crosses with valves for future branch lines on mains may be required at the direction of the City Engineer. Inline valves for mains may be required as directed by the City Engineer.

405.01.F Water mains installed by phased construction, which will be extended in the future, shall terminate with a blowoff assembly in a location approved by the City Engineer.

405.02 FIRE HYDRANTS

405.02.A Fire hydrants shall be Kennedy K-81D Guardian, Waterous 5 1/4 Pacer, or approved equal. Fire hydrants shall be "high gloss safety yellow" in color and painted or epoxy coated by the manufacturer.

405.02.B No fire hydrant shall be installed on a main of less than 8-inches inside diameter. The fire hydrant lateral shall be a minimum of 6-inches nominal diameter.

405.02.C Fire hydrant installation shall conform to the Standard Drawings. Maximum 6-foot bury fire hydrants will be required in all installations. Installation of fire hydrant extensions will not be allowed, unless specifically approved by the City Engineer.

405.02.D Each fire hydrant shall have an auxiliary valve and valve box that will permit repair of the hydrant without shutting down the main supplying the hydrant. Such auxiliary valves shall be resilient-wedge gate valves. The auxiliary valve shall have mechanical joint-by-flange joint ends and connected directly to the water main using a flange joint tee and "Megalug" retainer glands, or approved equal. Refer to the Standard Drawings.

405.02.E Where necessary or required, bollards (guard posts) shall be constructed at the corners of a 7-foot square with the fire hydrant located in the center for protection from vehicles. Clear access of the fire hydrant ports shall be maintained at all times.

405.02.F SPACING

1. The distribution of fire hydrants shall be based upon the required average fire flow for the area served. Design coverage shall result in hydrant spacing of approximately 500-feet in residential areas and 300-feet in commercial or industrial subdivisions. Where approved, this spacing may be reduced by 100-feet on dead end streets. In all cases, a fire hydrant shall be no further than 250-feet from any building. Additional fire hydrants shall be placed as required by the City Engineer.

2. Where new water mains are extended along streets where fire hydrants are not needed for protection of structures or similar fire problems, fire hydrants shall be provided at a spacing not to exceed 1,000 feet to provide for transportation hazards.

3. The minimum requirements for spacing and minimum number of fire hydrants for all development types shall comply with the Fire Code.

405.02.G LOCATION

1. Fire hydrants shall be placed on the same side of the right-of-way as the waterline serving the fire hydrant. Other proposed locations will require approval by the City Engineer

2. Fire hydrants shall be located at the back of the existing or proposed sidewalk, in the planter strip, or where approved, behind the sidewalk if adequate right-of-way exists. Residential fire hydrants shall be located as near as possible to the corner of street intersections and shall be located at or near the point of curvature of the curb return or at a common property line.

3. The pumper port of fire hydrant shall be perpendicular to the curb line or shoulder as applicable. If any public fire hydrant encroaches on private property (where approved), an easement must be provided to the City.

4. Fire hydrants shall not be further than 15 feet from an approved access road, shall not be located within 20-feet of any building, and shall not be blocked by parking, unless specifically approved by the Fire Marshall.

5. A fire hydrant shall be located within 70 feet of a fire department connection. The fire department connection and the fire hydrant should be on the same side of a fire access road.

6. Fire hydrants and fire department connections shall not be obstructed and shall not be installed closer than 5-feet from any utility (above or below ground), pole, guy wire, sign, or other obstruction. In addition, a utility (above or below ground), pole, guy wire, sign, or other obstruction shall not be placed less than 5-feet from an existing hydrant. A 5-foot clear space shall be provided at all times.

7. Considerations for placing fire hydrants shall be as follows:

    a. Where approved, existing fire hydrants in the area may be used to meet the required number of fire hydrants; however, fire hydrants that are over 500 feet away from the nearest point of the subject building shall not contribute to the required number of hydrants.

    b. Fire hydrants that are separated from the subject building by railroad tracks shall not contribute to the required number of hydrants.

    c. Fire hydrants that are separated from the subject building by a highway, arterial street, or major collector street shall not contribute to the required number of fire hydrants, unless specifically approved by the Fire Marshall.

    d. Fire hydrants that are accessible only by a bridge may be allowed to contribute to the required number of hydrants, only if specifically approved by the Fire Marshall.

    e. Private fire hydrants or public fire hydrants that are on adjacent private property shall not contribute to the required number of hydrants for the subject building.

    f. When evaluating the placement of fire hydrants at commercial or industrial complexes the first hydrant(s) to be placed shall be at the primary access and any secondary access to the site. After these fire hydrant(s) have been placed other fire hydrants shall be sited to meet the requirements for spacing and minimum number of fire hydrants.

405.03 PRESSURE-REDUCING VALVE ASSEMBLIES

405.03.A The City's water distribution system is divided into several pressure zones. Where water systems cross these zone lines, a pressure-reducing valve station may be required. The specific design and location for such valves will be reviewed by the City Engineer.

405.04 COMBINATION AIR/VACUUM VALVE ASSEMBLIES

405.04.A When shown on the plans or designated by the City Engineer, combination air/vacuum valves, per the Standard Drawings shall be installed. Such valves will be required on large diameter transmission and distribution lines at all high points in grade and at other points as determined appropriate by the City Engineer.

405.05 RAILROAD OR HIGHWAY CROSSINGS

405.05.A Railroad or road crossings of a hazardous nature, or as deemed necessary by the City Engineer, shall be valved on both sides of the crossing. Casing under railroad or road crossings, where required, shall be as specified in the permit from the respective agency.

406 WATER SERVICE LINES

406.01 GENERAL

406.01.A The sizes of water service lines that may be used are 1-inch and 2-inch copper, 4-inch, 6-inch, 8-inch, and 12-inch ductile iron. Water service lines will be reviewed for impacts on the distribution system and shall not be greater in size than the distribution main. In no case shall a new service be connected to an existing galvanized waterline, unless specifically approved by the City Engineer.

406.01.B Domestic service lines 1-inch and 2-inches shall normally extend from the main to behind the curb with an angle meter valve and meter box located at the termination of the service connection. See the Standard Drawings.

406.01.C Multiple service connections to a premise shall be laid out to follow a logical sequence of addresses to facilitate matching of service connection to building(s). Onsite waterlines shall be laid out to facilitate a logical matching of service connection to building and address. Each meter must have its own service line and connection to a water main.

406.01.D When a potential corrosive condition is encountered and the copper service passes over or under an active cathodic protection system, the service shall be installed in a Schedule 40 PVC conduit for a distance of 10-feet on each side of the active system. All conduit placements shall be included in the as-built drawings.

406.01.E Unless otherwise approved by the City Engineer, services and lines to be abandoned shall be removed completely back to the line that will remain in service. Existing corporation stops shall be removed and replaced with an approved watertight plug at the water main. The plugs shall not be of dissimilar metals.

406.02 METERS

406.02.A Meters will be provided and installed by the City with costs being the responsibility of the Developer. Meter boxes are to be provided and installed by the Developer. Individual service connections shall terminate in front of the property to be served along the street frontage where property is addressed, and shall be located 18-inches each side of a common side property line. Water service via an easement across a separate tax lot is not allowed unless specifically approved by the City Engineer.

406.02.B For 3/4-inch through 2-inch water meters, the meter shall be located at the termination of the City service line. Except for single-check devices (where approved), meters shall not be located in the same meter box or vault with a backflow prevention device, unless otherwise approved.

406.02.C For 3-inch and larger water meters, the meter shall be installed in vaults and shall be located in the public right-of-way at the entrance to the property being served, unless otherwise approved by the City Engineer, to allow easy reading and maintenance without entering private property. The vault shall be accessible by a crane truck to within 10-feet of the installation with a 10-foot vertical clearance over the vault.

406.02.D Provisions shall be made for a minimum 3-foot clear space around the vault to provide ample working space for maintenance. The vault shall be located such that storm water will not pond or flow into the installation. A design drawing and details must be submitted to the City showing the vault and fitting requirements, the expected flow (normal and maximum daily flow) requirements, and proposed usage.

406.02.E The following table provides general design criteria for water service and meter sizing *(based on Sensus SR-II and OMNI C² Meter Specifications)*:

GENERAL DESIGN CRITERIA WATER SERVICE AND METER SIZING			
Service Size (Inches)	**Meter Size (Inches)**	**Maximum Meter Design Flow[(1)(2)] (GPM)**	**Pressure Loss Through Meter (PSI @ GPM)**
1	3/4	30	9 @ 30
1	1	50	7.3 @ 50
2	1 1/2	200	6.9 @ 160
2	2	200	4.3 @ 160
4	3	500	3.2 @ 400
4	4	1000	6.4 @ 800
6	6	2000	5.5 @ 1600
8	8[(3)]	By Design Engineer	By Design Engineer

Notes:
1. *Continuous flow not to exceed 30% of maximum design flow for 3/4-inch and 1-inch disc meters.*
2. *Continuous flow not to exceed 50% of maximum design flow for all 1 ½-inch and larger compound meters.*
3. *Meters 8-inches and larger will be reviewed on a case-by-case basis.*

406.03 FIRE SERVICES

406.03.A There are three (3) categories of private fire services: (1) hydrants (private hydrants, except for large industrial sites are not allowed), (2) fire sprinkler lines, and (3) combination hydrant and fire sprinkler lines.

406.03.B The fire service lines shall extend from the water main to the property line, and end with an approved vault, metering device, and valves. An approved backflow prevention assembly will be required of the property being served. To minimize maintenance problems, the placement of an approved backflow prevention assembly within the building they serve is encouraged. The fire service line serving the building shall be placed in an easement. Additional valving is required to delineate the public and private portions of the fire service lines.

406.03.C The flow meter and sensor (Data Industrial Series 1400 w/220 MB sensor or approved equal) for fire service lines will be installed by the City, unless directed otherwise. All costs will be the responsibility of the Developer.

406.03.D Fire service lines serving only fire sprinkler systems shall be metered by a detector meter on the approved backflow assembly.

406.03.E Fire sprinkler systems for single-family residences shall be served through a standard metered service. The fire sprinkler system may be served through the domestic service for the same residence. The combined domestic, irrigation, and fire sprinkler flow demands may not exceed the allowable flow for that particular size of service and meter.

406.04 MANUFACTURED HOME PARKS AND MASTER PLANNED DEVELOPMENTS

406.04.A The review of plans and the inspection of manufactured home parks and master planned developments are under the jurisdiction of Marion County Building Department. Private distribution systems shall be designed in accordance with the Oregon Plumbing Specialty Code. Public water mains within manufactured home parks and planned unit developments shall be in exclusive easements to the City and built to public standards.

407 CROSS CONNECTION AND BACKFLOW PREVENTION

407.01 GENERAL

407.01.A Cross connection control and backflow assemblies shall conform to the requirements of the Oregon Administrative Rules Chapter 333, the Oregon Plumbing Specialty Code, NFPA, and Marion County Building Department.

407.01.B An approved backflow prevention assembly is required on all fireline systems, domestic water service 1 1/2-inch and larger, irrigation services, fire sprinkler systems, and/or structures or areas having potential health hazards in accordance with OAR 333-061-0070.

407.01.C It is the Design Engineer's responsibility to select the proper backflow prevention assembly and vault and to include the proper engineering drawings and detail sheets with both the site development permit and site plumbing permit application, as applicable for the particular circumstances. The Design Engineer is responsible for coordinating with the City Engineer, Contractor, and Marion County Building Official.

407.01.D If there is a change in the use or proposed use of the building served by the approved backflow prevention device, or other factors that requires an alternative backflow prevention design, it is the Design Engineer's responsibility to select an alternative backflow prevention assembly and vault as required to reflect the change, and to submit new detail drawings for review.

407.01.E City approval of the engineering plans and detail drawings within a plan set for a development is not formal approval of the private backflow prevention assemblies and vaults in said plan set. Further, City approval of plans and detail drawings within a plan set does not relieve the Design Engineer of any of the aforementioned responsibilities.

408 REQUIREMENTS FOR WATER SYSTEM VAULTS

408.01 GENERAL

408.01.A Vaults for water meters, PRVs, fire services, and combination air and vacuum release valves, and vaults' appurtenances including but not limited to ladders, access doors, sump pumps, and drains, shall conform to the Standard Drawings and the requirements shown in Subsection 408.02 below.

408.02 VAULT REQUIREMENTS

408.02.A Vault shall be as manufactured by Utility Vault, or approved equal. Vault shall have no other use, except for use described by these Standards.

408.02.B Access into the vault shall be through a standard Bilco door unless otherwise approved by the City Engineer. All Bilco doors on any public vault in the public right-of-way shall be structurally adequate for an H-20 loading. If any public or private vault is within a parking or maneuvering area (including the travel lane of any pubic or private street), the Design Engineer shall evaluate the specific loading conditions and specify the proper door for those loading conditions. The Design Engineer's evaluation and recommended lid design shall be submitted to the City Engineer for review.

408.02.C An approved ladder shall be provided if the vault or chamber depth is five (5)-foot or greater and entry is through the vault or chamber roof. Approved ladder extensions shall comply with OSHA requirements as required by City, State, and Federal standards.

408.02.D Adequate drainage that prevents water from accumulating on the vault or chamber floor shall be provided for the vault or chamber. Trapped water in the vault shall be drained to daylight by gravity or an approved duplex sump pump system. In no case shall the drainage be connected to a piped sanitary or storm water system. If a duplex sump pump system is utilized, the pumps shall be capable of removing accumulated water from the vault with a minimum flow rate of five (5) gallons per minute (GPM). The pumps shall be equipped with an automatic flow switch; the pumps and all the wiring shall conform to the National Electrical Code requirements.

408.02.E Vault shall not be installed in areas that are subject to ponding water or flooding. Vault shall be protected from freezing and other severe weather conditions in accordance with NFPA requirements.

408.02.F Vault shall be installed on 4-inch min thick compacted 1-inch minus granular base rock over stable subgrade. Backfill around the vault shall be in accordance with the Standard Construction Specifications, and in accordance with the manufacturer's recommendations. Vault pick holes shall be sealed with non-shrink grout. Vault pipe penetrations shall be installed with link-seal modular seals, or approved equal.

408.02.G Piping shall be adequately supported from the floor and suitably restrained from movement. Supports shall consist of approved steel supports with corrosion protection; no wood supports shall be used. Piping shall be readily accessible with adequate room for maintenance. Access shall remain clear at all times.

408.02.H No piping shall be installed in excess of three (3) feet above the vault floor. Piping shall have a minimum 12-inch clearance on the backside, 24-inch clearance on any test-cock side, and 12 inches below the piping from the vault. Adequate clearance (three (3) inches minimum) must be maintained above gate-valve stem at full extension. Headroom of six (6) feet is required in vaults without a full opening top.

408.02.I Where required, vaults shall be equipped with a moisture proof light fixture. All electrical wiring shall be inspected by Marion County Building Department (permit is required). The Design Engineer shall obtain a copy of final electrical inspection from the Contractor and submit it to the City.

408.02.J All new services shall be pressure tested and disinfected by the Contractor and proven to be bacteriologically safe from the existing main to the vault.

409 DISINFECTION, PRESSURE AND LEAKAGE TESTING

409.01 GENERAL

409.01.A New water systems (lines, valves, hydrants, services, etc.) shall be pressure tested, chlorinated, and tested for bacteria in accordance with the Standard Construction Specifications and in the presence of the City Engineer.

409.01.B No connection to existing water services shall be made until the new system has been tested and accepted.

410 WATER QUALITY SAMPLING STATIONS

410.01 GENERAL

410.01.A If a water sampling station is required by the City for a particular development (typically 1 station to 20 lots in new subdivisions), the sampling station shall be provided and installed by the Developer. Details pertaining to the water quality sampling station shall be coordinated with the City Engineer. See Standard Drawings.

*** END OF DIVISION***

DIVISION 5 – SANITARY SEWERS

DIVISION 5

SANITARY SEWERS

501 GENERAL

501.01 AUTHORITY AND PURPOSE

501.01.A These Design Standards shall apply to all improvements within existing and proposed public right-of-way and public easements, to all improvements to be maintained by the City, and to all improvements for which the City Code requires approval by the City. Most of the elements contained in these Design Standards are public works oriented and it is intended that they apply to both publicly financed public improvements under City contract and privately financed public improvements.

501.01.B Private construction firms, Developers, consulting engineers, or any other individuals or business entities engaged in the design and construction of improvement projects that ultimately will be owned, operated, or maintained by the City shall comply with these standards. Where minimum values are stated, greater values should be used whenever practical; where maximum values are stated, lesser values should be used whenever practical.

501.01.C The purpose of these Design Standards is to provide a consistent policy under which certain physical aspects of public improvements shall be implemented. All public system improvements and public works facilities shall be designed and constructed in accordance with applicable rules and regulations of the City and any City interpretations of those rules and regulations, including applicable technical guidance manuals, and in accordance with applicable federal, state, and local statutes and rules. Approval of public improvements must be made by the City Engineer or the Public Works Director before construction is permitted. An authorized representative of the City will be available for construction observation during construction of the project.

501.01.D It is important to emphasize that these Design Standards are not intended to inappropriately restrict or constrain the originality or innovativeness of the Design Engineer and his or her ability to exercise and apply professional judgment to each situation and project. The City recognizes that every public improvement project has unique characteristics and situations. These Design Standards cannot provide for all situations and are intended to assist, but not to serve as a substitute for competent work by design professionals. It is expected that the Design Engineer will bring to each project the standard of care from the Design Engineer's respective discipline.

501.01.E If the Design Engineer anticipates challenges in meeting these Design Standards, they should contact the City Engineer prior to extensive design efforts. The City Engineer will seek to work with each designer to achieve a satisfactory design and construction project that is in the best long-term interests of the City of Stayton and one that complies with applicable rules and regulations.

501.01.F These Design Standards are not intended to limit any innovative or creative effort which could result in better quality, better cost savings, or both. Any proposed departure from the Design Standards will be judged; however, on the likelihood that such variance will produce a comparable result, or long-term benefit to the City, while meeting the intended purpose of the design standard.

501.01.G Requests for alternatives to these Design Standards will be considered for approval by the City Engineer as the need arises and conditions warrant modification. Request must show that the variance meets the intent of the Design Standards and will not compromise safety, impact other properties or cause an increase in maintenance. This consideration will be on a case-by-case basis and require sufficient justification prior to approval. All requests will be in writing and be accompanied by engineered drawings and final design calculations.

501.01.H All franchise utility improvements, including telephone, electrical power, gas and cable TV shall meet the current standards of the appropriate agency as well as City Standards.

501.01.I In the case of conflicts between the text of these Design Standards and the Standard Drawings, or between the provisions of these Design Standards and the Standard Construction Specifications, the more stringent as determined by the City Engineer shall apply.

501.01.J All surveys for public works facilities shall be performed under the direction of a Professional Land Surveyor registered in the State of Oregon. All elevations shall be referenced to NAVD 88 vertical datum. Vertical benchmark locations shall be coordinated with the City.

501.01.K On completion of projects to become public works, the Design Engineer shall submit one complete set of reproducible "Record Drawings" (As-Builts), a compact disc (CD) containing electronic PDFs and cad files (AutoCAD or others as approved) to the City Engineer. The drawings shall show any deviations from the original construction drawings and shall include sufficient information to accurately locate public works facilities. No bond will be released until the City Engineer receives and approves an acceptable set of reproducible Record Drawings from the Design Engineer, with his/her stamp of certification.

501.01.L For privately financed public improvements, the Design Engineer, at the completion of construction, shall submit a completion certificate to the City stating that all work has been completed in accordance with the approved project plans and specifications.

501.01.M Before the City accepts a public works project for operation and maintenance and releases the Performance Bond, a one (1) year Warranty Bond on all materials and workmanship incorporated in the project shall be provided to the City.

501.01.N The objective of these Design Standards is to meet the intent of the wastewater master plan and to ensure the following:

- The system shall be designed to provide necessary sanitary sewer infrastructure within the City of Stayton and shall incorporate system best management practices.
- The system shall have the necessary hydraulic capacity to safely convey all design flows and shall be of sufficient depth to adequately serve the basin for which they are constructed. The use of individual sanitary sewer sump-pump systems for specific properties shall not be used unless approved by the City Engineer.
- The system components shall have adequate structural strength to safely withstand all expected external design loads.
- The system shall be designed and configured to prevent infiltration and inflow of ground and surface waters.
- The system shall be designed to be economical and safe to construct and maintain.
- The system shall be designed to minimize maintenance and operational requirements.

501.02 APPLICABILITY

501.02.A The Design Standards document will govern all design, construction, or rehabilitation of sanitary sewers and related facilities within the City of Stayton and applicable work within its service areas. This document will be routinely referred to as the Design Standards.

501.03 REFERENCES

501.03.A These Design Standards are intended to be consistent with the most current provisions of the documents and requirements listed and referenced in Subsection 101.03 and others specifically listed below. Projects are expected to be consistent with the following:

1. Applicable design criteria and concepts consistent with the most recent Wastewater Master Plan adopted by the City of Stayton unless more restrictive criteria are identified herein. Where additional detailed information and background is required for a particular project, the Wastewater Master Plan shall be referred and adhered to, as applicable. Any deviations from the Wastewater Master Plan shall be flagged and presented to the City Engineer for consideration. The most recent version of the City's sewer model (XP-SWMM) shall be used to model improvement requirements.

2. Applicable design criteria and concepts in accordance with the rules and regulations of the Oregon Department of Environmental Quality (DEQ) as established in the Oregon Administrative Rules, Chapter 340, Division 52, and as presented in the DEQ publication "Oregon Standards for Design and Construction of Wastewater Pump Stations" and DEQ publication "Guidelines for Writing Pump Station O&M Manuals".

3. State of Oregon Plumbing Specialty Code.

4. Applicable design guidelines published by the American Society of Civil Engineers.

501.04 SPECIAL DESIGN APPLICATIONS

501.04.A Special design applications not covered in these Design Standards require review and approval by the City. Additional review and approval by the Department of Environmental Quality (DEQ) may also be required. Submittal of full design calculations, supplemental drawings, and information will be required prior to any approval.

501.04.B Such design applications requiring special review and approval include, but are not limited to, the following:

- Wastewater Facilities
- Sewer Outfalls
- Pump Stations and Force Mains
- Electrical/Monitoring/Telemetry Devices
- Siphons
- Internal Sealing of Existing Sewers
- Relining of Existing Mains
- Energy Dissipators
- Hydrogen Sulfide and/or Hazardous Gases

501.05 STANDARD CONSTRUCTION SPECIFICATIONS AND STANDARD DRAWINGS

501.05.A Except as otherwise provided by these Design Standards, all construction design detail, workmanship, and materials shall be in accordance with the current edition of the City of Stayton Public Works Standard Construction Specifications and Standard Drawings.

501.06 CITY POLICY REGARDING ENGINEERING

501.06.A It will be the policy of the City to require compliance with Oregon Revised Statute 672 for Professional Engineers.

501.06.B Engineering plans, reports, or documents shall be prepared by a registered Professional Engineer or by a subordinate employee under the Design Engineer's direction, and shall be signed by the Design Engineer and stamped with the Design Engineer's seal to indicate responsibility for them. The Design Engineer shall maintain complete responsibility for the design of the project. The Design Engineer shall review any proposed public facility extension, modification, or other change with the City prior to engineering or other proposed design work to determine if there are any special requirements or whether the proposal is permissible.

501.06.C City approval of plans or any other engineering document produced by the Design Engineer does not in any way relieve the Design Engineer of responsibility for the design, or their responsibility to meet applicable City, County, State, and Federal requirements, or their obligation to protect life, health, and property of the public. The plan for any project shall be revised or supplemented at any time it is determined that the project requirements have not been met. It is also required that at any time a revision to the design is required; the Design Engineer shall maintain responsibility to redesign according to these Design Standards per the City's approval. It is therefore necessary for the Design Engineer to be available during construction should timely changes be required. If the Engineer of Record leaves the acting consulting firm then a new registered engineer will have to submit an updated Engineer of Record form to the City prior to work commencing.

501.07 CONVENTIONS USED THROUGHOUT THE DESIGN STANDARDS

501.07.A See Subsection 101.07 for conventions used throughout these Design Standards.

501.08 ORGANIZATION AND CLASSIFICATION OF DIVISIONS

501.08.A See Subsection 101.08 for the organization and classification of divisions throughout these Design Standards.

501.09 CLARIFICATIONS, MODIFICATIONS, AND REVISIONS TO DESIGN STANDARDS

501.09.A These Design Standards will be periodically updated due to changes in policy or procedures, new technology, and methods of design and construction. Periodic revisions to these Design Standards will be necessary to maintain consistency in that regard. The date appearing on the title page is the date of the latest revision for each Division. Parenthetical notations at the bottom of each page indicate the most recent change. It will be the user's responsibility to obtain and maintain his/her copy of these Design Standards with the latest changes.

501.09.B See Subsection 101.09 for general policies and procedures regarding clarifications, modifications, and revisions to the Design Standards.

501.10 DEFINITIONS AND TERMS

501.10.A See Subsection 101.10 for standard definitions and terms used throughout these Design Standards.

502 GENERAL DESIGN REQUIREMENTS

502.01 PERFORMANCE STANDARDS

502.01.A Sanitary sewer system design shall meet the policies and guidelines of the latest Wastewater Master Plan and its updates.

502.01.B Sanitary sewer systems shall be designed to provide gravity service to all areas of development, unless otherwise approved by the City Engineer.

502.01.C Sanitary sewer system capacity shall be designed for ultimate development density of the contributing area. The system shall allow for future system extension and for future development based on current and on proposed land use designations.

502.01.D Sanitary sewer systems shall be designed to remove industrial waste and to remove domestic sewer from basements of houses (where practical), commercial or industrial buildings, and all public and private establishments where possible.

502.01.E Stormwater and groundwater, including but not limited to, street, roof, footing drainage, water features, etc. shall not be connected to or will be allowed to discharge into the sanitary sewer system, but shall be removed by a system of storm drains or by some other method separate from the sanitary sewer system.

502.01.F Unpolluted or non-contact cooling waters shall not be discharged into sanitary sewer systems. The overflow drains and filter backwash lines of swimming pools and "hot tubs" shall drain into a sanitary sewer system, in accordance with the Stayton Municipal Code requirements.

502.01.G As a condition of sanitary sewer service, all developments will be required to provide public sanitary sewer systems to adjacent upstream parcels in order to provide for an orderly development of the drainage area. This shall include the extension of sanitary sewer mains in easements across the property to adjoining properties, and across and along the street frontage of the property to adjoining properties when the main is located in the street right-of-way. This shall include trunk lines that are sized to provide capacity for upstream development.

502.01.H All public sanitary sewer systems shall be located within the public right-of-way or as directed and approved by the City Engineer. These sanitary sewer systems are placed in the public right-of-way for ease of maintenance and access, control of the facility, operation of the facility, and to permit required replacement and/or repair. The City Engineer, under special conditions, may allow a public sanitary sewer system to be located within a public sewer easement as referenced in Subsection 102.08.

502.01.I Design shall comply with Oregon Department of Environmental Quality sewer design guidelines, OAR 340, Division 52.

502.01.J For any project requiring construction within or adjacent to watercourses and/or wetlands, in addition to approval by the City, permits from the appropriate responsible agencies (Oregon Department of Fish and Wildlife, Oregon Division of State Lands, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, U.S. National Marine Fisheries Service, etc.) shall be obtained. Copies of all permits, or written evidence that no permit is required shall be given to the City prior to City approval of the construction plans.

502.01.K When connection to a public sanitary sewer system is not practical as determined by the City, subsurface wastewater disposal may be permitted when approved by City Engineer and Marion County Sanitarian. All subsurface disposals shall meet and comply with Marion County and Department of Environmental Quality requirements.

502.02 SANITARY SEWER PLANS

502.02.A Complete plans and specifications for proposed sanitary sewer projects, including any necessary public dedications and easements, shall be submitted to the City Engineer for review. Such plans and specifications must receive City Engineer approval prior to construction permit issuance and prior to beginning of construction. Engineering documents shall be prepared by a Professional Engineer registered and licensed in the State of Oregon.

502.02.B Engineering design plans drawn to scale, showing the existing and proposed sewer system, shall be submitted in accordance with Division 2 of these Design Standards. The proposed plan shall show profile and plan view of the proposed improvements.

502.03 PIPE MATERIALS AND SIZE

502.03.A All public sanitary sewer systems shall be constructed with ASTM D-3034, SDR35 PVC pipe as specified in the Standard Construction Specifications. Where required for added strength, AWWA C-900, or AWWA C-905 PVC Pipe shall be used. ASTM C-76 reinforced concrete pipe shall only be used where specifically approved by the City Engineer. Class 52 or higher ductile iron pipe shall be used when added strength is needed and pipe wall thickness is limited. Solid wall HDPE pipe may be used in boring, jacking, pipe bursting, and other similar applications when approved by the City Engineer. Tracer wire shall be a minimum 12-gauge, green-coated copper wire and shall be installed with all plastic pipe. Regardless of selected pipe material, all joints shall be watertight.

502.03.B Regardless of the size of the area being served, the standard minimum pipeline diameter for all mainline sanitary sewers shall be 8-inches, unless otherwise approved by the City Engineer.

502.03.C Proposed sewers that are larger than required, but which are solely recommended in order to meet grade requirements, are not allowed. Surcharging shall not be designed into the collection system.

502.03.D Public sewer service laterals to single family residential properties shall be 4-inches in diameter. Minimum 6-inch diameter sewer service laterals shall be used for multi-family or commercial properties.

502.03.E The pipe size shall be based on the minimum size needed for the design flow and not the size needed to result in a desired slope. The pipe size shall be determined by using one-half (1/2) of the maximum gravity flow capacity of the pipe for pipes 15-inches in diameter and less, and shall be two-thirds (2/3) for pipes larger than 15-inches in diameter.

502.04 SANITARY SEWER SYSTEM CLASSIFICATION

502.04.A PRIVATE SERVICE LATERAL. A private service lateral is that part of each property's sanitary sewer service line that is on private property outside right of ways or public easements, typically 4-inches in diameter.

502.04.B PUBLIC SERVICE LATERAL. A public service lateral is that part of each property's sanitary sewer service line which extends from the public sewer main to the limit of the public right of way, and is used for servicing the individual consumer, typically 4-inches in diameter. For sanitary sewer mainlines located within public easements, the limit of the public service lateral will be the edge of a sanitary sewer easement.

502.04.C COLLECTOR SEWER. A public sewer main which one or more service laterals and/or other collector sewers connect or may connect, typically 8-inches in diameter.

502.04.D TRUNK SEWER. A public sewer main ten (10) inches and larger which has been, or is being constructed to accommodate more than one collector sewer. Trunk Sewers may in some cases function as a collector sewer.

503 MINIMUM DESIGN CRITERIA

503.01 SANITARY SEWER STUDY

503.01.A A separate study may be required by the City to justify a proposed project or development which poses unique or special situations or that is otherwise deemed necessary by the City. The sanitary sewer study shall provide detailed information on all engineering design aspects and considerations for City review and approval. The study shall include analysis of the potential upstream contributions and downstream capacities until the contribution is 10 percent or less of the total flow. The study shall include, but not be limited to, sewer service area map, sewage flow calculations, pump systems, and pipe hydraulic calculations. The study shall project sewer grade to upstream parcels within the basin to assure gravity service. The study map shall include as a minimum the following:

- Streets and street names
- Lot lines
- Contours or other form of ground surface elevation information
- Proposed and future pipe system, complete with manholes, pipe slopes, manhole flowline elevations, and pipe sizes
- Existing gravity stormwater drainage systems and other possible conflicting utilities
- Ultimate service area boundaries (from Wastewater Master Plan and consultation with the City)
- Delineated Sub-service area boundaries according to land use, as appropriate
- North arrow, scale, etc.
- Company name, designer's name, date, etc.
- Link-node data set with coordinates in digital format, if applicable

503.01.B Design calculations for pump stations, pipe sizing and design flows must be stamped by an Oregon Registered Professional Engineer and submitted to the City.

503.01.C When two or more existing sanitary sewers are available for use by a new development, an engineering study may be required to ensure adherence to established sanitary sewer drainage boundaries.

503.02 DESIGN FLOW CRITERIA

503.02.A All collection system components shall use and be consistent with the engineering design criteria and concepts presented in the most recent Wastewater Master Plan and updated environmental regulations and/or monitoring/modeling information. Where additional detailed information and background is required for a particular project, the Wastewater Master Plan shall be referred and adhered to. Each system shall be designed to serve its respective drainage basin, as shown in the most current Wastewater Master Plan.

503.02.B In sizing the collection system, the general wastewater design flow criteria to be followed is shown in the Table below (refer also to the Wastewater Master Plan). The wastewater design flow criteria shown in the Table below may be modified if more current or other relevant information is available to support the change. Population calculations used to forecast service area flows shall be consistent with the Wastewater Master Plan. The Design Engineer shall refer to and coordinate with the most recent version of Stayton's Comprehensive Plan.

503.02.C In addition to the wastewater design flow criteria listed below, all sewers shall be designed with reserve capacity to allow for unforeseen increases in flow due to land-use changes. The Design Engineer shall be prepared to submit for review pipe-sizing design calculations. These calculations shall include the maximum and minimum daily flows based upon population estimates, land-use assumptions, and all other assumed factors relative to the wastewater design flow criteria listed in the Table below.

503.02.D If there are no specific project values for the amount of sewage to be generated, the following design values shall be used:

WASTEWATER DESIGN FLOW CRITERIA	
Persons per Single Family Residence	2.7
Residential Average Flow Allowance	100 gal/per-capita/day
Multi-Family/Commercial/Commercial Retail Average Flow Allowance	1,500 gal/gross-acre/day
Industrial Commercial Average Day Flow Allowance	1,500 gal/gross-acre/day
Light Industrial Average Day Flow Allowance	2,000 gal/gross-acre/day
Industrial Ag Average Day Flow Allowance	2,500 gal/gross-acre/day
Heavy Industrial Average Day Flow Allowance	2,500 gal/gross-acre/day
Residential Flow Peak Day Factor	2.5
Residential Flow Peak Hour Factor	3.0
Commercial Flow Peak Hour Factor	Project specific (3.0 min)
Industrial Flow Peak Hour Factor	Project specific (3.0 min)
Service Area Infiltration/Inflow Allowance (see 503.02.E below)	1,000-gal/gross-acre/day

503.02.E In addition to the daily wastewater design flows shown in the Table above, an allowance of 1,000-gallons/gross-acre/day shall be added for all the land area in the basin being served to account for inflow and infiltration (I&I). A peak hour factor of 3.0 minimum shall be applied to the daily wastewater flow. The wastewater design flow in gallons per day (gpd) is then calculated as: (Acres * (1,000 + DWF * 3.0)) where DWF = Daily Wastewater Flow in gpd/acre from Table above.

503.03 VELOCITY AND SLOPE

503.03.A All sanitary sewer pipes shall be designed at a grade that produces a mean velocity of the sanitary sewer design flow of no less than 2-feet per second and not more than 15-feet per second when the pipe is flowing full or half-full. If topography requires a grade that would result in a velocity greater than 15-feet per second in one pipe section, additional drop manholes shall be installed as required by the City. The velocity shall be calculated using the sanitary sewer design flow for the basin to be served now and at ultimate design flow in the future.

503.03.B All sewers shall be laid on a consistent and uniform grade. Changes in piping size and grade shall only occur at manholes.

503.03.C For verification purposes the following Table of minimum pipe slopes shall be used. Actual slopes shall be determined by the actual sanitary sewer design flow.

Pipe Size (Inches)	Minimum Slope in Percent (feet per 100 feet)
8	0.40
10	0.28
12	0.22
15	0.20
18	0.20
21 and larger	0.20

503.03.D All sanitary sewer systems laid on slopes greater than 15 percent, or as recommended by pipe manufacturer for slopes 15 percent and less, shall be secured by anchor walls in accordance with the Standard Drawings. Anchor walls located at the middle of pipe runs of less than 200 feet between manholes are generally adequate, but for spans greater than 200 feet, anchor walls shall not exceed a spacing of 100 feet.

503.04 HYDRAULIC DESIGN

503.04.A The Design Engineer shall submit calculations for each sanitary sewer system to be installed, exclusive of sewer service laterals.

503.04.B When calculating volumes, slopes, and velocities, the Manning Formula shall be used. Note that new PVC or HDPE pipe likely have a manufacturer's "n" value of approximately 0.009. However, regardless of pipe material, sand, grit, and slime will build up on pipe walls. This results in true "n" values over time of approximately 0.013. As a consequence, a Manning coefficient of 0.013 shall be used for design of PVC or HDPE piping systems. If an alternative piping material is approved, either the pipe manufacturer's recommended coefficient shall be used or an "n" value of 0.013, whichever is greater.

503.04.C The Manning Formula is expressed by the following equation:

$$V = (1.486/n) * (R^{(2/3)}) * (S^{0.5})$$

Where:

V = Mean velocity of flow in feet per second (V=Q/A).
n = Manning's n, 0.013 minimum for pipe.
R = Hydraulic Radius in feet, defined as the area of flow divided by the wetted perimeter (A / WP);
A = cross sectional flow area in square feet.
WP = wetted perimeter in feet.
S = Slope of hydraulic grade line in feet per feet.

503.04.D In terms of discharge, the above formula becomes:

$$Q = (1.486/n) * A * (R^{(2/3)}) * (S^{0.5})$$

Where:

Q = rate of flow, cfs;
V = Mean velocity of flow in feet per second (V=Q/A).
n = Manning's n, 0.013 minimum for pipe.
R = Hydraulic Radius in feet, defined as the area of flow divided by the wetted perimeter (A / WP);
A = cross sectional flow area in square feet.
WP = wetted perimeter in feet.
S = Slope of hydraulic grade line in feet per feet.

504 ALIGNMENT AND COVER

504.01 RIGHT-OF-WAY LOCATION

504.01.A Sanitary sewer systems shall be located in the street right-of-way and shall be located 5-feet north or east of the right-of-way centerline as shown in the Standard Drawings. Any deviations will be reviewed on a case-by-case basis and will require City approval.

504.01.B Curved alignments in sanitary sewer systems, vertically or horizontally, are not permitted.

504.01.C All changes in direction and size of pipe shall be made at an approved manhole.

504.01.D Where approved by the City Engineer, public sewer systems serving a master planned development, apartment complex, or commercial/industrial development shall be in parking lots, private drives, or similar open areas that will permit an unobstructed vehicle access for maintenance by City forces.

504.02 MINIMUM COVER

504.02.A All sanitary sewer systems shall be laid at a depth sufficient to drain sewer service laterals, to protect against damage by frost or traffic, and to drain basement sewers where practical. Sufficient depth shall mean the minimum cover from the top of the pipe to finish grade at the sanitary sewer alignment. In new residential hillside subdivisions, mainline and sewer service laterals shall be placed in the street at a depth sufficient to drain sewer service laterals on the low side of the street.

504.02.B Sanitary sewer systems in residential areas shall be placed with the following minimum cover, unless otherwise approved by the City Engineer:

1. PUBLIC SEWER SERVICE LATERALS – 5-feet at roadway curb and gutters, measured from the top of pipe to roadway gutter finish grade (flow line).

2. PUBLIC SEWER MAINS (TRUNKS AND COLLECTORS) – Generally 6-feet to 8-feet in roadways and easements, measured from the top of pipe to roadway or easement finish grade.

504.02.C Deviations from the above standards will be considered when one of the following circumstances exists. Deviations will require City approval and will be reviewed on a case-by-case basis.

1. EXISTING SHALLOW SEWERS – Where the topography is relatively flat and existing sewers are shallow (5-feet or less), the minimum cover shall be 4-feet, measured from top of pipe to finish grade.

2. UNDERLYING ROCK STRATA – A request in writing to the City Engineer, together with submittal of a soils report, with a plan and profile certifying that bedrock exists 3-feet below the undisturbed ground surface at all investigated alignments.

3. A DITCH OR STREAM MUST BE CROSSED – A plan and profile showing ditch or stream crossing; horizontal scale 1-inch = 20-feet, vertical scale 1-inch = 2-feet.

504.03 SEPARATION FROM WATERLINES

504.03.A Sanitary sewer systems shall be installed a minimum clear distance of 10-foot horizontally from waterlines and shall be installed to go under such pipes with a minimum of 18-inch of vertical clearance at the crossing of these pipes (in accordance with the requirements of OAR Chapter 333, Public Water Systems (See 333-061-0050)). Deviations shall first be approved by the City Engineer before submittal for approval by State agencies. In all instances the distances shall be measured edge to edge.

504.03.B The basic separation requirements will apply to all gravity and pressure sewers of 24-inch diameter or less. Larger sewers may create special hazards because of flow volumes and joint types, and accordingly require additional separation requirements. The special construction requirements given are for the normal conditions found with sewer and water systems. More stringent requirements may also be necessary in areas of high ground water, unstable soil conditions, or other special site conditions. Any site conditions not conforming to conditions described in this Section will require assessment and approval by the City and appropriate State agencies.

504.03.C Where an individual property is served by a private pump station with a force main discharging to a public sanitary sewer system at the property line, and a domestic water well is also located on that same property, either State of Oregon Plumbing Specialty Code or Department of Human Services – Drinking Water Program specified separation of sanitary sewer and waterlines shall apply.

504.04 ACCESS AND UTILITY EASEMENTS

504.04.A When, in the Design Engineer's opinion, it is impractical to locate public utilities in rights-of-way, the utilities shall be placed in an easement, as approved by City Engineer. All public utility easements granted to the City shall be perpetual easements and shall conform to the requirements of Section 102.08.

504.05 RELATION TO WATERCOURSES

504.05.A Generally, the top of all sanitary sewer pipes entering, crossing, or adjacent to streams shall be at a sufficient depth below the natural bottom of the streambed to protect the line. A minimum of 1-foot of cover is required where the sanitary sewer line is in rock; 3-feet of cover is required in other materials.

504.05.B Sanitary sewer lines located along or parallel to streams shall be located outside of the streambed and sufficiently removed therefore to provide for future, possible stream channel widening. All manhole covers at or below the 100-year flood elevation shall be watertight.

504.05.C Sanitary sewer lines crossing streams or drainage channels shall be designed to cross the stream as nearly perpendicular to the stream channel as possible.

504.05.D The pipe material shall be ductile iron in accordance with Subsection 502.03. The specified pipe type shall extend to a theoretical point where a one-to-one slope begins at the top of the bank and slopes down from the bank away from the channel centerline and intersects the top of the pipe.

504.05.E Each deviation from the above requirements will be reviewed by the City Engineer on a case-by-case basis.

505 STRUCTURES

505.01 MANHOLES

505.01.A GENERAL

1. Manholes for mainlines shall be located at all changes in pipe slope, grade, alignment, size, type, and at all pipe junctions with present or future sanitary sewer lines. A manhole shall be placed at the upstream end of each mainline, 7-feet maximum from property line to centerline of manhole.

2. Manhole spacing shall not exceed 450-feet. Deviation from this standard will be considered based on whether or not flushing, cleaning, and closed-circuit television inspection equipment can adequately service the proposed spacing.

3. For ease of maintenance and inspection, manholes shall be installed within the right-of-way of paved public streets. If a manhole must be located outside of the public street right-of-way, access to the manhole shall be provided by means of an easement having a width consistent with Section 102.08. The easement shall be complete with an all-weather driveable surface from the adjacent public street to the manhole. The driveable surface shall extend to a point at least 10-feet beyond the manhole for equipment access.

4. Where practical, manholes shall be located at street intersections and shall be located outside the normal wheel paths. Manhole lids are not permitted within designated existing or future bike lanes. Manholes shall not be placed in curbs or gutters or behind curbs. Manhole lids shall have a minimum of 12-inches of clearance from the edge of a curb and gutter.

5. Manholes located in unimproved areas shall have their lids positioned approximately 1-foot above the surrounding grade and be marked with City approved metal marker post. Manholes located in backyards, side lots, or otherwise substantially outside of the traveled right-of-way, may require tamperproof, locking lids. For public lines in easements within parking lots or other similar traveled areas, locking lids will generally not be required. In all areas prone to ponding, flooding, or along stream corridors, and in all areas below the 100-year flood plain, waterproof covers shall be installed. These types of manhole locations should be avoided whenever feasible and practical. Non-standard locations will require review by the City on a case-by-case basis.

6. Two manholes shall be provided for locations where the horizontal angle between the outgoing sanitary sewer and the incoming line will be less than 90 degrees. This is intended to prevent wastewater from discharging into the oncoming flow of an opposing sewer.

7. Where internal system overflows may occur and covers are intended to prevent such overflows, the manhole cone and cover shall be designed to resist the resulting hydrostatic forces and be provided with vent piping. Vent piping configuration and cone and cover restraint will be reviewed by the City on a case-by-case basis.

505.01.B DROP THROUGH MANHOLES

1. Standards for elevation differences at manholes have been established to compensate for normal energy losses and to prevent surcharging of the sanitary sewer system. For purposes of slope calculation and for establishing elevation differences, the elevations are given at the theoretical horizontal intersection of the sanitary sewer centerlines (usually the center of the manhole). The rules for elevation differences at manholes are:

    a. Where the pipe size decreases upstream through the manhole, the upstream pipe crown shall match the elevation of the crown of the downstream pipe. Where grade is limited, matching 0.8 of the pipe diameters may be used. If the incoming and outgoing pipes are of equal size and are passing straight through the manhole, the invert elevation difference shall be at least 0.10-feet. Manhole channels shall meet the requirements of the Standard Construction Specifications.

    b. If the pipe alignment changes at the manhole, the invert elevation difference shall be at least 0.10-feet for 0 to 45 degrees of horizontal deflection angle, and 0.20-feet for 45 to 90 degrees of horizontal deflection angle. Horizontal deflection angles of greater than 90 degrees are not allowed. New piping, which is to be connected to existing manholes, shall generally adhere to these same hydraulic considerations. Existing concrete channels within the manhole shall be modified accordingly.

    c. Outside drop manholes shall be constructed in accordance with the Standard Drawings whenever a vertical separation exists between the inlet and outlet piping that is more than 2-feet. Prior approval by the City Engineer will be required for the use of any inside drop manhole. Outside drop assemblies shall only be used for pipelines 12-inches in diameter and smaller. Larger pipelines shall be introduced into the manhole at the manhole invert. Overall, drop manholes will only be allowed in cases of significant elevation differences between incoming and outgoing lines, or when special conditions exist such as a conflict with existing facilities or utilities that cannot be resolved.

2. Connections must enter the manhole through a channel in the base. This includes drop connections and connections to existing manholes.

505.01.C MANHOLE STANDARD DRAWINGS

1. Manholes shall have a minimum inside diameter of 48-inches and shall be in compliance with the Standard Construction Specifications. Manhole to piping connections shall be made with watertight, flexible manhole/pipe rubber connectors, as shown in the Standard Drawings.

2. The manhole Standard Drawings are suitable for most conditions. New designs or revisions should not be shown on the construction plans unless the Standard Drawings are not suitable. New or revised designs may be necessary if:

   - ❖ One or more of the sewers to be connected to the manhole is over 27-inches in diameter. (smaller diameters may require a special design if the manhole is at an alignment change)
   - ❖ Several sewers will be connected to the manhole.
   - ❖ There is less than 90 degrees between the incoming and outgoing sewer.
   - ❖ The manhole will be subject to unusual structural loads.
   - ❖ Diversion or other flow control measures are required.

3. If a special design is required for any reason, it will be necessary to show that design on the construction plans and to provide the City Engineer with structural calculations if so requested.

4. Some alternate manhole features are shown in the Standard Drawings. Where these features are required, they shall be specified by a note on the construction plans. Some examples are:

   - ❖ Slab tops shall be used in lieu of cones where there will be less than 5-feet between the invert of the outlet pipe and the top of the manhole lid.
   - ❖ Watertight manhole frames and covers shall be used if floodwaters are expected to cover the manhole top or if the manhole must be located in the street gutter. Such conditions should be avoided wherever feasible.
   - ❖ Tamperproof manhole frames and covers are required in all areas outside the paved public right-of-way.

505.02 CONNECTION TO EXISTING SEWERS

505.02.A Connections to, and extensions of, existing sanitary sewer systems will occur to facilitate new development. The connection methods and/or locations shall be carefully reviewed by the Design Engineer and is to be approved by the City Engineer.

505.02.B In general, connections to existing manholes shall be made with the following guidelines:

1. Where the invert of the connecting pipe is 2-feet or less above the invert of the outgoing pipe, the sewage entering the manhole shall follow a smooth concrete channel transitioning evenly from the invert of the inlet pipe into main channel.

2. Where the invert of the connecting pipe is more than 2-feet, the Contractor will be required to construct an outside drop per the Standard Drawings for pipes 12-inches and smaller. Drops for larger pipes will not be allowed. Prior approval by the City Engineer will be required for the use of any inside drop manhole. Sanitary sewer entering the manhole shall follow a smooth concrete channel transition from the bottom of the drop into the main channel.

3. Where the invert is required to enter below the shelf of the manhole, the inlet pipe shall not enter below a point where the crown of the new inlet pipe is below the crown of the outlet pipe. The base of the manhole shall be rebuilt if damaged in this process. The sanitary sewer flow shall enter the main flow in a smooth channel transitioning from the inlet pipe to the main channel.

4. No pipe shall enter an existing manhole where the angle between the incoming flow and the outgoing flow is less than 90 degrees.

5. Where a connection is proposed to an existing manhole, elevation of the existing shelf, location of steps, and elevations of existing inlets and outlets shall be submitted with the plans. Existing manholes which are located within proposed sidewalk areas shall be flush with the finished surface and shall be fitted with standard locking manhole lids.

505.03 MAINLINE CLEANOUTS

505.03.A Cleanouts will not be approved as substitutes for manholes on public sanitary sewer lines. Cleanouts are permitted at the upper end of a sanitary sewer system that is designed to be extended during a phase of construction, as approved by City Engineer. The distance between the cleanout and a manhole is a maximum of 150 feet. The standpipe shall be the same size as the pipeline up to a maximum of 8-inches. If future extension requires a change in pipe slope, alignment, size, or type, a manhole will be required at the cleanout location.

505.03.B Temporary cleanouts may be installed within the right of way at the end of a stub street where the street is expected to be extended in the future and the design of the sewer system does not warrant that a manhole be constructed at this location. The maximum distance of a main line extension without a temporary cleanout is 15 feet. The City will make the determination when and where temporary cleanouts are allowed. When the sewer is extended, the temporary cleanout shall be removed.

505.04 GREASE INTERCEPTORS

505.04.A Grease interceptors will be required in establishments where, in the opinion of the City Engineer or Public Works Superintendent, grease may be introduced into the drainage of sewage system in quantities that can affect sewer flow, hinder sewage treatment, or private sewage disposal.

505.04.B Establishments that require grease interceptors generally provide foods or beverages for sale or central food preparation as part of its service to residents, customers, or employees. A grease interceptor will not be required for individual dwelling units or for any private living quarters.

505.04.C Grease interceptors shall be designed so that it can be easily cleaned, be properly vented, and shall be sized in accordance with the most current version of the Oregon Plumbing Specialty Code and Standard Drawings. The flow rate through a grease interceptor shall not exceed its rated capacity.

505.04.D Manufactured grease interceptors shall be approved for use in the State of Oregon.

506 SEWER SERVICE LATERALS

506.01.A Sewer service laterals are those public sanitary sewer lines to which a private building sewer connects. Each individual building lot shall typically be connected by a single, separate, private, building-sewer/sewer lateral line connected to the public sanitary sewer system. Individual sewer service laterals shall be located no closer than 10-feet from adjacent property lines (property lines which are perpendicular to public right-of-way). All public service laterals shall extend from the sanitary sewer mainline to the private property line, where a two-way property line cleanout shall be installed. A continuous tracer wire shall be installed from the main to the clean-out of the sewer service lateral at the right-of-way.

506.01.B Sewer service laterals within public right-of-way shall conform to public works standards. Sewer service laterals outside of public right-of-way shall conform to State and local plumbing codes. No roof runoff, foundation drain, or stormwater line of any kind shall be connected to sewer service laterals. Laterals, which serve individual single-family residences or equivalent dwellings, shall be 4-inches in diameter. Multi-family dwellings or commercial buildings shall have 6-inch laterals. No 4-inch or 6-inch sewer service lateral from adjacent private property will be allowed to be connected directly to a manhole.

506.01.C Sewer service laterals shall be built to the same standards and of the same materials as the sanitary sewer main line. In general, sewer service laterals shall be placed at 90 degrees to the sanitary sewer main line to avoid excessive exposure to other utilities during excavation for construction or maintenance of the sewer service laterals. Angles other than 90 degrees (45 degrees minimum) may be approved by the City Engineer for cul-de-sac lots.

506.01.D The minimum slope of sewer service laterals shall be 2 percent; except that for unusual conditions, a slope of 1 percent may be approved by the City Engineer. The Design Engineer will be required to provide a complete analysis of the need for any sewer service lateral slope less than 2 percent. Depth of public sewer service laterals shall be in accordance with Section 504.02.B.

506.01.E The following additional requirements apply to public service laterals:

1. An existing service must be televised and inspected prior to use, unless otherwise approved by the City Engineer.

2. Sewer service laterals shall be connected to sewer mains using approved manufactured fittings.

3. For existing homes without sanitary sewer service or for vacant lots, new public sewer service laterals shall be provided as part of new development projects or other street rehabilitation/utility projects.

4. The length of sewer service laterals shall generally be limited to 100-feet. Cleanouts shall be installed every 100-feet if longer sewer service laterals are allowed. Where one or more sewer service laterals will exceed 100-feet in length in order to serve the adjacent private property, a public main and manhole may be required and located within an easement, as approved by the City Engineer.

5. Backwater check valves and isolation gate valves are required for all buildings where potential flooding exists if the public sanitary sewer system were to backup. These valves shall be private valves installed as part of the private sewer service piping.

507 PRIVATE SEWER SYSTEMS AND PRIVATE BUILDING SEWERS

507.01.A Private sewer systems and private building sewers shall be installed on private property in accordance with the requirements of the State of Oregon Plumbing Specialty Code.

507.01.B Easements for private sewer systems and private building sewers are the responsibility of the property owners; but copies of the recorded easements must be given to the City Engineer prior to any construction.

507.01.C Private sewer systems and private building sewers will not be permitted within the public right-of-way.

507.01.D Private sewer systems and private building sewers shall be connected to the public sewer system at a two-way property line cleanout for gravity single family and multi-family residences and a standard manhole within the public right-of-way or easement for all other private sewer connections, unless approved otherwise by City Engineer. Immediately upstream of the connecting manhole at the property line, a separate monitoring manhole will be required. The monitoring manhole shall be as shown in the Standard Drawings.

508 PUMP STATIONS

508.01 GENERAL

508.01.A Pump stations will not be allowed if other options exist for gravity sewer flow. If allowed by the City, pump stations must be consistent with the approved Wastewater Master Plan and approved by City Engineer.

508.01.B Pump stations shall be a submersible pump-type facility and shall meet or exceed the minimum requirements of the Oregon Department of Environmental Quality (DEQ) as established in the Oregon Administrative Rules, Chapter 340, Division 52, and as presented in the DEQ publication "Oregon Standards for Design and Construction of Wastewater Pump Station." Where conflicts exist between the Design Standards and the aforementioned documents, or any other technical specifications identified therein, the most stringent requirements shall take precedence.

508.01.C PUMP STATION FACILITY

1. The pump station facility shall include, but not be limited to the following:
    - ❖ Submersible pumps
    - ❖ Wet Well
    - ❖ Valve Vault
    - ❖ Bypass pump out connection
    - ❖ Associated Piping and Valves
    - ❖ Electrical Controls
    - ❖ Instrumentation
    - ❖ Telemetry to City system.
    - ❖ Access Road and Parking Area
    - ❖ Fencing, Landscaping
    - ❖ Potable Water Supply
    - ❖ Backup Generator w/ noise silencer, if required
    - ❖ Others, as deemed appropriate by the City

508.01.D PUMP STATION CAPACITY

1. Pump station shall be designed to pump the peak wastewater flow from the service area. When the service area is not built-out, staging of pump station capacity may be allowed.

508.01.E STANDBY POWER

1. All sewage pump stations shall be designed with capability for emergency power in case the primary electrical feed is out of service. Unless approved otherwise by the City Engineer, all pump stations shall have a permanent engine generator unit with automatic transfer switches to transfer the electrical feed from the primary to the standby unit when a power failure is detected by the instrumentation and control system.

2. Determining the engine generator's size depends upon the requirements of starting and operating the pumps at peak possible load and all ancillary equipment in the sewage pump station that could operate during a power outage. All sizing shall be coordinated with the manufacturer.

508.01.F LOCATION

1. The pump station facility shall be easily accessible and shall be vertically located at least 2-feet above base flood elevation. Pump station shall comply with the distance and utility separation requirements in accordance with DEQ guidelines.

508.02 DESIGN CRITERIA

508.02.A CALCULATIONS

1. Service area, peak flow, and other pump station calculations shall be submitted to the City Engineer and DEQ for review and approval within a pre-design study in accordance with DEQ requirements.

508.02.B STORAGE VOLUME

1. The wet well shall be designed to provide 4-hours of wastewater inflow storage, per Subsection 503.02, above high water alarm elevation.

508.02.C SUBMERSIBLE PUMPS

1. A minimum of two (2) submersible pumps shall be supplied. Each pump shall be capable of pumping the peak wastewater flow. Where more than two (2) pumps are used, the station shall be able to pump peak wastewater flow when the largest pump is out of service.

2. Pumps shall be submersible pumps manufactured by FLYGT (or approved equal), explosion-proof, suitable for hazardous location, capable of passing solids and shall be UL or FM listed.

3. Pumps shall be readily removable and replaceable without dewatering the wet-well or requiring personnel to enter the wet-well. Check valves and isolation valves shall be mounted outside the wet-well to facilitate access and contained in a structure suitable for protection against vandalism.

4. Control panels shall be physically separated from the wet-well, meet the requirements of the NEC, NFPA, and be suitably protected from the weather, humidity, and vandalism. The pumps shall be explosion-proof unless the control system can provide adequate assurance that pump motors in operation are submerged at all times. Electrical junction boxes shall be easily accessible without entering the wet-well.

508.02.D PIPING AND VALVES

1. All pump stations shall be provided with a valve vault for valves, piping, air and vacuum relief valves, and surge control components. Each pump discharge shall include a check valve, an isolation valve, and pressure gauge.

2. Sewage pump stations that discharge into long force mains in which there is high likelihood of grease buildup or where the force main will have low velocities, shall be equipped with valves, piping, and end cap for launching of a pig to remove buildups of undesirable materials in the force main. See Section 508.02.J.11. Also, long force mains shall be designed to control hydrogen sulfide and other hazardous gases.

508.02.E ELECTRICAL

1. Electrical controls shall be located above ground mounted in a waterproof enclosure and should be oriented facing away from prevailing weather. Electrical panels shall be UL listed. The pump station wet well shall be considered a hazardous location.

508.02.F CONTROLS

1. Pump stations shall utilize a PLC-based control system.

2. An ultrasonic level transducer shall control pump operation and alarms.

3. A redundant float activated circuit shall provide a fail-safe, high-water alarm system. The brand and model of the programmable logic controller, as well as other devices, should be obtained from the Public Works Superintendent in order to ensure compatibility with the existing system.

4. Control system design shall be subject to the approval of the City Engineer.

508.02.G ALARMS AND TELEMETRY

1. Alarms shall be telemetered to the City of Stayton Wastewater Treatment Plant. Telemetry shall conform to specifications and requirements provided by the Public Works Superintendent to ensure compatibility with existing systems. Required alarms include:

   - High water
   - Low water
   - Power failure
   - Pump failure
   - Telemetry failure
   - Others, as required by City

508.02.H LANDSCAPING AND FENCING

1. Landscaping and fencing shall be in accordance with the Stayton Municipal Code, DEQ requirements, and as required by the City Engineer.

508.02.I ADDITIONAL FEATURES

1. Provide 1-inch hose bib at valve vault. Potable water shall be provided by reduced pressure backflow preventer.

2. Provide positive ventilation in valve vault.

3. Provide odor control systems as required by DEQ and the City Engineer.

4. Provide analysis to determine if hydrogen sulfide or other hazardous gas control system is required and provide as necessary.

508.02.J FORCE MAINS

1. SIZE

   a. Except for small grinder and effluent pump installations, piping for force mains shall not be less than four inches in diameter. Force main headloss will determine pipe diameter; however, as a general rule, whenever the velocity exceeds 8 fps, a larger pipe shall be used.

2. VELOCITY

   a. At pumping capacity, a minimum self-scouring velocity of 2 fps shall be maintained unless flushing facilities are provided. Velocity shall not exceed 8 fps. Optimum velocities for reducing maintenance costs and preventing accumulation of solids range between 3.5 and 5 fps.

3. AIR RELIEF AND VACUUM VALVES

   a. An air relief and/or vacuum valves shall be placed at high points in the force main to relieve air locking or supply adequate air during vacuum scenarios. The surge effect on the system shall be considered when sizing these valves.

   b. Air relief and vacuum valves shall not be in combination. Separate valving is required and shall be equipped with isolation valves, be located directly above the force main, and designed with a cleanout or flushing attachments to facilitate maintenance. These valves shall be protected from freezing and from damage by heavy equipment.

4. BLOW-OFFS

   a. A blow-off shall be installed at low points of force mains where gritty material can accumulate and restrict flow.

5. TERMINATION

   a. The force main shall be aligned to enter the receiving manhole with its centerline horizontal to the outlet piping and at an invert elevation that will ensure a smooth transition of flow to the gravity flow section. In no case however, shall the force main enter the gravity system at a point more than 1-foot above the flow line of the receiving manhole. The design shall minimize turbulence at the point of discharge.

b. Consideration shall be given to the use of inert materials or protective coatings for the receiving manhole to prevent deterioration from hydrogen sulfide or other chemicals.

6. CONSTRUCTION MATERIALS

a. Materials to be considered for force mains shall include ductile iron, steel, polyethylene, polyvinyl chloride (PVC), and pre-stressed and reinforced concrete. The pipe material and interior lining shall be selected to adapt to local conditions, including industrial waste and soil characteristics, exceptionally heavy external loading, internal erosion, corrosion, and similar problems. The system design and surge allowances may preclude the use of some materials.

b. Installation specifications shall contain appropriate requirements based on the criteria, standards, and requirements established by the industry in its technical publications. Requirements shall be set forth in the specifications for the pipe and methods of backfilling to preclude damage to the pipe or its joints, impede future cleaning operations, prevent excessive side pressures that may create deformation of the pipe, or seriously impair flow capacity.

c. All pipes shall be designed to prevent damage from superimposed loads. Proper allowance for loads imposed on the pipe shall be calculated for the width and depth of the trench.

7. PRESSURE TESTS

a. All force mains shall be hydrostatically tested at a minimum pressure of at least 1.5 times above the design working pressure. Leakage shall not exceed the amount given in the following formula:

$$L = (ND\sqrt{P}) / 7400$$

L = allowable leakage, gallons per hour
N = number of joints in length of pipeline tested
D = nominal diameter of the pipe in inches
P = average test pressure during the leakage test (psig)

8. CONNECTIONS

a. In order to avoid shearing force main pipes because of differential settlement, flex couplings shall be used on force main pipes between the pump station structures, such as the pump station and the valve box. Flex couplings shall also be used between the final pump station structure and the force main.

9. SURGE CONTROL

a. Hydraulic surges and transients (water hammer) are dependent on a force main's size, length, profile, construction materials, and pump operating pressure. Pipe pressure tests and thrust restraint shall be based on maximum transient conditions, including an appropriate margin for safety.

10. THRUST RESTRAINT

    a. Thrust forces in pressurized pipelines shall be restrained or anchored to prevent excessive movement and joint separation under all projected conditions. Common methods include internal axial restraint.

11. PIG LAUNCHING/RETRIEVAL FACILITIES

    a. When required, pig launchers shall be provided and special care shall be given to designing the force main terminus to include a pig catcher and the ability to remove materials driven out of the force main by the pig.

    b. Pig launchers shall include proper valving so that a pig launcher can be isolated from the force main. After the pig is inserted into the line, the valves are adjusted to drive the pig through the force main using the force of the pumps. Additional water may be added to the wet-well to decrease the travel time in the force main.

    c. Pig launching facilities shall include a launch chamber, bypass piping, valves, and gauges to monitor pressure.

    d. Retrieval facilities shall be mirror images of the launch device. Baskets, traps, or screens placed in the receiving manhole for retrieval methods shall be as approved by City Engineer.

508.02.K FABRICATED STEEL SURFACE FINISH

1. Steel fabrications shall be 304 stainless steel or hot dipped galvanized. Corrosion resistant painting shall be required on valves, piping, and pipe fittings or other items that cannot be hot dipped galvanized.

508.02.L CODE AUTHORITY

1. Pump station and related facilities will be constructed in conformance with applicable Electrical, Building, and Fire Codes.

508.02.M OPERATING AND MAINTENANCE DATA

1. An operation and maintenance (O&M) manual including all product data and related information necessary for the City's operation and maintenance of all products and systems provided with the pump station shall be provided.

2. During the design of sewer pump stations, consideration shall be given to operations and maintenance (O&M) needs. The O&M manual shall include provisions for:

   - Detailed descriptions of all operating processes and procedures.
   - Design data for pumps, motors, force main, standby power, overflow point and elevation, telemetry, and sulfide control system, as applicable.
   - Pump curve with computed system curve showing design operating point.
   - Startup and shutdown procedures (step by step instructions).
   - Analysis of critical safety issues.
   - Inventory of critical components, including nameplate data for pumps and motors, etc.

- ❖ Description of the maintenance management system, including preventive and predictive maintenance.
- ❖ Vulnerability analysis.
- ❖ Contingency plan, including redundancy considerations.
- ❖ List of affected agencies and utilities, including after-hour contacts.
- ❖ List of local contractors for emergency repairs, including after-hours contacts.
- ❖ List of vendors and manufacturers of critical system components, including after-hour contacts.
- ❖ Staff training plan.
- ❖ Stand-by generator exercising and operation instructions.
- ❖ As-Built Drawings. All construction changes and location of underground pipe, conduit, buried facilities, shall be recorded by the contractor and be made part of the record drawings.

3. The O&M manual shall conform to the guidelines as set forth in the Oregon DEQ publication "Guidelines for Writing Pump Station O&M Manuals".

4. All O&M information and manufacturer's cut sheets shall be originals. Copies will not be accepted. Provide a minimum of 5 originals.

508.02.N SPARE PARTS OR TOOLS

1. Supply two (2) sets each of all gaskets, bearings, mechanical seals for rotating equipment, and other spare parts or special tools as deemed appropriate by the Public Works Superintendent.

509 TRENCHLESS TECHNOLOGIES

509.01 GENERAL

509.01.A Trenchless techniques for new construction include: micro-tunneling or directional boring, auguring or boring, pipe jacking, and other mining type operations. Costs, topography, or other issues that may preclude traditional open cut and excavation methods will most often direct the use of these techniques.

509.01.B The trenchless technologies are available for sewer system rehabilitation/replacement to preserve structural integrity and reduce Infiltration/Inflow. There are a number of products available from a variety of manufacturers and Contractors to help meet these objectives.

509.01.C Design Engineers shall take care to verify that a certain class of product is suited for its proposed application and that a specific product and its installer meet appropriate standards, including successful performance history. The purpose of this section is to highlight the advantages, disadvantages, and other issues for the various classes of sewer rehabilitation/replacement products.

509.01.D The following rehabilitation/replacement techniques that are approved to use for sewers within the City are discussed in the following Tables.

Sliplining		
Sliplining is a trenchless rehabilitation. Sliplining is the insertion of a new pipe, either continuous (typically butt-fused HDPE) or segmented (typically PVC, ductile iron, or HDPE), of smaller diameter into an existing pipe.		
Advantages	**Disadvantages**	**Issues**
• Economical. • Strong. • Bypass pumping of sewage may not be needed (for segmented slipliner pipe).	• Hydraulic capacity reduced. • Entry pits usually required. • Service lateral connections must be excavated.	• Flotation of liner must be prevented during grouting of annular space. • Condition of existing pipe may limit length of slipliner runs between pits, diameter of slipliner pipe, and/or lengths of segmented pipe pieces.

Cured-in-place Pipe (CIPP)		
CIPP is a trenchless rehabilitation. The CIPP lining process consists of inverting a resin impregnated flexible tube into an existing pipe using hydrostatic head or air pressure. The resin is cured using heat.		
Advantages	**Disadvantages**	**Issues**
• No access pits. • Service laterals can be internally reopened. • Minimal annular space. • Suitable for various cross sectional shapes. • Strength can be selected as a function of liner thickness and resin formula. • Manholes can be rehabilitated rather than replaced.	• Bypass pumping of sewage is required. • Limited local competition.	• Liner wet-out with resin must be ensured. • Resin pot life must not be exceeded. • Proper curing temperatures and times must be maintained. • I/I must be controlled during installation. • Expertise and performance of manufacturer and installer must be ensured.

Pipe Bursting		
Pipe bursting is a trenchless replacement. Through pipe bursting, the existing pipeline is fragmented and forced into the surrounding soil by pulling a bursting head through the line. A new pipe (typically butt-fussed HDPE) of equal or larger diameter is pulled behind the bursting head. New manholes are usually provided at insertion and withdrawal pits.		
Advantages	**Disadvantages**	**Issues**
• Creates a new, strong pipeline, not just rehabilitation of existing pipes. • Capacity can be increased. • Preparation of existing line is not critical.	• Entry pits are required. • Service lateral connections must be excavated. • Bypass pumping of sewage required. • Manholes usually must be replaced.	• Condition and location of adjacent buried utilities and foundations as well as surface improvements, should be considered • Dense or rocky soil may limit suitability of this method.

Point Repairs		
Point repairs can structurally rehabilitate and eliminate infiltration in short sections of lines by such methods as short CIPP liners, epoxy resins, and structural grouting sleeves. Defects such as protruding laterals can be repaired by robotic grinding. Point repairs may be needed to properly prepare the line for some of the manhole to- manhole rehabilitation/replacement options described in the techniques listed above.		
Advantages	**Disadvantages**	**Issues**
• Economical. • Repairs only what is needed.	• May not be appropriate for old lines if many more repairs may be needed in near future.	• Goals of project must be considered, along with cost estimates, to ensure manhole-to manhole rehabilitation and replacement is not warranted.

509.01.E Other rehabilitation/replacement techniques including Fold and Form (PVC and HDPE), Spiral Wound PVC, fiberglass linings, cement mortar lining, sprayed coatings, and others will be reviewed and considered on a case-by-case basis, and will only be allowed in certain applications at the approval of the City Engineer.

509.02 PRIVATE SEWER SERVICE LATERAL REPAIRS

509.02.A Private sewer service laterals are sewer lines that connect building sewers on private property to the public sewer main in the public right-of-way or easements.

509.02.B Research studies by EPA and others indicate that a significant percentage of system-wide I/I is caused by private property sources. These include sump pumps, foundation drains, roof drains, and defects in service laterals. Service lateral defects include cracked, broken, or open jointed laterals. In addition, infiltration frequently occurs at a leaky connection of the lateral to the sewer main.

509.02.C Repair of service lateral defects can be accomplished using many of the same methods listed above for sewer mains. Chemical grouting, CIPP lining, and pipe bursting, in addition to open cut excavation and replacement shall be considered for repair of service laterals, where required.

509.02.D In cases where sewage backups have occurred through service laterals and into buildings, installation of backwater valves provides an immediate solution until the longer term sewer system rehabilitation/replacement program shows results. Backwater valves are typically installed beneath basement floor slabs on that portion of the building drain serving the basement only. This allows plumbing fixtures on the main floor and above to drain even during times when the sewer main is surcharged.

509.03 MANHOLE REHABILITATION

509.03.A Manhole rehabilitation can be performed to correct structural deficiencies, address maintenance concerns, and/or eliminate I/I. Manhole rehabilitation options which shall be considered when required include lining, sealing, grouting, or replacing various components or the entire manhole. The rehabilitation method selected depends on whether inflow or infiltration, or both, is to be eliminated and whether structural integrity is an issue. Inflow typically occurs through holes in the manhole cover or around the manhole frame and cover.

509.03.B When inflow occurs or is likely to occur, manhole covers shall be sealed by replacing them entirely with new watertight covers with rubber covered gaskets, rubber vents, and pick hole plugs, or by installing watertight inserts under the existing manhole covers (inflow protectors). Inflow protectors shall contain vacuum and gas release valves.

509.03.C Chemical grouting shall be considered as a method to eliminate infiltration.

END OF DIVISION

DIVISION 6 – STORMWATER MANAGEMENT

DIVISION 6

STORMWATER MANAGEMENT

601 GENERAL

601.01 AUTHORITY AND PURPOSE

601.01.A These Design Standards shall apply to all improvements within existing and proposed public right-of-way and public easements, to all improvements to be maintained by the City, and to all improvements for which the City Code requires approval by the City. Most of the elements contained in these Design Standards are public works oriented and it is intended that they apply to both publicly financed public improvements under City contract and privately financed public improvements.

601.01.B Private construction firms, Developers, consulting engineers, or any other individuals or business entities engaged in the design and construction of improvement projects that ultimately will be owned, operated, or maintained by the City shall comply with these standards. Where minimum values are stated, greater values should be used whenever practical; where maximum values are stated, lesser values should be used whenever practical.

601.01.C The purpose of these Design Standards is to provide a consistent policy under which certain physical aspects of public improvements shall be implemented. All public system improvements and public works facilities shall be designed and constructed in accordance with applicable rules and regulations of the City and any City interpretations of those rules and regulations, including applicable technical guidance manuals, and in accordance with applicable federal, state, and local statutes and rules. Approval of public improvements must be made by the City Engineer or the Public Works Director before construction is permitted. An authorized representative of the City will be available for construction observation during construction of the project.

601.01.D It is important to emphasize that these Design Standards are not intended to inappropriately restrict or constrain the originality or innovativeness of the Design Engineer and his or her ability to exercise and apply professional judgment to each situation and project. The City recognizes that every public improvement project has unique characteristics and situations. These Design Standards cannot provide for all situations and are intended to assist, but not to serve as a substitute for competent work by design professionals. It is expected that the Design Engineer will bring to each project the standard of care from the Design Engineer's respective discipline.

601.01.E If the Design Engineer anticipates challenges in meeting these Design Standards, they should contact the City Engineer prior to extensive design efforts. The City Engineer will seek to work with each designer to achieve a satisfactory design and construction project that is in the best long-term interests of the City of Stayton and one that complies with applicable rules and regulations.

601.01.F These Design Standards are not intended to limit any innovative or creative effort which could result in better quality, better cost savings, or both. Any proposed departure from the Design Standards will be judged; however, on the likelihood that such variance will produce a comparable result, or long-term benefit to the City, while meeting the intended purpose of the design standard.

601.01.G Requests for alternatives to these Design Standards will be considered for approval by the City Engineer as the need arises and conditions warrant modification. Request must show that the variance meets the intent of the Design Standards and will not compromise safety, impact other properties or cause an increase in maintenance. This consideration will be on a case-by-case basis and require sufficient justification prior to approval. All requests will be in writing and be accompanied by engineered drawings and final design calculations.

601.01.H All franchise utility improvements, including telephone, electrical power, gas and cable TV shall meet the current standards of the appropriate agency as well as City Standards.

601.01.I In the case of conflicts between the text of these Design Standards and the Standard Drawings, or between the provisions of these Design Standards and the Standard Construction Specifications, the more stringent as determined by the City Engineer shall apply.

601.01.J All surveys for public works facilities shall be performed under the direction of a Professional Land Surveyor registered in the State of Oregon. All elevations shall be referenced to NAVD 88 vertical datum. Vertical benchmark locations shall be coordinated with the City.

601.01.K On completion of projects to become public works, the Design Engineer shall submit one complete set of reproducible "Record Drawings" (As-Builts), a compact disc (CD) containing electronic PDFs and cad files (AutoCAD, or others as approved) to the City Engineer. The drawings shall show any deviations from the original construction drawings and shall include sufficient information to accurately locate public works facilities. No bond will be released until the City Engineer receives and approves an acceptable set of reproducible Record Drawings from the Design Engineer, with his/her stamp of certification.

601.01.L For privately financed public improvements, the Design Engineer, at the completion of construction, shall submit a completion certificate to the City stating that all work has been completed in accordance with the approved project plans and specifications.

601.01.M Before the City accepts a public works project for operation and maintenance and releases the Performance Bond, a one (1) year Warranty Bond on all materials and workmanship incorporated in the project shall be provided to the City.

601.01.N The objective of these Design Standards is to provide for a stormwater system that will:

- Safely manage stormwater runoff that is generated upstream and on the site from given storm intervals to an approved discharge point.
- Prevent the uncontrolled or irresponsible discharge of stormwater onto adjoining public or private property in order to prevent the capacity of downstream stormwater systems from being exceeded.
- Maintain the stormwater runoff characteristics of the original undeveloped drainage basin, where feasible.
- Maintain or improve Stayton's overall stormwater quality, incorporate best management practices, and maximize efficient use of Stayton's natural drainage systems.
- Be designed to be economical and safe to maintain with materials that have sufficient structural strength to withstand expected external design loads to ensure a practical design life of seventy-five (75) years.
- Be consistent with the Stayton Municipal Code (SMC), Stayton Standard Construction Specifications and applicable state and federal regulations and requirements for stormwater quantity and quality.

601.02 APPLICABILITY

601.02.A These Design Standards will govern the design of all public drainage facilities in the City of Stayton and applicable work within its service areas. This document will be routinely referred to as the Design Standards. Permanent drainage facilities shall be provided on all property improvements within the City of Stayton per these Design Standards for the following types of development:

1. Partitions and subdivisions.

2. Commercial, industrial, and multifamily developments. These Design Standards are intended to fulfill the requirements of the "Special Storm Sewers" section of the State of Oregon Plumbing Specialty Code for private storm drains.

3. Developments entailing construction that would change the point of discharge of surface waters, the quantity of discharge, or discharge surface waters at a higher velocity or flow than that of the preconstruction discharge rate, or add to pollution of surface waters.

4. Construction or reconstruction of public roadways and temporary detours.

5. Developments entailing construction in or adjacent to any existing stream or surface watercourse including intermittent streams.

6. Developments requiring construction in or adjacent to the 100-year floodplain.

601.03 REFERENCES

601.03.A These Design Standards are intended to be consistent with the most current provisions of the documents and requirements listed and referenced in Subsection 101.03 and others specifically listed below. Projects are expected to be consistent with the following:

1. Applicable concepts consistent with the most recent Stormwater Master Plan adopted by the City of Stayton. Where additional detailed information and background is required for a particular project, the Stormwater Master Plan shall be referred and adhered to, as applicable. Any deviations from the Stormwater Master Plan shall be flagged and presented to the City Engineer for consideration.

2. State of Oregon Plumbing Specialty Code.

3. Applicable design guidelines published by the American Society of Civil Engineers.

4. Applicable design guidelines published by the Federal Highway Administration.

5. Applicable design guidelines published by the Oregon Department of Transportation.

6. Applicable stormwater and erosion control design manuals including, but not limited to, the following.

   - City of Portland Stormwater Management Manual
   - ODOT Hydraulics Manual
   - FHWA Hydraulic Engineering Circular No. 22
   - City of Portland Erosion and Sediment Control Manual
   - ODOT Erosion Control Manual
   - Oregon DEQ's Erosion and Sediment Control Manual

601.04 SPECIAL DESIGN APPLICATIONS

601.04.A Special design applications not covered in these Design Standards require review and approval by the City. Submittal of full design calculations, supplemental drawings, and information will be required prior to any approval.

601.04.B Such design applications requiring special review and approval include, but are not limited to, the following:

- Pump Stations and Force Mains
- Electrical/Monitoring/Telemetry Devices
- Siphons
- Internal Sealing of Existing Storm Drains
- Relining of Existing Storm Drains
- Energy Dissipaters
- Bank Protection

601.05 STANDARD CONSTRUCTION SPECIFICATIONS AND STANDARD DRAWINGS

601.05.A Except as otherwise provided by these Design Standards, all construction design detail, workmanship, and materials shall be in accordance with the current edition of the City of Stayton Public Works Standard Construction Specifications and Standard Drawings.

601.06 CITY POLICY REGARDING ENGINEERING

601.06.A It will be the policy of the City to require compliance with Oregon Revised Statute 672 for Professional Engineers.

601.06.B Engineering plans, reports, or documents shall be prepared by a registered Professional Engineer or by a subordinate employee under the Design Engineer's direction, and shall be signed by the Design Engineer and stamped with the Design Engineer's seal to indicate responsibility for them. The Design Engineer shall maintain complete responsibility for the design of the project. The Design Engineer shall review any proposed public facility extension, modification, or other change with the City prior to engineering or other proposed design work to determine if there are any special requirements or whether the proposal is permissible.

601.06.C City approval of plans or any other engineering document produced by the Design Engineer does not in any way relieve the Design Engineer of responsibility for the design, or their responsibility to meet applicable City, County, State, and Federal requirements, or their obligation to protect life, health, and property of the public. The plan for any project shall be revised or supplemented at any time it is determined that the project requirements have not been met. It is also required that at any time a revision to the design is required, the Design Engineer shall maintain responsibility to redesign according to these Design Standards per the City's approval. It is therefore necessary for the Design Engineer to be available during construction should timely changes be required. If the Engineer of Record leaves the acting consulting firm then a new registered engineer will have to submit an updated Engineer of Record form to the City prior to work commencing.

601.07 CONVENTIONS USED THROUGHOUT THE DESIGN STANDARDS

601.07.A See Subsection 101.07 for conventions used throughout these Design Standards.

601.08 ORGANIZATION AND CLASSIFICATION OF DIVISIONS

601.08.A See Subsection 101.08 for the organization and classification of divisions throughout these Design Standards.

601.09 CLARIFICATIONS, MODIFICATIONS, AND REVISIONS TO DESIGN STANDARDS

601.09.A These Design Standards will be periodically updated due to changes in policy or procedures, new technology, and methods of design and construction. Periodic revisions to these Design Standards will be necessary to maintain consistency in that regard. The date appearing on the title page is the date of the latest revision for each Division. Parenthetical notations at the bottom of each page indicate the most recent change. It will be the user's responsibility to obtain and maintain his/her copy of these Design Standards with the latest changes.

601.09.B See Subsection 101.09 for general policies and procedures regarding clarifications, modifications, and revisions to the Design Standards.

601.10 DEFINITIONS AND TERMS

601.10.A See Subsection 101.10 for standard definitions and terms used throughout these Design Standards.

602 GENERAL DESIGN REQUIREMENTS

602.01 PERFORMANCE STANDARDS

602.01.A Storm drainage design shall meet the policies and guidelines of the latest Stormwater Master Plan and its updates. All stormwater that is or will be discharged to the City system shall comply with the Stayton Municipal Code requirements.

602.01.B Stormwater and groundwater, including but not limited to, street, roof, or footing drainage, shall not be connected to, or will be allowed to discharge into, any sanitary sewer system.

602.01.C For any project requiring construction within or adjacent to watercourses and/or wetlands, in addition to approval by the City, permits from the appropriate responsible agencies (Oregon Department of Fish and Wildlife, Oregon Division of State Lands, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, U.S. National Marine Fisheries Service, etc.) shall be obtained. Copies of all permits, or written evidence that no permit is required shall be given to the City prior to City approval of the construction plans.

602.01.D Storm drainage design within a development area shall include provisions to adequately control runoff from all public and private streets and the roof, footing, and area drains of residential, multifamily, commercial, industrial, or public buildings, and to ensure future extension of the drainage system to the entire drainage basin in conformance with the Stayton Municipal Code and adopted Stormwater Master Plan.

602.01.E Storm drain system designs (conveyance, flow restrictions, detention) shall make adequate provisions for collecting all stormwater runoff. The system shall accommodate all runoff from upstream tributary areas whether or not such areas are within the proposed development. The amount of runoff to be accommodated shall be based upon ultimate development of all upstream tributary areas. Proposed storm drain systems shall not discharge flows into inadequate downstream systems.

602.01.F Calculations for storm drain design shall be submitted with all storm drain improvement projects. Calculations shall clearly show how flows were calculated and also how the proposed storm drain system is capable of conveying these flows. For projects that require stormwater quality and/or quantity facilities, additional design calculations shall be submitted. See Subsection 603.01 for Drainage Report submittal requirements.

602.01.G Connections to downstream stormwater systems (including roof drain connections) will not be allowed if a capacity issue exists or may exist after the connection is made, as identified through flood complaint calls, operational knowledge, or from the Stormwater Master Plan. The Developer will be required to perform an analysis of the downstream stormwater system per Subsection 603.01.B and make the needed capacity improvements or provide other means to mitigate the downstream impacts, and/or provide additional on-site detention/retention if capacity issues exist or may exist. This applies to all types of development in which a permit is required.

602.01.H Surface or subsurface drainage, caused or affected by the changing of the natural grade of the existing ground or removal of natural ground cover or placement of impervious surfaces, shall not be allowed to flow over adjacent public or private property in a location materially different from that which existed before development occurred, but shall be collected and conveyed in an approved manner to an approved point of disposal. Requirements of Building Codes shall also be met regarding alteration of drainage patterns.

602.01.I Surface water entering the subject property shall be received at the naturally occurring locations and surface water exiting the subject property shall be discharged at the natural locations with adequate energy dissipators within the subject property to minimize downstream damage and with no diversion at these discharge points.

602.01.J The approved point of discharge for all stormwater may be a storm drain, existing open channel, creek, detention, or retention facility approved by the City Engineer, or subsurface as allowed and approved by DEQ. Acceptance of suggested systems will depend upon the prevailing site conditions, capacity of existing downstream facilities, and feasibility/maintainability of the alternate design.

602.01.K All public storm drain systems shall be located within the public right-of-way or as directed and approved by the City Engineer. These storm drain systems are placed in the public right-of-way for ease of maintenance and access, control of the facility, operation of the facility, and to permit required replacement and/or repair. The City Engineer, under special conditions, may allow a public storm drain system to be located within a public storm drain easement as referenced in Subsection 102.08. When private property must be crossed in order to reach an approved point of discharge, it shall be the Developer's responsibility to acquire a recorded easement from the private property owner meeting the approval of the City Engineer. The Developer must secure all signed easement documents from private property owners prior to final plan approval.

602.01.L An erosion and sediment control plan shall be developed for all phases of the project construction to protect downstream waters and minimize erosion. Stormwater quality enhancements are encouraged and stormwater quality Best Management Practices (BMPs) shall be incorporated into the design.

602.01.M All other local, State, and Federal permitting requirements must be met. The Developer shall produce copies of approved permits for the City prior to final plan approval.

602.01.N Stormwater quality and quantity provisions shall be included as part of the design considerations. The City of Stayton's thresholds for proposals that are subject to the stormwater quality and quantity requirements are identified below. Unless otherwise specifically approved by the City Engineer, proposals meeting these thresholds must comply with the stormwater quality (pollution reduction) requirements specified in Section 607, the stormwater quantity (flow control) requirements specified in Section 608, and the stormwater infiltration requirements specified in Section 609. All projects shall comply with the City's stormwater operations and maintenance (O&M) plan and agreement requirements and source control requirements.

1. **Stormwater Quality (Pollution Reduction):** Development and any other activities which create new impervious surfaces of greater than ***500-square feet*** in area at the time of application, or if required by the City Engineer, are required to construct or fund permanent stormwater quality facilities to reduce contaminants entering the storm and surface water system. Properties with existing development that propose new offsite discharges or new connections to the public system that meet this threshold must also comply with the stormwater quality requirements. Stormwater shall be surface infiltrated onsite to the maximum extent feasible before discharging any flows offsite.

    a. Some site characteristics and uses may generate specific pollutants of concern or levels of pollution that are not addressed solely through implementation of the pollution reduction requirements in Section 607. The *City of Portland Stormwater Management Manual* (SWMM) defines these characteristics and uses and identifies structural source controls that must be implemented to manage the pollutants at their source (see SWMM Chapter 4, Source Controls). The City of Stayton requires that ***any project of any size*** that introduces these site characteristics or uses must comply with the SWMM source control requirements. This includes development, tenant improvements, and changes to site uses or activities, including changes to specific site or activity areas, even if no impervious area is added or replaced.

2. **Stormwater Quantity (Flow Control):** Development and any other activities which create new impervious surfaces of greater than ***500-square feet*** in area at the time of application, or if required by the City Engineer, shall incorporate stormwater quantity facilities for mitigating its impacts on the public stormwater systems and receiving water bodies. Properties with existing development that propose new offsite discharges or new connections to the public system that meet this threshold must also comply with the stormwater quantity requirements. Stormwater shall be surface infiltrated onsite to the maximum extent feasible before discharging any flows offsite.

    a. Unless directed otherwise, stormwater quantity facilities will be required to detain post-developed peak runoff rates from the 2-year, 5-year, 10-year, and 50-year 24-hour storm events to the respective pre-developed peak runoff rates and the post-developed peak runoff rate for the 25-year storm event will be required to be detained to the 10-year pre-developed peak runoff rate (required release rates). Potential downstream damage due to stormwater quantity facility system failure/overflow may require greater detention requirements or improvements downstream. In no case shall the required release rates increase the flooding conditions downstream.

3. **Stormwater Infiltration:** Stormwater shall be surface infiltrated onsite to the maximum extent feasible, before discharging any flows offsite. Maximum extent feasible is defined as the extent to which a requirement or standard must be complied with as constrained by the physical limitations of the site, practical considerations of engineering design, and reasonable considerations of financial costs and environmental impacts. The appropriate use of stormwater surface infiltration depends on a number of factors, including soil type, soil conditions, slopes, and depth to groundwater. The point of discharge is also site specific and dependent on the availability and condition of public and private infrastructure. The feasibility of surface infiltration and the discharge point have a direct impact on the stormwater quality and quantity requirements for a site; therefore, it is critical to determine the feasibility of surface infiltration and the point of discharge before designing a stormwater facility.

602.01.O These stormwater quality and quantity requirements are minimum standards. If the City determines that additional controls are necessary in basins that drain to sensitive receiving waters or groundwater sources (such as defined by the DEQ's 303d, and proposed Total Maximum Daily Load (TMDL) requirements for water-quality limited streams, the DEQ's Underground Injection Control Regulations, or Federally designated threatened and endangered fish listings), additional facilities, treatments, or other best management practices (BMP's) may be required. These requirements could include larger facility designs as well as additional types of stormwater quality and quantity controls.

602.01.P Stormwater management facility designs with the City of Stayton shall comply with the most current edition of the *City of Portland Stormwater Management Manual*, except as specifically modified by these Design Standards, or as specifically approved by the City Engineer. The *City of Portland Stormwater Management Manual* provides guidance for selection and basic design considerations of various stormwater management facilities. The guidelines are not intended to be a comprehensive list of all stormwater management facilities, but provide a general overview of those commonly used. In selecting the appropriate stormwater management facility for a site, the designer must consider the site characteristics, anticipated land uses, runoff characteristics, and treatment objectives. The use of any other resource shall be coordinated with and approved by the City Engineer prior to design.

602.01.Q The City of Stayton administers the development review process, including land use reviews, as well as building permits for private improvements. The City also reviews, approves, and inspects stormwater facilities on private property as part of the development permitting process. Public works improvement permits are required for public infrastructure improvements, which are generally located in the public right-of-way. See Subsection 103.02 for more information on the City's Public Works permit process.

602.02 STORM DRAINAGE PLANS

602.02.A Complete plans and specifications for proposed storm drain projects, including any necessary public dedications and easements, shall be submitted to the City Engineer for review. Such plans and specifications must receive City Engineer approval prior to construction permit issuance and prior to beginning of construction. Engineering documents shall be prepared by a Professional Engineer registered and licensed in the State of Oregon.

602.02.B Engineering design plans drawn to scale, showing the existing and proposed storm drain system, shall be submitted in accordance with Division 2 of these Design Standards. The proposed plan shall show profile and plan view of the proposed improvements.

602.03 PIPE MATERIALS AND SIZE

602.03.A Public storm drains shall be constructed with non-reinforced concrete pipe, reinforced concrete pipe, smooth interior, corrugated exterior HDPE pipe, or PVC pipe, as specified in the Standard Construction Specifications, unless approved otherwise. Pipe material shall be uniform throughout segmented manhole pipe runs. Tracer wire shall be a minimum 12-gauge, green-coated copper wire and shall be installed with all plastic pipe. Where required for added strength, Class 52 or greater ductile iron pipe or concrete pipe meeting the applicable Sections of ASTM C-76 shall be used. Regardless of selected pipe material, all joints shall be watertight.

602.03.B Public storm drain main lines (Collectors and Trunk lines) shall be a minimum of 12-inches in diameter. Public storm drain connector pipes to side-inlet catch basins and other inlet structures shall be a minimum of 10-inches in diameter.

602.03.C When two (2) parallel pipes are installed in-lieu-of one (1) large pipe or a box culvert, the minimum separation between the pipes shall be 1-foot or one-third the diameter of the largest diameter pipe, whichever is greater. This requirement may be waived if the void between the pipes below the spring line is filled by grouting, controlled-density fill, or other City approved method/substance.

602.04 STORM DRAINAGE SYSTEM CLASSIFICATION

602.04.A **PRIVATE STORM DRAINS.** A privately owned, operated, and maintained storm drain system which serves one or multiple building storm drains, catch basins, area drains, or other stormwater facilities located on private property outside rights-of-way or public easements. Private storm drains typically consist of the following:

- Private building roof drains, typically 3-inches in diameter.
- Private storm drains that are directly connected to public storm drain systems, where specifically allowed by the City Engineer, typically 6-inches in diameter.
- Private storm drain conveyance systems located within private property.
- Private stormwater quantity and quality facilities, as required by the City Engineer.

602.04.B **INLET CONNECTOR PIPES (sometimes also referred to as LATERALS).** A public storm drain 10 inches to 18 inches in diameter which connects inlets (side-inlet catch basins, curb inlets, inlet manholes, and/or ditch inlets) to collector or trunk main storm drain systems. This portion of the system is designed to convey the required storm event of the entire contributing area in an un-surcharged state. Inlet connector pipes terminate at the subsequent downstream point at which it connects to a collector main or trunk main storm drain system.

602.04.C **COLLECTOR MAINS.** A public storm drain main line 12 inches to 21 inches in diameter which accommodates one or more inlet connector pipes and/or other storm drain collector mains. This portion of the system is designed to convey the required storm event of the entire contributing area in its fully developed land use condition. This portion of the storm drain system begins with a 12-inch or larger diameter pipe at the discharge point of the inlet connector pipes and terminates at the subsequent downstream point at which it is no longer capable of conveying the flow in an un-surcharged state in an 21-inch diameter pipe, at which point the system becomes a trunk storm drain system.

602.04.D **TRUNK MAINS.** A public storm drain main line 24 inches in diameter and larger to which one or more collector main lines and/or other storm drain trunk main lines connect or may connect. Trunk storm drain main lines may consist of man-made facilities such as pipes, ditches, and culverts or may consist of waterways. This portion of the system is designed to convey the required storm event of the entire contributing area in its fully developed land use condition, assuming on-site and/or regional detention has been incorporated in the design.

602.04.E **CULVERTS.** A stormwater conveyance system which provides for passage of water under or through traveled ways or obstructions placed across streams and waterways. Culverts shall be 12 inches in diameter and larger for driveways and 18 inches in diameter and larger for crossings of street rights-of-way. Culverts shall be designed to at minimum convey the 25-year storm event (50-year storm event for Collector and Arterial Streets) of the entire contributing area and shall be designed to pass the required flows without compromising public safety or causing new or additional flooding. Culverts that convey flows from or through natural creeks, streams, flood hazards or other sensitive areas, or as otherwise deemed appropriate by the City Engineer, shall be designed to convey the 100-year storm event. Fish passage accommodations may be required on any creek and stream that has a history or the potential for fish production. In this case, a local representative of Oregon Department of Fish and Wildlife (ODFW) or other applicable state or federal agency shall be contacted by the Design Engineer to identify site-specific design criteria and to determine if fish passage is required.

602.05 STORMWATER DESIGN SUMMARY

602.05.A **CONVEYANCE SYSTEMS.** Conveyance systems shall be designed to convey the peak flows of the design storm recurrence interval shown in Table 602.05.A. Where required, a downstream capacity analysis shall be performed in accordance with Section 603.01.B.

Table 602.05.A CONVEYANCE SYSTEM DESIGN REQUIREMENTS

SYSTEM ELEMENT		DESIGN STORM RECURRENCE INTERVAL
Local and Collector Streets[1][2]	Surface drainage (driveways, streets, alleys, curbs, curbs and gutters, inlets) and inlet connector pipes	10-year
	Collector Mains (pipes 12" to 21")	25-year
	Trunk Mains (pipes 24" and larger)	25-year
	Ditches and Culverts	25-year
Arterial Streets[1][2]	Surface drainage (driveways, streets, alleys, curbs, curbs and gutters, inlets) and inlet connector pipes	25-year
	Collector Mains (pipes 12" to 21")	50-year
	Trunk Mains (pipes 24" and larger)	50-year
	Ditches and Culverts	50-year
Watercourses[2]	Without designated floodplain	50-year
	With designated floodplain	100-year
Bridges[2]	All	100-year

Notes:

1. *The width of gutter flow on all street classifications shall not exceed 8 feet from face of curb or 3 inches in depth measured at the curb face for the required storm event at any point along the street. Inlets shall be designed to completely intercept the storm event gutter flow. Sag vertical curves in major collectors and arterials shall be designed to intercept the 50-year storm event. The 100-year design storm shall be evaluated and provisions shall be provided at all locations where ponding to hazardous depths are likely to occur. Emergency access shall be provided at all times.*

2. *Adequacy of the conveyance system may be required to be demonstrated by performing and submitting for City review and approval hydraulic grade line calculations and/or a downstream capacity analysis. Surcharged conditions for pipe systems and culverts and bank-full conditions for open ditches and channels are acceptable only for demonstrating the adequacy of the conveyance system to convey the peak runoff for the required design storm, provided that:*
   a. *Runoff is contained within defined conveyance system elements, and*
   b. *Hydraulic grade line does not exceed the elevation of the roadway subgrade, and*
   c. *No portions of a building will be flooded.*

602.05.B **STORMWATER QUALITY.** Development which creates new impervious surfaces of greater than ***500-square feet*** in area at the time of application, or if required by the City Engineer, is required to comply with the stormwater quality requirements in Table 602.05.B. Properties with existing development that propose new offsite discharges or new connections to the public system that meet this threshold must also comply with the stormwater quality requirements. Stormwater shall be surface infiltrated onsite to the maximum extent feasible, before discharging any flows offsite. All projects shall comply with the City's stormwater operations and maintenance (O&M) plan and agreement requirements and source control requirements.

Table 602.05.B STORMWATER QUALITY (POLLUTION REDUCTION) DESIGN REQUIREMENTS

SYSTEM ELEMENT	REQUIREMENTS
Stormwater Quality Facilities[1] *Exemptions: Runoff from residential roofs (three units or less) that goes directly to infiltration facilities.*	❖ Shall achieve 70 percent TSS removal from 90 percent of the average annual runoff. ❖ Shall be designed to address the Willamette Basin TMDL pollutants of mercury, temperature, and bacteria. ❖ Shall use vegetated facilities to infiltrate onsite to the maximum extent feasible.

Notes:

1. *Design shall be in accordance with the most current edition of the City of Portland SWMM. Other proposed facilities shall be approved by the City Engineer prior to design.*

602.05.C **STORMWATER QUANTITY.** Development which creates new impervious surfaces of greater than ***500-square feet*** in area at the time of application, or if required by the City Engineer, is required to comply with the flow control requirements described in Table 602.05.C. Properties with existing development that propose new offsite discharges or new connections to the public system that meet this threshold must also comply with the stormwater quantity requirements. Stormwater shall be surface infiltrated onsite to the maximum extent feasible, before discharging any flows offsite. All projects shall comply with the City's stormwater operations and maintenance (O&M) plan and agreement requirements and source control requirements.

Table 602.05.C STORMWATER QUANTITY (FLOW CONTROL) DESIGN REQUIREMENTS

SYSTEM ELEMENT		REQUIREMENTS
Detention Facilities[1][2] *Detention Exemptions: Sites that drain directly to the North Santiam River as approved by the City Engineer. Pollution reduction requirements still apply.*	All Facilities	❖ Shall use vegetated facilities to infiltrate onsite to the maximum extent feasible. ❖ Limited to pre-developed peak runoff rates for the 2, 5, 10 and 50-year storm events. 25-year post- shall be limited to the 10-year pre-. Flow control, is also a function of downstream capacity.
Retention Facilities[1][2] *Retention Exemptions: Sites with unstable soils, contamination, or high risk of contamination.*	Infiltration Capacity	❖ Shall use vegetated facilities to infiltrate onsite to the maximum extent feasible. ❖ Designed for 50-year storm event. ❖ Seasonal High Groundwater shall be verified. ❖ Overflow Provisions for 100-year storm event.

Notes:

1.. *Provisions for an adequate and approved overflow system are required to convey the 100-year storm event to an acceptable point of discharge. Additional provisions shall be provided at all locations where the overflow system will create ponding to hazardous depths. Emergency access shall be provided at all times.*
2. *As approved by the City Engineer (and DEQ as applicable). Design shall be in conformance with the City of Stayton Public Works Standards, City of Portland SWMM and DEQ requirements, as applicable.*

602.06 LAND USE APPLICATION STORMWATER SUBMITTAL REQUIREMENTS

602.06.A **PRELIMINARY DRAINAGE IMPACT ANALYSIS.** At the time a land use application is filed, the applicant shall provide a preliminary drainage impact analysis or a preliminary drainage report for City review. The analysis shall include a preliminary stormwater plan, preliminary stormwater calculations, and a stormwater narrative which identifies the impacts the "new development" will have on existing stormwater systems and receiving waterbodies. The stormwater narrative shall at minimum include and discuss the following. A more complete stormwater analysis and Drainage Report per Section 603.01.A will be required to be submitted following the land use application phase.

1. A brief description of existing and developed site conditions, including pervious and impervious surface area calculations.

2. The proposed stormwater facilities required to comply with the stormwater quality (pollutant reduction) requirements, including any source control requirements.

3. The proposed stormwater facilities required to comply with the stormwater quantity (flow control) requirements, including existing and design infiltration rates, the preliminary pre-development and post-development stormwater runoff flow rates.

4. The method of discharging stormwater offsite and any anticipated design provisions needed to control the velocity and direction of the discharge in order to minimize damage to receiving stormwater systems or water bodies.

603 MINIMUM DESIGN CRITERIA

603.01 STORMWATER ANALYSIS REQUIREMENTS

603.01.A DRAINAGE REPORT

1. The Drainage Report shall be on 8-1/2" x 11" paper and maps shall be folded to 8-1/2" x 11" size unless another format is approved prior to submittal. See Section 612 for the Drainage Report Sample Format.

2. The Drainage Report shall be prepared by, and bear the seal and original signature of, a Professional Engineer registered in the State of Oregon and shall contain the following information:

   a. COVER SHEET. Provide the project name, the City of Stayton land use file number, the Owner's name, address, and telephone number, the Design Engineer's name, address, and telephone number, and the date of the submittal. The Cover Sheet shall also indicate the status of the Drainage Report, either as being the final version or a preliminary draft.

   b. TITLE SHEET. Provide the Design Engineer's certification statement, stamp/seal.

      "I hereby certify that this Drainage Report for _____ (name of project) has been prepared by me or under my direct supervision and complies with the City of Stayton's Public Works Standards and standard engineering practice."

   c. TABLE OF CONTENTS. Provide the page numbers for each section of the report, including figures, tables, charts, appendices, exhibits, or attachments.

d. PROJECT OVERVIEW AND DESCRIPTION: Describe the project, including the size and location, proposed land use, proposed site improvements, proposed construction of impervious surfaces, proposed landscaping, and special circumstances. Include a summary of the proposed facilities necessary to comply with the stormwater quality (pollutant reduction) requirements and the proposed facilities necessary to comply with the stormwater quantity (flow control) requirements. Either include, or provide an attachment reference to, a project Vicinity Map.

1) Project Planning and Permit Requirements: Provide the project's planning information including the address or parcel information, property zoning, etc. List any required City of Stayton permit(s) for which the proponent is applying for. List any other applicable permits required from other jurisdictions (e.g. DEQ Rule Authorization, Corps of Engineers 404 Fill Permit, DSL Permit, DEQ 1200-C or CN Permit, etc). Include references to relevant reports such as basin plans, flood studies, groundwater studies, wetland designation, watershed plans, sub-basin master plans, sensitive area designation, environmental impact statements, stormwater quality reports, or other relevant documents. Where such reports impose additional project conditions, those conditions shall be included in the report.

2) Stormwater Concepts and Relation to Master Plan: Describe how the project complies with, or will impact (if not shown), the Stormwater Master Plan.

e. EXISTING SITE CHARACTERISTICS

1) Existing Site Information: Describe the project site, general land use and ground cover, offsite contributing property's general land use and ground cover, and the general routing of stormwater runoff into and out of the project.

2) Existing Soils Information: Describe the project's existing soil engineering properties including the NRCS soil designations/classifications, depth to groundwater, infiltration capacities, etc. Identify any sources of runoff to the project site and any existing drainage or erosion issues upstream that may have an impact on the proposed development. This should be based on field investigation. Provide a soils report(s), where applicable.

f. DRAINAGE SUB-BASIN DESCRIPTIONS AND MAPS

1) Describe both existing and developed site conditions and relevant hydrological conditions including, but not limited to, the following:

- Approximate sub-basin total area and approximate pervious and impervious surface areas,
- General topography;
- Any offsite contributing drainage;
- Any natural and constructed channels;
- Any sensitive areas, wetlands, creeks, ravines, gullies, steep slopes, springs and other environmentally sensitive areas on or adjacent to the project site.
- Proposed stormwater improvements and points of discharge from the project site;

2) Provide Sub-basin Map(s) showing proposed boundaries, any offsite contributing drainage sub-basins, onsite drainage sub-basins, approximate locations of all major drainage structures within the sub-basins, and depicting the course of stormwater originating from the subject property and extending all the way to the closest receiving body of water. The sub-basin maps shall also show the assumed time of concentration flow paths, the design point locations, the source of the topographic base map (e.g. USGS), the scale of the map, and north arrow. Both existing and developed sub-basin maps shall be submitted with all necessary calculations. The sub-basin maps shall clearly show how stormwater is being routed through the improvements.

g. HYDROLOGIC DESIGN METHODOLOGY AND ANALYSIS. Identify the methodology and modeling used. Include all relevant hydrologic design calculations, including time of concentration calculations, rainfall intensity, and other necessary information. Provide a summary table comparing the pre-developed and post-developed peak flow rates for all discharge points for the 2, 5, 10, 25, 50, and 100-yr storm events. The table shall show the peak flow rates **without** the proposed stormwater quantity facility.

h. STORMWATER MANAGEMENT FACILITY DESIGN. Identify the methodology and modeling used. Include all relevant design calculations, including safety factors, design coefficients, and other necessary information for all proposed stormwater quality and quantity control facilities. Provide calculations verifying the capacity and design of any existing stormwater facilities to remain. Calculations shall include overflow computations as required. Provide a summary table comparing the pre-developed and post-developed peak flow rates for all discharge points for the 2, 5, 10, 25, 50, and 100-yr storm events. The table shall show the peak flow rates **with** the proposed stormwater quantity facility.

i. CONVEYANCE SYSTEM DESIGN. Provide supporting design information for all proposed conveyance systems. Provide calculations verifying the capacity of new and existing drainage systems. These computations may include capacity and hydraulic grade line calculations required either as part of the proposed storm drainage system design or as part of the downstream capacity analysis, for flood routing computations required for the design of detention/retention storage facilities, for wetland impact analysis, or for floodplain analysis.

j. DOWNSTREAM CAPACITY ANALYSIS SUMMARY/REPORT. See Section 603.01.B for downstream capacity analysis requirements. If a downstream capacity analysis is required, the summary/report shall identify any capacity issues that may result from the project/development runoff, and provide the supporting data and calculations as required. The summary/report shall provide recommendations for mitigation downstream capacity issues identified. Where open channel hydraulic modeling is used in the downstream analysis, the following information shall be included:

- A site map showing the location of the project and the surrounding drainage basin.
- A description of all calculations, references, and modeling used in the analysis.
- A discussion of how Manning's n-values were determined, including photos of typical cross sections used in determining the n-values.
- A description of the storm events used in the study.
- A brief description of the physical condition and the estimated capacity of all existing drainage structures analyzed.
- A list of any previous hydraulic analysis and references relied on for the current study.

- ❖ Cross section plots for all cross sections, plotted at no more than two per 8½ x 11 sheet. Each cross section shall be scaled consistently and properly labeled with the cross section number. Cross sections shall be perpendicular to the flow and waterway centerline. Sections shall be oriented left to right facing downstream and show the 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year water surface elevations.
- ❖ A CD-ROM with the model input and output files shall be included in the report package, as applicable.
- ❖ Additional information may be required by the City as appropriate, based on the size and complexity of the project.

k. FLOODWAY/FLOODPLAIN ANALYSIS. If a Floodway/Floodplain Analysis is required, provide a description of how the upstream and downstream boundary conditions were established. All proposed grading, culverts, bridges, drop structures, access ramps, etc., that are in the floodplain must be shown and included in the modeling. Describe the floodway analysis. Provide photographs of the existing study reach shall be included. A table with existing and proposed water surface elevations and velocities at each cross section shall be shown. The 100-year floodplain and floodway lines shall be clearly shown on the map based on the modeling results and tied to the appropriate contour lines.

l. ENGINEERING CONCLUSIONS/RECOMMENDATIONS. Provide a summary of how the project satisfies the stormwater quality, quantity and discharge requirements. Provide a summary of how the stormwater design complies with other local, State, and Federal stormwater requirements. Provide a description of how the stormwater system will function during the 100-year storm event and any provisions needed to convey the 100-year storm event to an approved point of discharge. Provide recommendations for mitigation of any downstream capacity issues identified (as applicable). Provide recommendations based on floodway and floodplain analysis (as applicable).

m. OPERATION AND MAINTENANCE PLAN AND AGREEMENT: An operation and maintenance (O&M) plan and agreement is required for privately owned and maintained stormwater quality and quantity control facilities. The O&M plan will need to be an attachment to the Drainage Report, to any declaration of covenants for the project, and included as part of the recorded O&M Agreement.

n. APPENDICES. Provide supporting data and technical information as necessary.

603.01.B DOWNSTREAM CAPACITY ANALYSIS REQUIREMENTS

1. Connections to downstream stormwater systems (including roof drain connections) will not be allowed if a capacity issue exists or may exist after the connection is made, as identified through flood complaint calls, operational knowledge, or from the Stormwater Master Plan. The Developer will be required to perform an analysis of the downstream stormwater system and make the needed capacity improvements or provide other means to mitigate the downstream impacts, and/or provide additional on-site detention/retention if capacity issues exist or may exist. This applies to all types of development in which a permit is required.

2. The analysis shall be divided sequentially into three parts: REVIEW OF RESOURCES; INSPECTION OF THE AFFECTED AREA; AND ANALYSIS OF DOWNSTREAM EFFECTS.

a. REVIEW OF RESOURCES. During the review of resources, the Design Engineer shall review any existing data concerning drainage of the project area. This data will commonly include area maps, floodplain maps, wetland inventories, stream surveys, habitat surveys, engineering reports concerning the entire drainage basin, inventories of known drainage problems, and previously completed downstream analyses. The City may be able to provide most of this information. Other sources of information include, Oregon Department of Environmental Quality, Oregon Department of State Lands, Department of Fish and Wildlife, and other local agencies.

b. INSPECTION OF THE AFFECTED AREA. During the inspection of the affected area, the Design Engineer shall physically inspect the drainage system at the project site and downstream of the site. During the inspection, the Design Engineer shall investigate any problems or areas of concern that were noted during the review of resources. The Design Engineer shall also identify any existing or potential capacity problems in the drainage system, any existing or potential areas where flooding may occur, any existing or potential areas of channel destruction (including erosion and sedimentation), and existing or potential areas of significant destruction of aquatic habitat.

c. ANALYSIS OF THE DOWNSTREAM EFFECTS. During the analysis of downstream effects, the information that has been gathered shall be analyzed to determine if construction of the project will create any drainage problems downstream or will make any existing problems worse. Whenever a situation is encountered where it has been determined that there will be negative impacts resulting from the project, mitigation measures shall be included in the project to correct for the impacts. The downstream capacity analysis shall:

1) Be based on peak flows at the point of discharge for the design storm recurrence intervals shown in Section 602.05.A.

2) Evaluate the system's conveyance capacity from the point of discharge, 1/4 mile downstream or to a distance where the project site contributes less than 10 percent of the upstream drainage basin area, whichever is greater.

3) Use the Manning's Formula for evaluating the capacity of pipes, ditches, and waterways. Backwater effect shall be included in determining capacity for waterways with drainage areas greater than 250 acres using HEC-RAS or an equivalent computer modeling software. Surcharged conditions for pipe systems and culverts and bank-full conditions for open ditches and channels are acceptable only for demonstrating the adequacy of the conveyance system to convey the peak runoff for the required design storm in accordance with Section 602.05.A, provided that:

a) Runoff is contained within defined conveyance system elements, and

b) Hydraulic grade line does not exceed the elevation of the roadway subgrade, and

c) No portions of a building will be flooded.

603.02 HYDROLOGY

603.02.A GENERAL

1. The Design Engineer is not limited to any one analytical method for hydrologic calculations. However, hydrograph analysis methods shall be used for the design of all stormwater quality (pollution reduction) facility designs and for all stormwater quantity (flow control) facility designs, unless otherwise approved in advance by the City Engineer.

2. Design Engineers are encouraged to use FEMA flow quantities for FEMA regulated waterways.

603.02.B RATIONAL METHOD

1. GENERAL

   a. The Rational Method may be used for analyzing small drainage basins with the following limitations:

      1) Only for use in predicting a conservative peak flow rate to be used in determining the required capacity for conveyance elements.

      2) Drainage sub-basin area cannot exceed 25 acres for a single calculation without approval from the City.

      3) The time of concentration shall be five minutes when computed to be less than five minutes.

   b. The Rational Method shall not be used for the design of stormwater quality (pollution reduction) or stormwater quantity (detention) facilities unless otherwise approved in advance by the City Engineer.

2. RATIONAL FORMULA *(Source: ODOT Hydraulics Manual, 2011):*

   a. EQUATION:

$$Q = C_F * C * I * A$$

Where,

Q = peak flow in cubic feet per second.

C_F = a runoff coefficient adjustment factor to account for reduction of infiltration and other losses during high intensity storms.

C = a runoff coefficient determined by ground cover. The engineer must document the methodology used in determining the value proposed.

I = rainfall intensity in inches per hour. Rainfall intensity found on the ODOT Zone 8, I-D-F curve (as shown in Section 612) shall be used. For the Rational Method, the basin time of concentration is used as the storm duration. The time of concentration must first be calculated (see Time of Concentration below), and then the rainfall intensity can be read from the I-D-F curve.

A = the basin area in acres.

b. RUNOFF COEFFICIENT "C"

1) The runoff coefficient is often difficult to estimate because it represents the interaction of many complex factors including surface ponding, infiltration, antecedent moisture, ground cover conditions, ground slopes, and soil type. The actual runoff coefficient for a given drainage basin can best be approximated by calculating a weighted average of all distinct surface types:

$$_{AVG}C = \frac{\sum(C_{i\ AREAS})(A_{i\ AREAS})}{A_{TOTAL\ AREA}}$$

Where,

$_{AVG}C$ = the weighted average C-value for the drainage basin.
$C_{i\ AREAS}$ = individual C-values for distinct surface types within a subbasin.
$A_{i\ AREAS}$ = individual areas for distinct surface types within a subbasin.
$A_{TOTAL\ AREA}$ = total area of the drainage basin.

2) The impervious surface area is often a factor in stormwater storage and stormwater quality treatment designs. Impervious surfaces have runoff coefficients greater than 0.80 based on Table 603.02.B.2.b.2.

Table 603.02.B.2.b.2) RUNOFF COEFFICIENTS "C" (for Rational Method)

Surface Type	Flat (0 - 2%)	Rolling (2% to 10%)	Hilly (Over 10%)
Pavement & Roofs	**0.90**	**0.90**	**0.90**
Earth Shoulders of Roadways	0.50	0.50	0.50
Drives & Walks	0.75	0.80	**0.85**
Gravel Surfacing	**0.85**	**0.85**	**0.85**
City Business Areas	0.80	**0.85**	**0.85**
Apartment Dwelling Areas	0.50	0.60	0.70
Light Residential: 1 to 3 units/acre	0.35	0.40	0.45
Normal Residential: 3 to 6 units/acre	0.50	0.55	0.60
Dense Residential: 6 to 15 units/acre	0.70	0.75	0.80
Lawns	0.17	0.22	0.35
Grass Shoulders	0.25	0.25	0.25
Side Slopes, Earth	0.60	0.60	0.60
Side Slopes, Turf	0.30	0.30	0.30
Median Areas, Turf	0.25	0.30	0.30
Cultivated Land, Clay & Loam	0.50	0.55	0.60
Cultivated Land, Sand & Gravel	0.25	0.30	0.35
Industrial Areas, Light	0.50	0.70	0.80
Industrial Areas, Heavy	0.60	0.80	**0.90**
Parks & Cemeteries	0.10	0.15	0.20
Playgrounds	0.20	0.25	0.30
Woodland & Forests	0.10	0.15	0.20
Meadows & Pasture Land	0.25	0.30	0.35
Unimproved Areas	0.10	0.20	0.30

*Note: Impervious surfaces are shown in **bold.***

c. RUNOFF COEFFICIENT ADJUSTMENT FACTOR "C_F" – The Coefficients in the Table above are applicable for 10-years or less recurrence interval storms. Less frequent, higher intensity storms require adjusted runoff coefficients because infiltration and other losses have a proportionally smaller effect on runoff. Runoff coefficient adjustment factors (C_F) for storms of different recurrence intervals are listed in Table 603.02.B.2.c.

Table 603.02.B.2.c RUNOFF COEFFICIENT ADJUSTMENT FACTORS "C_F" (for Rational Method)

Recurrence Interval	Runoff Coefficient Adjustment Factor (C_F)
10 years or less	1.0
25 years	1.1
50 years	1.2
100 years	1.25

d. RAINFALL INTENSITY "I" – This variable indicates rainfall severity. Rainfall intensity is related to rainfall duration and design storm recurrence interval. Rainfall intensity at a duration equal to the time of concentration (Tc) is used to calculate the peak flow in the Rational Method. Calculations for Time of Concentrations are shown in Subsection 603.02.D below. Once the time of concentration is known, the rainfall intensity can be selected from the ODOT Zone 8 I-D-F curve shown in Section 612.

603.02.C HYDROGRAPH METHOD

1. GENERAL

a. Hydrograph methods shall be used for all stormwater quality (pollution reduction) facility designs, for all stormwater quantity (flow control) facility designs, unless otherwise approved in advance by the City Engineer.

b. The physical characteristics of the site and the design storm shall be used to determine the magnitude, volume and duration of the runoff hydrograph. The Santa Barbara Urban Hydrograph (SBUH) is the primary acceptable hydrograph method. However, other acceptable methods include the Natural Resources Conservation Service (NRCS) TR-20 method, the TR-55 method, or other similar methods. If a software package is used, documentation of the software's processing and methodology shall be submitted with the results. All input and assumptions shall be clearly documented. The typical input information needed for the hydrograph methods are:

- Rainfall Distribution
- Total 24-hour Rainfall
- Time of Concentration (see Subsection 603.02.D)
- Basin Area
- Curve Number (CN)

c. Trunk main lines and all improvements that require detention shall be designed only after a full analysis of the basins contributing to the improvements is completed. Hydrographs for all basins shall be developed.

2. RAINFALL DISTRIBUTION

   a. The rainfall distribution to be used within the City is the design storm of 24-hour duration based on the standard NRCS Type 1A rainfall distribution as shown in Section 612.

3. 24-HOUR RAINFALL FOR STAYTON

   a. The 24-hour rainfall totals for the given return intervals shall be in accordance with the rainfall depths presented in the Stormwater Master Plan (Table 3.1), as shown in Table 603.02.C.3.

Table 603.02.C.3 24-HOUR RAINFALL DEPTHS

Return Interval	Peak 24-Hour Rainfall
Water Quality Storm Event	0.83 inches
2-year Storm Event	2.50 inches
5-year Storm Event	3.00 inches
10-year Storm Event	3.50 inches
25-year Storm Event	4.00 inches
50-year Storm Event	4.50 inches
100-year Storm Event	4.60 inches

4. BASIN AREA

   a. To obtain the highest degree of accuracy in hydrograph analysis, requires the proper selection of homogeneous basin areas. Significant differences in land use within a given basin must be addressed by dividing the basin area into sub-basin areas of similar land use and/or runoff characteristics. Hydrographs should be computed for each sub-basin area and superimposed to form the total runoff hydrograph for the basin.

   b. Pervious and impervious areas within a given basin or sub-basin shall generally be analyzed separately. This may be done by either computing separate hydrographs or computing the precipitation excess. The total precipitation excess is then used to develop the runoff hydrograph. By analyzing pervious and impervious areas separately, the cumulative errors associated with averaging these areas are avoided and the true shape of the runoff hydrograph is better approximated.

5. RUNOFF CURVE NUMBERS

   a. GENERAL

      1) Runoff curve numbers were developed by the Natural Resources Conservation Service (NRCS) (formerly referred to as the Soil Conservation Service (SCS)) after studying the runoff characteristics of various types of land. Curve numbers (CN) were developed to reduce diverse characteristics such as soil type, land usage, and vegetation into a single variable for doing runoff calculations. The approved runoff curve numbers are included in Section 612.

2) The curve numbers presented in Section 612 are for wet antecedent moisture conditions. Wet conditions assume previous rainstorms have reduced the capacity of soil to absorb water. Given the frequency of rainstorms in the City, wet conditions are most likely, and give conservative hydrographic values.

3) The following are important criteria/considerations for selection of CN values:

a) Many factors may affect the CN value for a given land use. For example, the movement of heavy equipment over bare ground may compact the soil so that it has a lower infiltration rate and greater runoff potential.

b) CN values can be area weighted when they apply to pervious areas of similar CN (within 20 CN points). However, high CN areas should not be combined with low CN areas (unless the low CN areas are less than 15 percent of the sub-basin).

c) Antecedent soil moisture values should be considered. Soil should be considered to be moist prior to the start of the precipitation event.

b. HYDROLOGIC SOIL GROUP DESCRIPTION – Curve Numbers have been assigned to one of four hydrologic soil groups, according to their runoff characteristics as described below:

1) Group A Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

2) Group B Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

3) Group C Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

4) Group D Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a fragipan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

c. CURVE NUMBER EQUATIONS:

1) The area's potential maximum storage capacity, S, is related to its curve number, CN:

$$S = (1000 / CN) - 10$$

2) The rainfall-runoff equations of the NRCS curve number method relate a land area's runoff depth (precipitation excess) to the precipitation it receives and to its natural storage capacity, as follows:

$$Q_{INCHES} = \frac{(P - 0.2S)^2}{(P + 0.8S)} \quad \text{for P} \geq 0.2S\text{; and}$$

$$Q_{INCHES} = 0 \quad \text{for P} < 0.2S$$

Where,

Q_{INCHES} = runoff depth in inches over the area
P = precipitation depth in inches over the area
S = potential maximum storage capacity, in inches over the area, due to infiltration, storage, etc.

3) The computed runoff represents inches over the tributary area. Therefore, the total volume of runoff is found by multiplying Q_{INCHES} by the area (with necessary conversions):

   a) Total Runoff Volume (cubic-feet) = Q_{INCHES} (in) x A (ac) x 3,630 (cubic-feet/(ac-in))

4) When developing the runoff hydrograph, the above equation for Q_{INCHES} is used to compute the incremental runoff depth for each time interval from the incremental precipitation depth given by the design storm hyetograph. This time distribution runoff depth is often referred to as the precipitation excess and provides the basis for synthesizing the runoff hydrograph.

603.02.D TIME OF CONCENTRATION

1. Time of concentration is a very important variable in determining runoff volumes and peak flows. Time of concentration calculations shall be submitted for review. There are three components that shall be considered when determining time of concentration: OVERLAND SHEET FLOW (T_{OSF}), SHALLOW CONCENTRATED FLOW (T_{SCF}), and CHANNEL/PIPE FLOW (T_{CPF}). The three runoff flow time components shall be calculated separately and then added together to determine the total basin time of concentration *(source: ODOT Hydraulics Manual, 2011).*

2. OVERLAND SHEET FLOW – Overland sheet flow is shallow flow over a plane surface. It occurs in the furthest upstream segment of the drainage path, which is located immediately downstream from the drainage divide. The length of the overland sheet flow segment is the shorter of (1) the distance between the drainage divide and the upper end of a defined channel, or (2) a distance of 300 feet. For the first 300 feet of overland flow, the sheet flow time of concentration can be calculated using the following equations.

   a. KINEMATIC WAVE METHOD (for use with IDF curves): Overland sheet flow of runoff to the initial catchment point into the storm drain system shall be a minimum of 5 minutes.

$$T_{OSF} = \frac{0.93 L^{0.6} n^{0.6}}{I^{0.4} S_o^{0.3}}$$

Where,

T_{OSF} = Travel time for the overland sheet flow segment in minutes.
L = Length of overland flow in feet (300 feet max).
N = Manning's Roughness Coefficient.
I = Rainfall intensity in inches per hour.
S_O = The average slope of overland area in feet per feet.

b. MANNING'S KINEMATIC SOLUTION (for use with NRCS method). Overland sheet flow of runoff to the initial catchment point into the storm drain system shall be a minimum of 10 minutes.

$$T_{OSF} = \frac{0.42(nL)^{0.8}}{P_2^{0.5} S_o^{0.4}}$$

Where:

T_{OSF} = Travel time for the overland sheet flow segment in minutes.
n = Manning's roughness coefficient.
L = Length of flow in feet
P_2 = 2-year, 24-hour rainfall in inches.
S_O = The average slope of overland area in feet per feet.

Surface Type	Manning's n
Pavement & Roofs	0.014
City Business Areas	0.014
Graveled Surfaces	0.020
Apartment Dwelling Areas	0.050
Industrial Areas	0.050
Urban Residential Areas (more than 6 units/acre)	0.080
Meadows, Pastures, & Range Land	0.150
Rural Residential Areas (more than 6 units/acre)	0.240
Playgrounds, Light Turf	0.240
Parks & Cemeteries, Heavy Turf	0.400
Woodland & Forests	0.400

3. SHALLOW CONCENTRATED FLOW

a. To determine the flow time of runoff in the shallow concentrated flow regime, the flow velocity will need to be estimated. The average velocity is a function of watercourse slope and surface type and can be approximated using the figure shown in Section 612 (*source: ODOT Hydraulics Manual, originally from the 1972 Soil Conservation Service Handbook)*. For slopes less than 0.005 feet per feet, the following equations can be used to determine the average flow velocity of the shallow concentrated flow.

For unpaved Surfaces: $V = 16.1345 * (S)^{0.5}$

For paved Surfaces: $V = 20.3282 * (S)^{0.5}$

Where:
V = Velocity in feet per second
S = Slope in feet per feet

b. Once velocity is calculated, divide the distance of flow by velocity to get flow time in which the travel time for the concentrated flow segment can be calculated as follows:

$$T_{SCF} = \frac{L}{60V}$$

Where,

T_{SCF} = Travel time for the shallow concentrated flow segment in minutes.
L = Length of the shallow concentrated flow segment in feet.
V = Average flow velocity in feet per second.

4. CHANNEL/PIPE FLOW

a. The Manning Formula shall be used to calculate velocities in channels and pipes. Flow length shall then be divided by the velocity to get flow time. The Manning Formula is expressed by the following equation.

$$V = (1.486/n) * (R^{(2/3)}) * (S^{0.5})$$

Where:

V = Mean velocity of flow in feet per second (V=Q/A).
n = Manning's n, 0.013 minimum for pipe.
R = Hydraulic Radius in feet, defined as the area of flow divided by the wetted perimeter (A / WP);
A = cross sectional flow area in square feet.
WP = wetted perimeter in feet.
S = Slope of hydraulic grade line in feet per feet.

b. Once velocity is calculated, divide the distance of flow by velocity to get flow time in which the travel time for the concentrated flow segment can be calculated as follows:

$$T_{CPF} = \frac{L}{60V}$$

Where,

T_{CPF} = Travel time for the channel/pipe flow in minutes.
L = Length of the channel/pipe flow segment in feet.
V = Average flow velocity in feet per second.

c. Note that new PVC or HDPE pipe likely have a manufacturer's "n" value of approximately 0.009. However, regardless of pipe material, sand, grit, and slime will build up on pipe walls. This results in true "n" values over time of approximately 0.013. As a consequence, a Manning coefficient of 0.013 shall be used for design of PVC or HDPE piping systems. If an alternative piping material is approved, either the pipe manufacturer's recommended coefficient shall be used or an "n" value of 0.013, whichever is greater.

603.03 VELOCITY AND SLOPE

603.03.A Storm drains shall be laid on a grade that will produce a mean velocity (when flowing full) of at least 3-feet per second, based upon Manning's pipe friction formula using a roughness coefficient valued at not less than 0.013, or the pipe manufacturer's recommendations, whichever is greater. An "n" value of less than 0.013 will not be considered for approval.

603.03.B The minimum slope may be reduced to produce an absolute minimum velocity of 2.5 feet per second upon approval of the City Engineer. But the grade of any pipe, regardless of diameter, shall not be less than 0.002-feet/foot unless otherwise authorized by the City Engineer. Other cases requiring a flatter slope than permitted above shall also be reviewed on a case-by-case basis for approval by the City Engineer. Design Engineers are cautioned not to specify storm drains of sizes that are obviously larger than is necessary for satisfactory carrying capacity, but which are specified solely in order to meet grade requirements, i.e., a 12-inch pipe for a 10-inch pipe to acquire a decrease in slope.

603.03.C The maximum grade for storm drains will generally be limited such that pipeline velocities when flowing full do not exceed 15-feet/second. If, out of necessity, velocities greater than this will result, ductile iron piping shall be used. Drop manholes with flatter pipe slopes can also be used.

603.03.D Where velocities in storm drains greater than 15-feet/second are attained, special provisions shall be made to protect structures against erosion and displacement by shock. Specific approval will be required from the City Engineer.

603.03.E Storm drains laid on slopes greater than 15 percent, or as recommended by pipe manufacturer for slopes 15 percent and less, shall be secured by anchor walls in accordance with the Standard Drawings. Anchor walls located at the middle of pipe runs of less than 200 feet between structures are generally adequate, but for spans greater than 200 feet, anchor walls shall not exceed a spacing of 100 feet. Specific approval for slopes greater than 15 percent will be required from the City Engineer.

603.04 HYDRAULIC DESIGN

603.04.A The Design Engineer shall submit calculations for each public storm drain system to be installed. The hydraulic design of storm drains shall be in accordance with the most current edition of the *ODOT Hydraulics Manual* or the *Hydraulic Engineering Circular No. 22 (FHWA-TS-84-202) Drainage of Highway Pavements.*

603.04.B When calculating volumes, slopes, and velocities, the Manning Formula shall be used. Note that new PVC or HDPE pipe likely have a manufacturer's "n" value of approximately 0.009. However, regardless of pipe material, sand, grit, and slime build up on pipe walls. This results in true "n" values over time of approximately 0.013. As a consequence, a Manning coefficient of 0.013 shall be used for design of PVC or HDPE piping systems. If an alternative piping material is approved, either the pipe manufacturer's recommended coefficient shall be used or an "n" value of 0.013, whichever is greater.

603.04.C The Manning Formula is expressed by the following equation:

$$V = (1.486/n) * (R^{(2/3)}) * (S^{0.5})$$

Where:

- V = Mean velocity of flow in feet per second (V=Q/A).
- n = Manning's n, 0.013 minimum for pipe.
- R = Hydraulic Radius in feet, defined as the area of flow divided by the wetted perimeter (A / WP);
- A = cross sectional flow area in square feet.
- WP = wetted perimeter in feet.
- S = Slope of hydraulic grade line in feet per feet.

603.04.D In terms of discharge, the above equation becomes:

$$Q = (1.486/n) * A * (R^{(2/3)}) * (S^{0.5})$$

Where:

- Q = rate of flow in cubic feet per second
- V = Mean velocity of flow in feet per second (V=Q/A).
- n = Manning's n, 0.013 minimum for pipe.
- R = Hydraulic Radius in feet, defined as the area of flow divided by the wetted perimeter (A / WP);
- A = cross sectional flow area in square feet.
- WP = wetted perimeter in feet.
- S = Slope of hydraulic grade line in feet per feet.

603.04.E HYDRAULIC GRADE LINE

1. The hydraulic grade line (HGL) shall be evaluated as part of the design. The HGL represents the water surface elevation of the flow traveling through the storm drain system. If the HGL becomes higher at a manhole or inlet than the rim elevation of that structure, flow will leave the storm drain. This can cause severe traffic safety problems and must always be avoided.

2. Hydraulic grade line calculation procedures shall be in accordance with the most current edition of the *Hydraulic Engineering Circular No. 22 (FHWA-TS-84-202) Drainage of Highway Pavements.*

603.05 CULVERTS

603.05.A Culverts shall be designed to convey the required storm event from the entire contributing area and shall be designed to pass the required flows without compromising public safety or causing new or additional flooding. Culverts shall be minimum 12 inches in diameter for driveways and minimum 18 inches in diameter for crossings of street rights-of-way.

603.05.B Culverts that convey flows from or through natural creeks, streams, flood hazards or other sensitive areas, or as otherwise deemed appropriate by the City Engineer, shall be designed to convey the 100-year frequency flow.

603.05.C Water crossing structures on all creeks and tributaries shall be constructed and maintained so as to not impede or eliminate a native fish species' access to habitat or ability to migrate. Proposed culvert crossings, regardless of tributary size, intermittent or perennial, shall conform to Oregon Department of Fish & Wildlife and National Marine Fisheries Service's regulations and stream crossing guidelines.

603.05.D Culvert headwater water surface elevations shall not exceed 1.5-times the culvert diameter or shall remain at least 1-foot below the roadway subgrade, whichever is less.

603.05.E Culverts shall be designed in accordance with the most current version of the *ODOT Hydraulics Manual* or other design manual as approved by the City Engineer.

603.06 BRIDGES

603.06.A New and replacement bridges over natural perennial channels shall be designed to pass the 100-year peak discharge from the tributary area assuming full development. Unless approved otherwise, vertical clearance between the design water surface and the bottom of any part of the bridge shall be a minimum of 2-feet or 25 percent of the mean channel width between ordinary high water marks at the crossing, whichever is greater. Bridge hydraulics shall be designed in accordance with the most current version of the *ODOT Hydraulics Manual* or other design manual as approved by the City Engineer.

603.07 ENERGY DISSIPATORS

603.07.A Energy dissipators shall be designed in accordance with the most current version of the *ODOT Hydraulics Manual* or other design manual as approved by the City Engineer.

603.08 FLOODPLAIN INFORMATION

603.08.A Floodplain information, delineating the floodway and 100-year floodplain limits, shall be shown where it occurs within the development. Floodplain limits shall be based on maps prepared by the Federal Emergency Management Agency (FEMA). Where better information is available, it shall be used. The Design Engineer is cautioned about placing fill material or obstructions within the delineated floodplain limits.

604 ALIGNMENT AND COVER

604.01 RIGHT-OF-WAY LOCATION

604.01.A Storm drain systems shall be located in the street right-of-way and shall generally be located 5-feet south or west from right-of-way centerline as shown in the Standard Drawings. Any deviations will be reviewed on a case-by-case basis and will require City approval.

604.01.B Curved alignments in stormwater systems, vertically or horizontally, are not permitted.

604.01.C All changes in direction and size of pipe shall be made at an approved structure.

604.01.D Under normal conditions, storm drains shall be on the low side and on the south and west sides of the street, except when inlet locations warrant otherwise. Piping between inlets and storm drain lines shall be at near right angles to the street and other utility lines. All exceptions shall be reviewed on a case-by-case basis for approval.

604.01.E Where storm drains are being designed for installation parallel to other utility pipe or conduit lines, the vertical location shall be in such a manner that will permit future side connections of storm drains and avoid conflicts with parallel utilities without abrupt changes in vertical grade of main or lateral storm drains. A minimum separation of 5-feet clear distance shall be maintained between storm drain lines and all other public utilities.

604.01.F Where approved by the City Engineer, public storm drains serving a master planned development, apartment complex, or commercial/industrial development shall be in parking lots, private drives, or similar open areas that will permit an unobstructed vehicle access for maintenance.

604.02 MINIMUM COVER

604.02.A Storm drains shall be at a minimum depth of 4-feet or greater below the finish grade elevation. Minimum pipe depth shall be measured between the finished surface grade at the centerline of the storm drain and the top of storm drain pipe. Storm drains at depths less than this create problems with water line crossings, sewer lateral crossings, and proper cover over the pipe per manufacturer's recommendations. Fill may be required on development sites to maintain adequate cover over storm drain lines.

604.02.B In locations where flat terrain limits the extension of storm drains, the City Engineer may allow some pipeline configuration changes as well as alternate pipe cover depths in conjunction with site filling. Storm drain pipes with depths less than 4-feet, where allowed by the City Engineer, shall be connected from catch basin to catch basin in lieu of the use of manholes. Special pipe material such as ductile iron pipe or reinforced concrete pipe (down to 24-inches of cover) will be required.

604.02.C In areas of flat terrain, the Design Engineer shall show that sufficient depth is provided at the boundary of the development to properly drain the remainder of the upstream basin area tributary to the site or that other drainage options are available to the upstream property.

604.03 SEPARATION FROM WATERLINES

604.03.A Storm drain lines shall be installed a minimum clear distance of 5-foot horizontally from water mains and shall be installed to go under such waterlines with a minimum of 6-inch of vertical clearance at the crossing of these pipes. Exceptions shall be approved by the City Engineer. In all instances the distances shall be measured surface to surface.

604.04 ACCESS AND UTILITY EASEMENTS

604.04.A When, in the Design Engineer's opinion, it is impractical to locate storm drains in rights-of-way, the storm drain shall be placed in an easement, as approved by City Engineer. Public utility easements granted to the City shall be perpetual easements and shall conform to the requirements of Section 102.08, except as noted below.

1. Open channels shall have easements sufficient in width to cover the 100-year floodplain line when a 100-year design storm is required, or 15-feet from the waterway centerline, or 10-feet from the top of the recognized bank, whichever is greatest. In addition, a 15-foot wide access easement shall be provided on both sides of the channel for channel widths greater than 14-feet at the top of the recognized bank.

605 STRUCTURES

605.01 MANHOLES

605.01.A GENERAL

1. Manholes shall be located at all changes in pipe slope, grade, alignment, size, type, and at all pipe junctions with present or future storm drain lines. A manhole shall be placed at the upstream end of each mainline, 7-feet maximum from property line to centerline of manhole.

2. Manhole spacing shall not exceed 450-feet. Deviation from this standard will be considered based on whether or not flushing, cleaning, and CCTV inspection equipment can adequately service the proposed spacing.

3. For ease of maintenance and inspection, manholes shall be installed within the street right-of-way. If a manhole must be located outside of the street right-of-way, access to the manhole shall be provided by means of an easement having a width consistent with Section 102.08. The easement shall be complete with an all-weather driveable surface from the adjacent public street to the manhole. The driveable surface shall extend to a point at least 10-feet beyond the manhole for equipment access.

4. Where practical, manholes shall be located at street intersections and shall be located outside the normal wheel travel lanes. Manhole lids are not permitted within designated existing or future bike lanes. Manholes shall not be placed in curbs or gutters or behind curbs. Manhole lids shall have a minimum of 12-inches of clearance from the edge of a curb and gutter.

5. Manholes located in unimproved areas shall have their lids positioned approximately 1-foot above the surrounding grade and be marked with City approved metal marker post. Manholes located in backyards, side lots, or otherwise substantially outside of the traveled right-of-way, may require tamperproof, locking lids. For public lines in easements within parking lots or other similar traveled areas, locking lids will generally not be required. In all areas prone to ponding, flooding, or along stream corridors, and in all areas below the 100-year flood plain, waterproof covers shall be installed. These types of manhole locations should be avoided whenever feasible and practical. Non-standard locations will require review by the City on a case-by-case basis.

6. Two manholes shall be provided for locations where the horizontal angle between the outgoing storm drain and the incoming storm drain will be less than 90 degrees. This is intended to prevent stormwater from discharging into the oncoming flow of an opposing storm drain.

7. Where internal system overflows may occur and covers are intended to prevent such overflows, the manhole cone and cover shall be designed to resist the resulting hydrostatic forces and be provided with vent piping. Vent piping configuration and cone and cover restraint will be reviewed by the City on a case-by-case basis.

8. Tee connections in storm lines will not be allowed (with the exception of private service lateral connections), unless otherwise approved by the City Engineer. Private connections to the public system will be reviewed on a case-by-case basis.

9. Standard inlets will not be allowed in lieu of manholes in any system.

605.01.B DROP THROUGH MANHOLES

1. Standards for elevation differences at manholes have been established to compensate for normal energy losses and to prevent surcharging of the storm drain system. For purposes of slope calculation and for establishing elevation differences, the elevations are given at the theoretical horizontal intersection of the storm drain centerlines (usually the center of the manhole). The rules for elevation differences at manholes are:

a. Where the pipe size decreases upstream through the manhole, the upstream pipe crown shall match the elevation of the crown of the downstream pipe. Where grade is limited, matching 0.8 of the pipe diameters may be used. If the incoming and outgoing pipes are of equal size and are passing straight through the manhole, the invert elevation difference shall be at least 0.10-feet. Manhole channels shall meet the requirements of the Standard Construction Specifications.

b. If the pipe alignment changes at the manhole, the invert elevation difference shall be at least 0.10-feet for 0 to 45 degrees of horizontal deflection angle, and 0.20-feet for 45 to 90 degrees of horizontal deflection angle. Horizontal deflection angles of greater than 90 degrees are not allowed. New piping, which is to be connected to existing manholes, shall generally adhere to these same hydraulic considerations. Existing concrete channels within the manhole shall be modified accordingly.

c. Pipes entering manholes may have a maximum free fall of 3-feet as measured to the invert of the manhole base, unless otherwise approved by the City Engineer. Larger pipelines shall be introduced into the manhole at the manhole invert.

2. Connections must enter the manhole through a channel in the base. This includes drop connections and connections to existing manholes.

605.01.C MANHOLE STANDARD DRAWINGS

1. All manholes shall have a minimum inside diameter of 48-inches and shall be in compliance with the Standard Construction Specifications. Manhole to piping connections shall be made with watertight, flexible manhole/pipe rubber connectors, as shown in the Standard Drawings.

2. The manhole Standard Drawings are suitable for most conditions. New designs or revisions should not be shown on the construction plans unless the Standard Drawings are not suitable. New or revised designs may be necessary if:

   - One or more of the sewers to be connected to the manhole is over 27-inches in diameter. (smaller diameters may require a special design if the manhole is at an alignment change)
   - Several sewers will be connected to the manhole.
   - There is less than 90 degrees between the incoming and outgoing sewer.
   - The manhole will be subject to unusual structural loads.
   - Diversion or other flow control measures are required.

3. If a special design is required for any reason, it will be necessary to show that design on the construction plans and to provide the City Engineer with structural calculations if so requested.

4. Some alternate manhole features are shown in the Standard Drawings. Where these features are required, they shall be specified by a note on the construction plans. Some examples are:

   - Slab tops shall be used in lieu of cones where there will be less than 5-feet between the invert of the outlet pipe and the top of the manhole lid.
   - Watertight manhole frames and covers shall be used if floodwaters are expected to cover the manhole top or if the manhole must be located in the street gutter. Such conditions should be avoided wherever feasible.
   - Tamperproof manhole frames and covers are required in all areas outside the paved public right-of-way.

605.02 INLET MANHOLES

605.02.A Where stormwater systems connect to the existing or proposed public stormwater system at an inlet location, inlet manholes will be required where any of the following apply, unless otherwise approved by the City Engineer:

- The pipe connection is larger than 6-inches in diameter.
- Two (2) or more pipes discharge to the location.
- The design peak flow from the onsite system exceeds 0.5 cubic feet per second..

605.02.B The inlet manhole shall be designed in accordance with the most current edition of the *Hydraulic Engineering Circular No. 22 (FHWA-TS-84-202) Drainage of Highway Pavements.*

605.03 INLETS (SIDE-INLET CATCH BASIN AND CURB INLETS)

605.03.A Inlets may be connected together (maximum of three (3) inlets) at intersections to minimize the number of pipe crossings of the streets and number of manhole penetrations required. Inlet piping shall be connected to the storm drain system at manholes.

605.03.B Inlets shall be spaced to assure that the flow in the streets can be intercepted and no ponding in the street occurs during the design storm. However, the maximum total length of curb and gutter that may be drained by a curb inlet is 400-feet.

605.03.C The width of gutter flow on all street classifications shall not exceed 8-feet from face of curb or 3-inches in depth measured at the curb face for a 10-year design storm at any point along the street. Inlets shall be designed to completely intercept the 10-year design storm gutter flow. However, sag vertical curves in major collectors and arterials shall be designed to intercept the 50-year design storm. The 100-year design storm shall be evaluated, and provisions shall be provided, at all locations where ponding to hazardous depths are likely to occur.

605.03.D Inlet locations shall be coordinated with other design features such as sags, driveways, crossroad intersections, pedestrian crosswalks and handicap ramps, and interception points for concentrated flow from sources outside the pavement. Inlets shall not be placed in locations that may be objectionable to residents or interfere with other construction elements along the street. Avoid inlets directly in front of store fronts or pedestrian handicap ramps. Exceptions will be considered on a case-by-case basis.

605.03.E Inlets shall be located at the following locations, but in no case be spaced further than 400-feet:

- At curb returns on the upstream side of an intersection.
- At the ends of all dead-end streets with a descending grade (both gutters).
- At intermediate locations so that flows for the required storm event at the curb line do not exceed 8-feet in width (measured from the curb face) or 3-inches in depth (measured at the curb face), whichever is less.
- At the upstream end of the street improvements that abut unimproved roads or undeveloped property.
- At the downstream end of the street improvements that abut unimproved roads or undeveloped property.
- At superelevation transitions, 10 feet before the point where the street cross slope begins to super-elevate toward the opposite side to prevent cross street flow.
- As required by the City Engineer.

605.03.F Two inlets, or a single unit double inlet, are required at low point (sag) of all vertical curves, unless otherwise approved by the City Engineer.

605.03.G Runoff from side drainage, such as parking lots, usually enters the street at a specific location. An inlet shall be placed downstream of this point when gutter capacity is inadequate. If there are ditches behind the curb and gutter, area inlets shall be provided in the ditch to intercept flows from offsite.

605.03.H After the project inlets have been preliminarily placed in the proposed plan, the Design Engineer shall perform a complete inlet spacing analysis. The analysis begins at the upper most inlet in the drainage basin and the quantity of flow in the street is calculated. This calculated runoff is the sum of the street runoff and side drainage runoff reaching the inlet. The inlet is then moved uphill or downhill, changing the drainage area until the computed runoff equals the street capacity within allowable water spread width.

605.03.I Inlets shall be designed in accordance with the most current edition of the *Hydraulic Engineering Circular No. 22 (FHWA-TS-84-202) Drainage of Highway Pavements.*

605.04 SURFACE DRAINAGE INTERCEPTION (DITCH INLETS AND AREA DRAINS)

605.04.A Ditch inlets or area drains shall be provided wherever a surface drainage (creek, ditch, swale, or ponding areas) is intercepted and placed into a piped system. The ditch inlet or area drain shall be concrete and shall have removable grating covering the inlet. See Standard Drawings. The ditch inlet grate shall have the bars oriented in the vertical direction.

605.04.B The invert of the ditch inlet or area drain shall be at or below the invert of the drainage being intercepted. The inlet shall be designed to accommodate the anticipated peak flows of the surface drainage at the design storm.

605.04.C Special attention shall be paid to where water will accumulate and flow, should the inlet become clogged or blocked. In sensitive areas, accommodations for overflows caused by inlet clogging shall be made such that the overflow does not damage downstream areas.

605.05 SLOPE INTERCEPT DRAINS

605.05.A Slope intercept drains shall be provided at the following locations:

1. Along the upper boundaries of a development where the natural ground slope exceeds 10 percent to intercept drainage from the tributary area above the site.

2. Along the lower boundary of a development where the natural ground slope exceeds 10 percent to prevent drainage onto a lower tributary area other than by means of an approved point of disposal.

3. Along the top of all cuts that exceed 4-feet with cut slopes that exceed 2:1 where the tributary drainage area above the cut slopes towards the cut and has a drainage path greater than 40-feet, measured horizontally.

605.06 SUBSURFACE DRAINAGE INTERCEPTION

605.06.A Subsurface drains (underdrains) shall be provided at the following locations:

1. Cut and fill slopes in excess of 4-feet for stability, except when a soils report submitted by a registered professional engineer experienced in soils certifies they are not required.

2. Existing springs or springs intercepted during construction activity for other facilities, i.e., sewer, water mains, or street excavations.

3. Where high ground water exists or when it is necessary to reduce the piezometric surface to an acceptable level to prevent land slippage or underfloor flooding of buildings.

605.06.B The drainage line installed shall begin at a cleanout and terminate at an approved point of discharge. Open-jointed storm drain lines will not be considered as an acceptable solution.

605.07 OUTFALLS TO SURFACE DRAINAGE CHANNELS

605.07.A GENERAL

1. Storm drain lines shall enter a creek or drainage channel at 90 degrees or less to the direction of flow. The outfall shall have a head wall and scour pad or rock protection to prevent erosion of the existing bank or channel bottom in accordance with Subsection 605.08 and as approved by the City Engineer. Outfall structures for pipes of 24-inches in diameter or greater shall have grating covering the outlet. The grate shall have the bars oriented in the vertical direction. Outfall grates shall be attached to the outlet structure with a hinged connection at the top of the grate.

2. The outfall shall not intrude into the channel and reduce flow capacity of the channel. Pipe ends shall be beveled to match the side slope of the channel. Energy dissipation measures and armament of the channel bank are required at the outfall. The size of the receiving facility will govern what protective measures are required. Backflow valves may be required on outfall structures to prevent backwater from surcharging and flooding the new storm drain improvements.

3. Outfall rock protective measures shall conform to the requirements of Section 605.08.

605.07.B STEEP SLOPES

1. Outfalls proposed on slopes greater than 15 percent or greater than 20-feet in height must meet one of the following criteria:

   a. The discharge must be less than 0.5 cubic feet per second.

   b. A tight-line conveyance system shall be constructed to convey the runoff to the bottom of the slope with adequate energy dissipation at the bottom to protect the toe of the slope and/or the receiving watercourse from erosion.

605.08 OUTFALLS AND BANK PROTECTION

605.08.A Any outfall into the Salem Ditch, Stayton Ditch, Power Canal, and Main Canal requires written approval from the Santiam Water Control District.

605.08.B The outfalls of all stormwater systems shall be adequately protected to prevent erosion of slopes and channels. Outfalls shall be designed in accordance with the most current edition of the *ODOT Hydraulics Manual* or the *City of Portland Stormwater Management Manual*.

606 SURFACE DRAINAGE

606.01 GENERAL

606.01.A For purposes of these Design Standards, surface drainage routes will be classified according to two general categories: constructed watercourses and natural creeks.

1. Plan requirements for surface drainage courses shall include the requirements previously specified in Subsection 602.02 and the following supporting data and calculations:

    a. Profile of the channel showing the existing flowline and top of bank, proposed flowline and top of bank, and design water surface profile (backwater curve).

    b. A minimum of three (3) cross sections of the existing channel adjoining or crossing the property taken at the upstream, midsection, and downstream boundaries of the property. More sections may be required depending on the length of the reach and existing channel alignment.

    c. Calculations for arriving at the design flow rate. Analyze the proposed system and show that the channel cross section after improvement will pass the design storm with 1-foot of freeboard to the top of bank. For channels shown on the F.I.R.M. maps, show that the channel cross section after improvement will pass the base flood at or below the 100-year flood elevation shown on the F.I.R.M.

    d. A storm drain easement sufficient in width shall be provided to cover the 100-year Floodplain Line when a 100-year design storm is required or 15-feet from the top of the recognized bank, whichever is greater.

2. Access roads shall be provided when required by the City Engineer and shall meet the requirements set forth in Section 608.05.D.

606.02 CONSTRUCTED WATERCOURSE REQUIREMENTS

1. Constructed watercourses shall be designed with a "natural" curved alignment with a variable side slope not to exceed 3H:1V, except that in tight spots created by existing natural features (e.g., boulders, large trees, etc.) where the slope can be 2.5H:1V until the natural feature is bypassed or where steeper slopes are needed and do not impair the hydraulic efficiency of the waterway. The watercourse shall include a low flow channel as described below and will be reviewed on a case-by-case basis for approval.

2. The bank shall be designed with a minimum of 1-foot of freeboard above the maximum water surface elevation with a minimum top of bank width of 6-feet. A larger width shall be provided when required by the City Engineer for maintenance purposes. The backslope of the bank shall not exceed 3H:1V, unless otherwise approved by the City. The existing ground adjacent to the toe of the bank backslope shall be graded to slope away at 2 percent to prevent water ponding at the backslope toe.

3. Design shall be curvilinear with a 100-foot minimum radius. Tighter curves may be used if the City Engineer determines that sufficient erosion control has been incorporated into the design to maintain stable bank conditions following development.

4. A low flow channel shall be designed to carry a 2-year design storm or the normal low water flow of a year-round creek, whichever is greater. Low flow channel slopes shall not exceed 3H:1V and shall be stabilized to the satisfaction of the City Engineer. In general, bank stabilization will be required in any channel with a design flow velocity in excess of 3-feet per second.

5. Capacity of channels shall be determined by the Manning Formula. The minimum value for "n" shall be 0.033 for maintained grass-lined swales and shall be 0.035 for channels with rock-lined and/or unmaintained bottoms, unless otherwise approved by the City Engineer. A greater value of “n” shall be used for the capacity analysis when required by the City Engineer.

6. Channel sides and bottoms shall be seeded, sodded, or rock lined immediately following construction. Bank stabilization measures shall be designed and included in the construction plans.

7. Points of discharge from culverts and storm drains into ditches and swales shall be rock lined with riprap. Riprap shall extend for a distance of 10-feet minimum from the point of culvert or storm drain discharge and shall have a minimum width 3-feet in excess of the diameter of the culvert or storm drain. Special energy dissipaters may be substituted for riprap at the discretion of the City Engineer.

606.03 NATURAL CREEK REQUIREMENTS

606.03.A GENERAL

1. For the purposes of these standards “Natural Creek” shall include, North Santiam River, Mill Creek, Lucas Ditch, Salem Ditch, Stayton Ditch, Power Canal, and Main Canal.

2. A permit shall be obtained from the Division of State Lands and the Department of Fish and Wildlife for all work between the creek banks.

606.03.B CREEK CLASSIFICATION

1. Creeks in Stayton are classified as salmon-producing creeks or other natural creeks in Chapter 3 of the 2013 Comprehensive Plan Update. No in-stream work will be allowed in salmon producing creeks during the months of September or October. The intent is to minimize sediment production in these creeks during critical salmon spawning season.

606.03.C SALMON-PRODUCING CREEK REQUIREMENTS

1. In addition to the other natural creek requirements listed below, the following requirements shall be met in salmon-producing creeks. These are not in replacement of the requirements for natural creeks, but in addition to them.

    a. Creek bed alterations shall provide diversified habitats for a variety of creek organisms and a pleasing appearance. Creek bed alternations shall be as approved by the regulatory agency and the City Engineer on a case-by-case basis based on the following provisions:

        1) Sufficient water depth to support fish and other aquatic life during low flows.

        2) Diversity of water velocities through the use of pools and riffles.

        3) A meandering channel to facilitate 1) and 2) above.

        4) Sufficient creek bed gradient to provide adequate flow velocities.

    b. Creek bed gravel shall be well rounded rock in the following gradations (with larger rock in sufficient quantity to provide adequate riffling) and shall be as approved by the regulatory agency and the City Engineer:

        1) Mill Creek – Approximately 15 percent, 3”-6”.

    c. Creek banks and sides shall be designed and constructed so as to provide stability, adequate shading, and cover for fish and other aquatic life, to the approval of the regulatory agency and the City Engineer. Shading shall be provided by plantings of appropriate types and sufficient quantities per these Design Standards. Creek bank designs and vegetation restoration plans shall be as approved by the regulatory agency and the City Engineer on a case-by-case basis.

    d. Vertical creek banks (walls) should be avoided whenever possible; as such a creek channel configuration decreases the creek carrying capacity and increases in-creek velocities during high flows (depending on bottom width provided).

    e. Creek work and channel design shall include a construction sequence list designed primarily to control erosion and also to facilitate the planned construction. The construction sequence may be modified by the City Engineer during the construction as field conditions warrant.

    f. Vegetation disturbance shall be minimized and creek banks revegetated with appropriate native vegetation to provide shading for the creek.

    g. Bank protection using large diameter rock (riprap) is not permitted by regulatory agencies and natural organic protection, such as root balls, log jams, and bio-engineered lining, shall be used. Regulatory agency approval of the design will be required.

606.03.D OTHER NATURAL CREEK REQUIREMENTS

1. Natural creeks shall be preserved and all work in and adjacent to creeks shall incorporate both temporary and permanent erosion control measures to protect disturbed areas from erosion and damage. No alteration will be permitted that reduces the overall creek capacity.

2. Creek channel design and construction practices shall be such that the cumulative incremental effects of creek work considered alone or together with existing or similar projects in the vicinity will not result in substantial damage to existing waterways and surface waters by erosion, siltation or sedimentation, significant changes in stormwater quality, increased downstream water velocity, significant harmful deterioration of groundwater drainage, or significant deterioration of aquatic wildlife habitat.

3. Creek construction, relocation, and/or reconstruction may be approved if the City Engineer determines that such a proposal will result in an overall benefit to or maintenance of a surface water system of equal quality in terms of water quantity and quality control and the Developer can obtain the appropriate State and Federal permits.

4. Any and all stream work shall be consistent with the floodplain management policies and regulations and as set forth in Stayton Municipal Code.

606.04 CHANNEL PROTECTION

606.04.A Open channels shall be designed to prevent scouring of the channel. Use of riprap on any channel will be reviewed by the City Engineer on a case-by-case basis. Bio-engineering lining may be required. In addition, regulatory agency approval of the design may be required.

606.04.B Channel protection shall be designed in accordance with the most current edition of the *ODOT Hydraulics Manual*.

607 STORMWATER QUALITY (POLLUTION CONTROL) FACILITIES

607.01 GENERAL

607.01.A Stormwater quality facility designs shall comply with the most current edition of the *City of Portland Stormwater Management Manual*, except as specifically modified by these Design Standards or as approved by the City Engineer. The use of any other resource shall be coordinated with and approved by the City Engineer prior to design. All stormwater quality facility setbacks shall also comply with the *City of Portland Stormwater Management Manual*, unless otherwise approved by the City Engineer. All setback requirements are minimums and can be increased, as required by the City Engineer.

607.01.B Development and any other activities which create new impervious surfaces of greater than ***500-square feet*** in area at the time of application, or if required by the City Engineer, are required to construct or fund permanent stormwater quality facilities to reduce contaminants entering the storm and surface water system. Properties with existing development that propose new offsite discharges or new connections to the public system that meet this threshold must also comply with the stormwater quality requirements. Stormwater shall be surface infiltrated onsite to the maximum extent feasible, before discharging any flows offsite.

1. Some site characteristics and uses may generate specific pollutants of concern or levels of pollution that are not addressed solely through implementation of the pollution reduction requirements. The *City of Portland Stormwater Management Manual* (SWMM) defines these characteristics and uses and identifies structural source controls that must be implemented to manage the pollutants at their source (see City of Portland SWMM Chapter 4, Source Controls). The City of Stayton requires that ***any project of any size*** that introduces these site characteristics or uses must comply with the City of Portland SWMM source control requirements. This includes development, tenant improvements, and changes to site uses or activities, including changes to specific site or activity areas, even if no impervious area is added or replaced.

607.01.C The purpose of stormwater quality facilities is to reduce the pollutants associated with stormwater runoff from new development and redevelopment. By establishing criteria, the City is satisfying federal regulatory requirements to control the discharge of pollutants into stormwater as specified in the Clean Water Act Amendments of 1987 and its National Pollutant Discharge Elimination System (NPDES) permit for discharges from a municipally owned and operated separate storm sewer system issued by the Oregon Department of Environmental Quality (DEQ) under authority of the United States Environmental Protection Agency (EPA).

607.01.D It is the responsibility of the Developer(s) to meet stormwater treatment requirements for their particular development. While there have been significant advances in the field of stormwater treatment technologies, the stormwater quality program still requires a best effort attempt at installing facilities that will address the commonly predictable stormwater problems of a development.

607.02 MINIMUM DESIGN CRITERIA

607.02.A The stormwater quality facilities shall be designed to remove 70 percent of the total suspended solids from 90 percent of the average annual runoff in accordance with the most current edition of the *City of Portland Stormwater Management Manual.*

607.02.B The total suspended solids removal efficiency specifies only the design requirements and is not intended as a basis for performance evaluation or compliance determination of the stormwater quality control facility installed or constructed pursuant to this document.

607.02.C If an onsite stormwater quality facility cannot be constructed to treat the runoff from the development's impervious surface, then with City approval, an on- or off-site stormwater quality facility may be designed to treat runoff from an equivalent area of adjacent untreated impervious surfaces.

607.02.D Facilities shall be designed such that flow from the development is treated off-line from the storm conveyance system and reconnected to upstream flows following treatment. If an off-line facility is not feasible, additional capacity may be required for upstream flow.

607.02.E Discharges to sensitive areas shall maintain the pre-development flow rate to the extent necessary to protect the characteristic functions of the sensitive area.

607.02.F Stormwater quality facilities shall be constructed as part of the public improvements.

607.02.G Stormwater quality facilities shall be designed to address the Willamette Basin TMDL pollutants of mercury, temperature, and bacteria.

607.02.H Other design options for meeting this section may be considered by the City for approval.

607.03 ON-SITE FACILITIES

607.03.A A stormwater quality facility shall be constructed on-site and be above ground/open surfaced, unless otherwise approved by the City Engineer. A stormwater quality manhole shall be located upstream of vegetated stormwater facilities, unless otherwise approved by the City Engineer.

607.04 IMPERVIOUS AREAS

607.04.A The sizing of stormwater quality facilities shall be based on the impervious area created by the development and for all existing contributing impervious areas proposed to remain on site, including but not limited to roofs, structures, roads, and other impervious areas. Impervious areas shall be determined based upon building permits, construction plans, or other appropriate methods of measurement as approved by the City Engineer.

607.04.B The City encourages design initiatives that reduce effective impervious area.

607.05 OPERATION AND MAINTENANCE PLAN AND AGREEMENT

607.05.A An operation and maintenance plan and agreement shall be submitted for City review and approval for all stormwater quality facilities. The O&M Plan shall include types and frequencies of operation and maintenance activities and shall comply with the most current edition of the *City of Portland Stormwater Management Manual.*

608 STORMWATER QUANTITY (FLOW CONTROL) FACILITIES

608.01 GENERAL

608.01.A Stormwater quantity facility designs shall comply with the most current edition of the *City of Portland Stormwater Management Manual*, except as specifically modified by these Design Standards or as approved by the City Engineer. The use of any other resource shall be coordinated with and approved by the City Engineer prior to design. All stormwater quantity facility setbacks shall also comply with the *City of Portland Stormwater Management Manual*, unless otherwise approved by the City Engineer. All setback requirements are minimums and can be increased, as required by the City Engineer.

608.01.B Development and any other activities which create new impervious surfaces of greater than ***500-square feet*** in area at the time of application, or if required by the City Engineer, shall incorporate stormwater quantity facilities for mitigating its impacts on the public stormwater systems and receiving water bodies. Properties with existing development that propose new offsite discharges or new connections to the public system that meet this threshold must also comply with the stormwater quantity requirements. Stormwater shall be surface infiltrated onsite to the maximum extent feasible, before discharging any flows offsite.

608.01.C Unless directed otherwise, stormwater quantity facilities will be required to detain post-developed peak runoff rates from the 2-year, 5-year, 10-year, and 50-year 24-hour storm events to the respective pre-developed peak runoff rates, and the post-developed peak runoff rate for the 25-year storm event will be required to be detained to the 10-year pre-developed peak runoff rate (required release rates). Potential downstream damage due to stormwater quantity facility system failure/overflow may require greater detention requirements or improvements downstream. In no case shall the required release rates increase the flooding conditions downstream.

608.01.D All stormwater quantity and infiltration facilities shall have emergency overflow (auxiliary outlet) provisions incorporated into the design. Flow capacity of the overflow shall be calculated and shown as supporting information. The emergency overflow must be designed to accommodate 100-year 24-hour storm event peak flows. Emergency overflow spillways shall be located in existing soils when feasible and armored with riprap or other approved erosion protection extending to the toe of the embankment.

608.01.E Storm drainage runoff originating from and/or draining to any proposed development shall be controlled and/or conveyed in accordance with all City Standards and Policies as described in these Design Standards. When existing conditions make storm drainage detention impossible for a portion of a site, the City Engineer may permit compensatory storage volume to be provided on another portion of the site, provided the total site area is tributary to one drainage basin both prior to and after development. In no case shall the runoff rate from the total site exceed the allowable release rate.

608.01.F Under some specific situations, detention requirements may be waived and direct discharge may be allowed, as determined by the City Engineer. Direct discharge will not exclude the use of erosion control or other stormwater quality control techniques within the development.

608.01.G The storm drainage system must be properly designed to handle all flows developed on-site and all flows that flow through the site from upstream. Designers should conceptualize how water will move into, through, and out of the system, looking for such potential problems as flow impediments, construction difficulties, future maintenance problems, and soil erosion potential.

608.01.H Public health, safety, maintenance, nuisance abatement, and vector control must be carefully reviewed in every drainage control system plan. Protective measures are often necessary and will be required whenever appropriate. The protective measures themselves shall be designed so as not to constitute hazards or nuisances.

608.01.I The impact of a system failure shall be analyzed both in terms of on-site and off-site effects. The impacts may be to adjacent properties, or to elements of the public drainage system or other private systems. The downstream consequences of failure of a detention facility shall be included in determining location and design parameters.

608.01.J The frequency and difficulty of future maintenance can be minimized by thorough consideration during design of what could possibly go wrong in the system and what would be required to correct the problem. Facility design shall incorporate maintenance considerations to ease such problems.

608.01.K The use of the site shall be evaluated to determine if hazardous materials or other pollutants are likely to be present, and if extraordinary design considerations are necessary. Construction of on-site detention will not be allowed if such a detention facility would have an adverse effect upon receiving waters in the basin or sub-basin in the event of flooding, or would increase the likelihood or severity of flooding problems downstream of the site.

608.01.L The visual impact and other potential problems (mosquito breeding, smell, etc.) shall be minimized. Concerns will vary with the site environment, but aesthetics should always be of concern to the designer.

608.01.M It is important that runoff from rooftops pass through the detention system; the design shall clearly indicate how roof runoff moves through the system.

608.01.N Access, passable by a maintenance vehicle to all control structures by appropriate equipment, shall be provided with easements dedicated to the City.

608.01.O Drainage plans shall include a plan and profile of the facilities. The profile requirement for private drainage systems may be waived at the discretion of the City Engineer when sufficient data is provided on the plan in a clear and concise manner including the following minimum hydraulic and physical data:

- Grades, bottom elevations of ditches, channels, ponds and swales, parking lots and infiltration trenches;
- Inverts of pipes;
- Inverts and tops of all structures such as manholes, catch basins, chambers, or similar structures;
- Design infiltration rates;
- Stage-storage curve with design and check storms shown for all detention facilities;
- Size, length, and slope of all pipes or other detention or conveyance facilities, including the invert elevations of the existing or any other storm drainage system that the subject drainage proposes to discharge into. Add a note indicating that all facilities shall be inspected prior to landscaping.
- Proposed seeding, vegetative covering and landscaping.

608.02 ON-SITE FACILITIES

608.02.A A stormwater quantity facility shall be constructed on-site and be above ground/open surfaced. Underground detention systems (pipe/vault) may be used where specifically approved by the City Engineer.

608.03 IMPERVIOUS AREA

608.03.A The sizing of stormwater quantity facilities shall be based on the impervious area created by the development and for all existing contributing impervious areas proposed to remain on site, including but not limited to roofs, structures, roads, and other impervious areas. Impervious areas shall be determined based upon building permits, construction plans, or other appropriate methods of measurement as approved by the City Engineer.

608.03.B The City encourages design initiatives that reduce effective impervious area.

608.04 OPERATION AND MAINTENANCE PLAN AND AGREEMENT

608.04.A An operation and maintenance plan and agreement shall be submitted for City review and approval for all stormwater quality facilities. The O&M Plan shall include types and frequencies of operation and maintenance activities and shall comply with the most current edition of the *City of Portland Stormwater Management Manual.*

608.05 ABOVE GROUND DETENTION FACILITIES

608.05.A GENERAL

1. Interior slopes of detention facilities shall not exceed 4-feet horizontal to 1-foot vertical (4H:1V) for all detention facilities in public developments, master planned developments, subdivisions, and land partitions unless otherwise approved by the City Engineer. Facilities in commercial, industrial, and multifamily developments that are to remain under private ownership and maintenance shall have at least one interior slope not exceeding 4H:1V with all other interiors exceeding 4H:1V to be either retaining walls designed by a licensed structural engineer or a design submitted by a licensed engineer experienced in soils mechanics. Detention facilities exterior slopes shall not exceed 3-feet horizontal to 1-foot vertical.

2. The maximum design water depth in all detention facilities shall be 4-feet. Facilities less than 3-feet shall have a minimum bottom dimension of 6-feet or as approved by the City Engineer. Facilities 3-feet to 4-feet deep shall have a minimum bottom dimension of 15-feet.

3. Facilities suited to multiple use are encouraged. Examples of multiple uses are sport courts, play areas, neighborhood parks, picnic areas, and athletic fields. Such facilities that will provide public access shall be designed with special attention to safety of the public during inundation of the facility. Side-slopes shall be very gradual to avoid the risk of someone slipping into the facility and not being able to walk out.

4. Facilities shall be landscaped so as to provide slope stability, water treatment, and pleasant appearance by utilizing sodding, seeding, and planting of trees and shrubbery. Under no circumstances will the use of easily floatable or erodible materials (such as "bark dust") be permitted in facility interiors.

5. Maintenance of surface facilities is the responsibility of the property owner(s) or owner's association. Maintenance of surface facility landscaping in single family residential areas and Master Planned Developments shall be the responsibility of an owner's association, unless otherwise accepted for maintenance by the City.

608.05.B STORMWATER QUALITY CONSIDERATIONS

1. Stormwater quantity facilities that will also be designed to address stormwater quality shall include the appropriate water quality volume (permanent pool or dead storage) as further required in the most current edition of the *City of Portland Stormwater Management Manual.*

2. The bottom of constructed and graded retention/detention facilities shall be sloped no flatter than 0.01 foot/foot (1 percent) towards the outlets for drainage. EXCEPTION: This requirement need not apply to natural facilities, which exist and are utilized for stormwater detention.

3. Detention facilities shall have a well-defined low flow channel to contain runoff of lesser storms. Low flow channels shall be designed so as to enhance the facility landscaping and overall facility appearance.

4. Outlets of detention facilities shall be provided with suitable debris barriers designed to protect the outlet from blockage or plugging. Properly-sized overflow structures shall be designed into the facility.

5. The inlet and outlet structures shall be on opposite ends of the facility to promote maximum residence time and to prevent short-circuiting. Baffles may be required to be installed to increase the residence time and flow path if locating outlet structures on opposite sides of the facility is not practical.

6. Detention facilities shall be designed so that the "drawdown" time does not exceed 48 hours. In the event drawdown time exceeds 48 hours, additional calculations shall be submitted showing the proposed facility can contain an additional 25-year, 24-hour storm event.

7. The use of a sedimentation fore-bay will be required during the construction process if the facility is to be used for sedimentation control. After construction is complete, the facility shall be completely cleaned and any sediment shall be removed prior to connection to City infrastructure.

608.05.C OVERFLOW - EMERGENCY SPILLWAY

1. Detention facilities shall have a minimum of 1-foot of freeboard above the maximum design water surface.

2. A detention facility overflow system shall provide controlled discharge of the design storm event for developed contributing area without overtopping any part of the facility embankment or exceeding the capacity of the emergency spillway. The design shall provide controlled discharge directly into the downstream conveyance system. An emergency overflow spillway (auxiliary outlet) shall be provided in accordance with the most current edition of the *City of Portland Stormwater Management Manual* to safely pass the 100-year, 24-hour design storm event over the facility embankment in the event of control structure failure and for storm/runoff events exceeding design. The spillway shall be located to direct overflows safely towards the downstream conveyance system. The emergency spillway shall be located in existing soils when feasible and shall be armored with riprap or other approved erosion protection extending to the toe of each face of the berm embankment.

608.05.D ACCESS - MAINTENANCE

1. City-maintained detention facility control structures not abutting a public right-of-way shall be accessible to the City for maintenance and operation. Access roads and easements shall be provided to accommodate vehicular traffic year-round to both sides of the facility as necessary for vehicular maintenance access. Control structures shall be designed to operate automatically as much as possible.

2. A vehicular access shall be provided to the bottom of the detention facility when the bottom width of the facility is 20-feet or greater or when the height of the facility interior wall exceeds 5-feet.

3. Access roads shall meet the following criteria:

   - A maximum grade of 15 percent and a maximum cross slope of 3 percent.
   - A 40-foot minimum outside turning radius.
   - A minimum width of 15-feet.
   - Access roads in excess of 50-feet in length shall have a turn around.
   - The capability of supporting a 20-ton vehicle under all weather conditions.

608.05.E BERM EMBANKMENT - SLOPE STABILIZATION

1. Any embankment for a detention facility with berms 4-feet in height or less (3-feet maximum water depth), forming one or more sides of a retention/detention facility shall have a minimum 10-foot wide top of berm with a back slope not to exceed three (3) horizontal to one (1) vertical, unless otherwise approved by the City Engineer. Facility embankment shall be designed and the construction certified by a professional Civil Engineer licensed in the State of Oregon.

2. Any embankment for a detention facility in excess of 4-feet must be designed by a professional Geotechnical Engineer licensed in the State of Oregon and approved by the City Engineer. The geotechnical engineer shall design, inspect, and certify the construction such that the facility and earth berms are safe for the intended use. Notes to the effect of the above shall be shown on the plans submitted for approval. The minimum top width of the berm shall be 15-feet, unless otherwise approved by the City Engineer.

3. The toe of the exterior slope of facility berm embankment shall be no closer than 5-feet from the tract or easement property line.

4. The facility berm embankment shall be constructed on native consolidated soil (or adequately compacted and stable fill soils analyzed by a geotechnical engineer) free of loose surface soil materials, roots and other organic debris.

5. The facility berm embankments shall be constructed by excavating a 'key' equal to 50 percent of the berm embankment cross-sectional height and width or as designed by a geotechnical engineer.

6. Anti-seepage collars shall be placed on pipes in berm embankments which impound water greater than 3-feet in depth at the design water surface.

7. Exposed earth on the facility bottom and side slopes shall be seeded with seed mixture approved by the City Engineer.

608.05.F DETENTION FACILITY VOLUME

1. The design volume of the detention facility shall be shown on the plan and the facility volume inspected prior to landscaping (a note to this effect shall be shown on the plans).

608.05.G USE OF PARKING LOTS FOR DETENTION

1. Parking lots may be used to provide additional detention volume for runoff events greater than the 2-year storm event provided that:
    - ❖ The depth of water detained shall not exceed one (1) foot at any location in the parking lot for runoff events up to and including the 100-year storm event, AND
    - ❖ The gradient of the parking lot area subject to ponding shall be one (1) percent or greater, AND
    - ❖ The emergency overflow path shall be identified and noted on the engineering plan, and comply with all other development and drainage requirements, AND
    - ❖ Fire lanes used for emergency equipment shall be free of ponding water for all runoff events up to and including the 100-year storm event, AND
    - ❖ Buildings and parking lot utilities and facilities are not affected.

608.05.H USE OF ROOFS FOR DETENTION

1. Detention on roofs of structures may not be used to meet flow control requirements.

608.06 UNDERGROUND DETENTION FACILITIES

608.06.A GENERAL

1. City preference is to have stormwater runoff detention occur above ground. In select locations, the City may approve the use of underground detention facilities. Underground detention facilities may only be proposed once all other means of surface detention have been explored and exhausted, and are subject to the approval of the City Engineer. Underground detention facilities shall be designed by a professional Civil Engineer licensed in the state of Oregon, and shall only be used as a means of controlling stormwater quantity. Stormwater quality treatment measures by utilizing manufactured treatment devices may only be used when specifically approved by the City Engineer.

2. To minimize the occurrence of routine maintenance, all underground detention facilities shall be designed with a stormwater quality manhole (or equivalent) upstream, to facilitate sediment fallout prior to stormwater entering the detention facility. Incoming velocities shall be reviewed as to reduce the potential for sediment washout.

608.06.B FREEBOARD

1. Underground detention facilities shall be designed to provide adequate freeboard. Freeboard is measured as the vertical distance between the water surface and the rim of the auxiliary outlet or the inside top of the detention pipe or detention vault.

2. The following freeboard shall be provided:

   - ❖ DESIGN STORM EVENT – 6 inches from design storm high water elevation to the auxiliary outlet rim elevation (i.e. overflow riser pipe). The freeboard criteria apply to the highest intensity storm if there are multiple design storms.

   - ❖ 100-YEAR STORM EVENT – 6 inches from the 100-year storm event (check storm) high water elevation to the inside top of the detention facility. The water surface elevation for the 100-year storm event freeboard calculations is based on the entire flow passing through the auxiliary outlet (i.e. overflow riser pipe) and no flow through the primary outlet (i.e. orifice(s)).

3. The detention facility should have adequate venting to prevent pressure or vacuum as the water surface level rises or falls within the facility. This can be accomplished by having vented access cover over the facility or by connecting the top of the facility to a ventilated area with a pipe having a minimum diameter of 2 inches.

608.06.C DETENTION PIPE SYSTEMS

1. GENERAL

   a. Detention pipes serve as runoff quantity control through the means of underground storage. In addition to runoff quantity control, detention pipes shall be designed for factors such as environmental conditions (soil corrositivity, inundation, etc.), maintenance access, and ground and/or surface loadings.

b. The minimum pipe size allowed for a detention pipe in the public drainage system shall be 36-inches in diameter.

c. Detention pipes shall be designed as flow-through systems, incorporating the use of in line manholes for maintenance and sediment removal.

d. Detention pipe bottoms shall be set at a minimum grade of 0.002-feet per foot.

e. City owned detention pipes shall be located in the right-of-way; detention pipes proposed to be located outside the public right-of-way shall be located in a public easement, dedicated to the City.

f. The outlet flow control structure and detention pipe shall comply with the Standard Drawings, unless otherwise approved by the City Engineer.

2. MATERIALS

a. Acceptable materials for City owned detention pipes in public rights-of-way or public easements are:

- Reinforced concrete pipe.
- Solid wall HDPE.
- As approved by City Engineer

b. The following materials may be used for private systems located outside of public rights-of-way or public easements:

- Reinforced concrete pipe.
- Solid wall HDPE.
- Sanitite HDPE
- PVC pipe.
- As approved by City Engineer.

3. BUOYANCY

a. The effects of buoyancy shall be considered in areas with a known high groundwater table, or areas where seasonal high groundwater may cause flotation of the detention pipe.

b. Measures such as concrete anchors, concrete backfill, subsurface drains, etc. shall be required in these areas, as well as supporting engineered calculations.

4. STRUCTURAL STABILITY

a. Special consideration shall be given to ensure pipes meet requirements for potential traffic loading and overburden support. Access and structural end-cap bracing specifications from the manufacturer are required. Pipes shall be placed on stable, well consolidated native material or engineered fill with appropriate bedding. A structural analysis, geotechnical analysis, and engineered calculations may be required with the design, demonstrating stability and constructability. For pipes proposed under the traveled way, H20 live loadings shall be accommodated.

5. ACCESS MAINTENANCE

   a. Access easements and roads shall be provided when pipes are not located within the public right-of-way.

   b. Access openings shall be provided at a distance of no less than 100 feet from any location within the pipe, shall be a minimum of 36 inches in diameter, and shall have water-tight round lids. Additionally, access openings shall be located at both the inlet and outlet locations of the detention pipe. Improvements shall be made to facilitate maintenance equipment access to the maintenance access points year-round. Maintenance access point shall not be in areas that can be fenced off by private property owners.

   c. Access openings shall have surface access for maintenance vehicles.

   d. The distance from pipe invert to finished grade shall be not more than 15 feet, unless otherwise approved by the City Engineer.

   e. OSHA confined space requirements shall be met for pipes, and entrances to confined spaces shall be clearly marked.

6. ACCESS ROADS

   a. Access roads shall meet the requirements set forth in Section 608.05.D above.

608.06.D DETENTION VAULTS

1. GENERAL

   a. Detention vaults serve as runoff quantity control through the means of underground storage. Besides runoff quantity control, vaults shall be designed for considerations such as environmental conditions (soil corrosivity, inundation, etc.), maintenance access, and ground and/or surface loadings.

   b. Detention vaults shall be a box-shaped design constructed with reinforced concrete.

   c. Detention vaults shall be designed as flow-through systems with level bottoms.

   d. Ventilation pipes (minimum 1 foot diameter or equivalent) should be provided in all four corners of vaults to allow for ventilation for maintenance personnel. This is not required if removable panels are provided over the entire vault.

   e. City owned detention vaults shall be located in the right-of-way; detention vaults proposed to be located outside the right-of-way shall be located in a Public Utility Easement, dedicated to the City.

2. MATERIALS

   a. Detention vaults shall consist of minimum 3,300 psi structural reinforced concrete. Joints shall be constructed with water stops.

3. BUOYANCY

   a. The effects of buoyancy shall be considered in areas with a known high groundwater table, or areas where seasonal high groundwater may cause flotation of the detention vaults.

   b. Measures such as concrete anchors, concrete backfill, subsurface drains, etc. shall be required in these areas, as well as supporting engineering calculations.

4. STRUCTURAL STABILITY

   a. Special consideration shall be given to ensure vaults meet requirements for potential traffic loading and overburden support. Vaults shall be placed on stable, well consolidated native material or engineered fill with appropriate bedding. A structural analysis, geotechnical analysis, and engineering calculations may be required with the design, demonstrating stability and constructability. For vaults proposed under the traveled way, H-20 live loadings shall be accommodated.

5. ACCESS MAINTENANCE

   a. Access easements and roads shall be provided when vaults are not located within the public right-of-way.

   b. Access openings shall be provided at a distance of no less than 50 feet from any location within the vault, shall be a minimum of 36 inches in diameter, and shall have water-tight round lids. Additionally, access openings shall be located at both the inlet and outlet locations of the detention vault. Improvements shall be made to facilitate maintenance equipment access to the maintenance access points year-round. Maintenance access point shall not be in areas that can be fenced off by private property owners.

   c. Access openings shall have surface access for maintenance vehicles.

   d. The distance from vault invert to finished grade shall be not more than 15 feet, unless otherwise approved by the City Engineer.

   e. OSHA confined space requirements shall be met for vaults, and entrances to confined spaces shall be clearly marked.

6. ACCESS ROADS

   a. Access roads shall meet the requirements set forth in Section 608.05.D above.

608.07 OUTLET FLOW CONTROL STRUCTURES

608.07.A In many instances, the 2-year pre-developed flow rate is so small that it is impracticable to release at the allowable flow rate from an outlet flow control structure. In these cases, the total post-developed 2-year storm event runoff shall be infiltrated (preferred) or stored for evaporation, and the detention facility designed to release at the pre-developed 10-year storm event flow rates. The minimum allowable diameter for an orifice in an outlet flow control structure shall be 1-1/2-inches due to the possibility of clogging or plugging.

608.07.B See Standard Drawings for typical outlet flow control structure.

608.07.C Primary (orifice(s)) and auxiliary (overflow riser pipe) outlets within the outlet flow control structure shall be designed in accordance with the most current edition of the *ODOT Hydraulics Manual, Chapter 12 – Storage Facilities* or the *City of Portland Stormwater Management Manual.*

608.08 RIGHT-OF-WAY / EASEMENTS

608.08.A All publicly maintained storm drainage systems including collection, conveyance, flow restrictors and detention systems not located in right-of-way shall be located in a drainage easement or tract dedicated to the City.

608.08.B Detention facilities in subdivisions or partitionings shall be located in separate tracts dedicated to the City with access easements for maintenance where required. The minimum width of a dedicated tract or access easement shall be 15 feet. The City Engineer may require wider easements.

608.08.C When a storm drainage detention facility is located on property not owned by the developer, a permanent access and drainage easement shall be granted to the City from the owner in fee simple and contract purchaser of the property on which the facility is located. An all-weather access road to that facility, located within an access easement, shall be constructed in accordance with 608.05.D.

609 STORMWATER INFILTRATION

609.01 GENERAL

609.01.A The City of Stayton's stormwater surface infiltration requirements are designed to:

- ❖ Protect watershed health by requiring onsite surface infiltration wherever feasible in order to mimic pre-development hydrologic conditions.
- ❖ Protect the capacity of downstream infrastructure.
- ❖ Protect groundwater resources by preventing and removing pollutants from stormwater before discharging it into an underground injection control (UIC).

609.01.B All stormwater infiltration system design and testing requirements shall comply with the *City of Portland Stormwater Management Manual* unless otherwise approved by the City Engineer. All stormwater infiltration requirements are minimums and can be increased, as required by the City Engineer.

609.02 SURFACE INFILTRATION

609.02.A Stormwater shall be surface infiltrated onsite to the maximum extent feasible, before discharging any flows offsite. The appropriate use of surface infiltration depends on a number of factors, including soil type, soil conditions, slopes, and depth to groundwater. The point of discharge is also site specific and dependent on the availability and condition of public and private infrastructure. The feasibility of surface infiltration and the discharge point have a direct impact on the pollution reduction and flow control requirements for a site. Therefore, it is critical to determine the feasibility of surface infiltration and the point of discharge before designing a stormwater facility.

609.02.B While many of the stormwater facilities aim to maximize surface infiltration, not every site can infiltrate all of the stormwater from large, intense rainfall events. Unless complete surface infiltration of the 100-year storm can be accomplished, an offsite discharge point must be identified.

609.03 SUBSURFACE INFILTRATION

609.03.A UNDERGROUND INJECTION CONTROL (UIC)

1. In Oregon, all fresh water aquifers are protected as underground sources of drinking water. The Oregon Department of Environmental Quality (DEQ) regulates and requires the registration of certain infiltration facilities as injection wells. Registration covers all injection wells, including stormwater drainage wells, industrial/commercial injection facilities, aquifer recharge wells, subsidence control wells, aquifer remediation wells, and other miscellaneous injection wells.

2. The use of a UIC for the discharge of stormwater, other than for single lot residential roof drains, shall not be considered unless specifically approved in advance by the City Engineer. If approved, the UIC shall be designed in accordance with DEQ and the most current edition of the *City of Portland Stormwater Management Manual* and will be required to be registered with DEQ. A geotechnical evaluation of the site, prepared by a geotechnical Engineer or licensed Geologist will be required. In addition to the minimum Federal UIC requirements, all UICs shall further comply with Oregon Administrative Rule 340-44.

610 PRIVATE STORM DRAIN SYSTEMS

610.01.A The City reviews, approves, and observes construction of all stormwater conveyance and management facilities on private property as part of the development permitting process. This includes, but is not limited to, private storm drain systems associated with parking areas, private streets, and other impervious surfaces that are required to conform to these Standards. Private storm drain systems associated with buildings on private property shall comply with the State of Oregon Plumbing Specialty Code and other applicable Building Codes.

610.01.B Private storm drain systems will not be permitted within a public right-of-way, unless otherwise approved by the City Engineer. Where approved, private storm drain lines shall be a minimum of 6 inches in diameter and directly connected into a drainage structure of the public system at a location and elevation approved by the City Engineer. Private storm drain systems that convey water directly from private property shall be 3 inches in diameter for drains under sidewalks and through curbs.

610.01.C Private easements for private storm drain systems are the responsibility of the property owners. Copies of the recorded easements must be given to the City prior to any construction.

611 EROSION AND SEDIMENT CONTROL MEASURES

611.01 GENERAL

611.01.A APPLICATION AND PURPOSE

1. It is a City requirement to reduce the amount of sediment and other pollutants reaching the public storm and surface water system resulting from development, construction, grading, excavating, clearing, and any other activity that accelerates erosion, to the limits prescribed in these Standards.

2. It is the policy of the City to require temporary and permanent measures for all construction projects to lessen the adverse effects of construction on the environment. Projects shall include properly installed, operated, and maintained temporary and permanent erosion-control measures as provided in these Standards or in an approved plan, designed to protect the environment during the term of the project. Compliance with the measures prescribed herein or in an approved plan does not lessen the necessity to provide effective and comprehensive erosion prevention and sediment control.

611.01.B PERMIT REQUIREMENTS

1. Construction projects with ground disturbance of one (1) or more acres will require a National Pollutant Discharge Elimination System Stormwater Construction General Permit No. 1200-C or 1200-CN, as required by the Oregon Department of Environmental Quality. The City does not administer the State's 1200-C or CN permit program. Evidence of a 1200-C or CN permit shall be submitted to the City prior to final plan review approval and prior to any ground-disturbing activities.

2. In addition, an erosion and sediment control plan may be required to be submitted to the City for any ground-disturbing activity that requires a City building, public works, or development permit.

3. Sites that require an Oregon DEQ 1200-C or CN permit are encouraged to submit the same erosion and sediment control plan for both the 1200-C or CN permit and the City building, public works, or development permit.

611.01.C EROSION PROHIBITED

1. Visible or measurable erosion that enters, or is likely to enter, the public or private stormwater and surface water system or other properties is hereby prohibited, and is a violation of these Standards. An offsite sedimentation control facility may be utilized if it has been identified and approved in writing by the City Engineer, written approval is obtained from the respective property owner, and a written agreement for rehabilitation of the facility by the applicant or contractor is submitted to the City. The owner of the property or the applicant under a Public Works Permit, together with any person or persons, including but not limited to the Contractor or the Design Engineer causing such erosion, shall be held responsible for violation of the City's Standards.

2. No person shall create physical erosion by dragging, dropping, tracking, or otherwise placing or depositing, or permitting to be deposited, mud, dirt, rock, or other such debris on a public street, or into any part of the public stormwater and surface water system, or into any part of a private stormwater and surface water system that drains or connects to the public stormwater and surface water system. Any such deposited material shall be immediately removed by hand labor or mechanical means. No material shall be washed or flushed into any part of the stormwater and surface water system until all mechanical means to remove the debris are exhausted and preventive sediment filtration is in place.

3. The owner of the property or the applicant under a Public Works Permit, together with any person or persons, including but not limited to the contractor or the design engineer who causes such erosion, shall be held responsible for violation of these Standards.

4. The following minimum provisions are required for all ground-disturbing activities:

a. Install measures intended to keep soil on site or out of water bodies, storm drainage systems or the public right-of-way as the first step in any development. These measures shall be made functional prior to any upslope development taking place.

b. Remove any soil that enters the public right-of-way.

c. Protect stormwater inlets that are functioning during the course of the development by approved sediment control measures so that sediment-laden water cannot enter the inlets without first being filtered.

d. Apply permanent or temporary soil stabilization to denuded development site areas in conformance with the following schedule:

- ❖ Between October 1 and April 30, all denuded sites shall be provided with either temporary or permanent soil stabilization as soon as practicable, but in no case more than 2 days after ground-disturbing activity occurs.
- ❖ Between May 1 and September 30, temporary erosion and sediment control measures to reduce dust and sediment transport shall be applied as soon as practicable, but in no case more than seven days after ground-disturbing activity occurs.
- ❖ Groundcover shall be installed on any portion of a site that is denuded for more than six months. Sports fields or playgrounds surrounded by vegetative cover or permanently installed curbing are exempt from this requirement.
- ❖ Temporary measures shall be maintained until permanent measures are established.
- ❖ Plant appropriate non-invasive replacement vegetative cover.
- ❖ Secure or protect soil stockpiles throughout the project with temporary or permanent soil stabilization measures. The responsible party is accountable for the protection of all stockpiles on the site, and those transported from the site. Depositions of soil may be subject to additional regulations requiring permit, review or erosion and sediment control.
- ❖ Select appropriate BMPs from the Standard Drawings and the ODOT Erosion Control Manual.

5. Existing vegetation shall be protected and left in place whenever practicable. Work areas shall be carefully located and marked to reduce potential damage to trees and existing vegetation. Trees shall not be used as anchors for stabilizing working equipment. Where required, trees and existing vegetation shall be protected with a non-movable, chain link fence.

6. Where existing vegetation has been removed, or the original land contours have been disturbed, the site shall be revegetated, and the vegetation established, as soon as practicable.

611.01.D ENFORCEMENT

1. Failure to comply with any provision of this Section or with any term of a permit shall be deemed a violation and subject to enforcement action pursuant to applicable City ordinance and resolutions and orders, including all implementing rules and regulations. Nothing in this Section shall relieve any person of the obligation to comply with the regulations or permits of the City, County, State, or Federal authority.

611.02 EROSION PREVENTION TECHNIQUES AND MEASURES

611.02.A GENERAL

1. The use of erosion prevention techniques shall be emphasized, rather than measures to control sediment. This shall be especially important on construction sites immediately before and during the rainy season. Erosion prevention techniques are designed to protect soil particles from the force of rain and wind so they will not erode. When land is disturbed at a construction site, the erosion rate accelerates dramatically.

2. Erosion prevention techniques include, but are not limited to, construction scheduling, ground cover, and matting. Erosion prevention measures include, but are not limited to, silt fences, sediment barriers, and settling basins. Both erosion prevention techniques and sediment control measures have appropriate uses. Sediment control measures are designed to capture soil particles after they are dislodged and to retain the soil particles on site. Studies have shown, however, that sediment control measures are less effective than erosion prevention techniques in preventing soil movement.

611.02.B TYPICAL TECHNIQUES AND MEASURES TO BE IMPLEMENTED

1. The following provides a brief summary of some of the basic required erosion prevention techniques and measures to be implemented within the City. Refer to the Standard Drawings, the Oregon DEQ guidelines, and the ODOT Erosion Control Manual for additional information and for other best management practices (BMPs).

2. GRAVEL CONSTRUCTION ENTRANCE

   a. A gravel construction entrance is required. If there is more than one vehicle access point, a gravel construction entrance shall be required at each entrance.

   b. The responsibility for design and performance of the driveway remains with the applicant. Vehicles or equipment shall not enter a property next to a stream, watercourse, stormwater or surface water facility, or wetlands unless adequate measures are installed to prevent physical erosion into the water or wetland.

3. GENERAL EROSION CONTROL MEASURES

   a. During periods of wet weather, disturbed areas of the site and/or stockpiled soil shall be covered by tarps or straw at the end of each day's operations; all disturbed, unworked areas of the site shall be protected from erosion.

   b. Temporarily seed disturbed soils and slopes that are not at finished grade and which will be exposed for two months or longer before being disturbed again.

   c. Where seeding is used for erosion control, Regreen® or equivalent, or sterile wheat shall be used to stabilize slopes until permanent vegetation is established.

   d. Temporary seeding shall establish a minimum of 70% coverage of the ground surface with uniform healthy plants. If this coverage is not achieved, or if the City determines that it is not effective in stabilizing the soil from erosion, the applicant, at their expense, will be required stabilize the area with other temporary stabilization methods as approved by the City Engineer.

e. Biodegradable fabrics (Coir/Jute Matting), reinforced turf mats, or straw mulch can be used to stabilize slopes and channels. The fabrics can also be used to hold plugs in place and discourage floating upon inundation.

f. Permanent vegetation or seeding shall be established only between March 1 through May 15 and September 1 through October 15. If an irrigation system is installed, vegetation or seeding may be established from March 1 through November 15. If an area falls under definition of a wetland, permanent vegetation or seeding shall be established only between March 1 through April 30 and September 1 through October 15 and in a manner satisfying applicable City, County, State and Federal requirements.

4. BIOENGINEERING TECHNIQUES

a. Any person performing work in a watercourse or in an environmentally sensitive area (e.g., essential salmonid habitat, wetlands, steep slopes) shall employ bioengineering techniques whenever feasible.

b. Bioengineering techniques include, but are not limited to, contour wattling, brush layering or matting, live cuttings, fascines, and stakes.

5. SEDIMENT FILTERS AND FENCES

a. A sediment filter system may not be used on catch basins in public streets as part of erosion and sediment control plans for single-family dwellings.

b. The use of sediment fences will be required. Sediment fences are not required on a site in the following circumstances, unless otherwise specifically required by the City Engineer:

1) Where a Neighborhood Erosion and Sediment Control Plan (see Subsection 610.03.B) is in effect, for a maximum of four (4) lots.

2) Where there are no concentrated flows and the slope being protected has a grade of less than 2 percent.

3) Where flows are collected by using temporary or permanent grading or other means, such that the flows are routed to an approved settling pond, filtering system, or sediment barrier.

4) Where there are no concentrated flows, where slopes are less than 10%, and where the runoff passes through a grassed area that is either owned by the applicant or where such use is allowed, by written agreement, by the owner of the grassed area. The grass area shall be at least equal in dimension to the project area.

5) Where the surface is protected by ground cover or matting approved by the City Engineer.

c. Using straw bales as a sediment filter, fence, or barrier is not allowed.

6. PLASTIC SHEETING

   a. Plastic sheeting shall generally not be used as an erosion control measure for single-family dwelling construction. Plastic sheeting may be used to protect small, highly erodible areas or temporary stockpiles of material. If plastic sheeting is used, the path of concentrated flow from the plastic must be protected.

7. DUST PREVENTION

   a. During all phases of the work, the applicant shall take precautions to abate any dust nuisance. Dust-prevention measures shall be continuous until final inspection by the City Engineer. Dust shall be minimized to the extent practicable, using all measures necessary to accomplish results satisfactory to the City Engineer, including, but not limited to:

      1) Sprinkling haul and access roads and other exposed dust-producing areas with water.

      2) Applying City-approved dust palliatives on access and haul roads.

      3) Establishing temporary vegetative cover.

      4) Placing wood chips or other effective mulches on vehicle- and pedestrian-use areas.

      5) Maintaining proper moisture conditions on all fill surfaces.

      6) Prewetting cut and borrow area surfaces.

      7) Using covered haul equipment

611.03 EROSION AND SEDIMENT CONTROL PLAN (ESCP)

611.03.A GENERAL

1. An Erosion and Sediment Control Plan (ESCP) is a detailed description of where and how activities will be implemented to control erosion, sediment, and pollutants on a development site. The ESCP is a central, specific component of the overall site development management plan. The ultimate goal of erosion prevention is to limit the time and area of ground disturbance, keep pollutants separate from stormwater runoff, and establish permanent groundcover as quickly and thoroughly as possible.

2. An ESCP shall be developed by a professional knowledgeable in erosion and sediment control. The responsible party shall designate an individual to be responsible for onsite installation, maintenance, and removal of ESCP measures. The ESCP shall be submitted and approved prior to any ground disturbance. Construction projects with ground disturbance of one (1) or more acres will require a NPDES 1200-C or CN permit, as required by the Oregon Department of Environmental Quality.

3. A Certified Professional in Sediment and Erosion Control (CPESC) or a licensed Professional Engineer with the State of Oregon may be required to prepare the ESCP under a City issued permit for special sites or when a major plan revision is required because of site violations.

611.03.B ESCP DEVELOPMENT MINIMUM REQUIREMENTS

1. As part of the construction plans, an Erosion and Sediment Control Plan shall be developed in accordance with the following criteria, the Oregon DEQ guidelines, and the *ODOT Erosion Control Manual*. The ESCP shall meet the following minimum requirements:

   - Demonstrate compliance requirements set forth above in Subsection 611.01.
   - Show compliance with special requirements mandated by the City Engineer.
   - Identify any wetland, water body or outfalls within 200 feet of the ground-disturbing activity.
   - Provide a simplified narrative description of existing land uses and proposed land use. Provide a copy of any applicable land use review documents.
   - Provide clear delineation and approximate size of the area to be disturbed. Show existing and proposed ground contours. Provide drainage patterns for existing and final ground contours. In addition, provide drainage patterns for all intermediate contours throughout the length of the ground-disturbing activity.
   - Show drainage controls that will be used prior to installation of a final stormwater conveyance system.
   - Indicate the name and address of responsible parties, including the Developer and property owner.
   - Identify an emergency contact and telephone number.
   - Provide a preliminary activity schedule (general construction schedule), including anticipated start and completion dates for all sequencing of ground-disturbing activity and the associated dates for installation of erosion, sediment, and pollution control BMPs. The activity schedule shall indicate the timeframe for installation, maintenance, and removal of temporary BMPs. The applicant is responsible for notifying the City when site work will deviate from the preliminary schedule. The preliminary schedule can be modified through the designated site inspector as work on the site progresses.
   - Identify the application and maintenance of BMPs, including planning-level BMPs such as speed limits on interior roads.
   - Show the location of erosion and sediment control BMPs and their position in relation to ground-disturbing activities. Identify which BMPs, if any, are permanent controls. Provisions shall be made for the interception of all potential silt-laden runoff that could result from the site clearing and grading. Interception shall preclude any silt-laden runoff from discharging from the proposed land development to downstream properties. Interception shall cause all silt-laden runoff to be conveyed by open ditch or other means to whatever temporary facility is necessary to remove silt prior to discharge to downstream properties.
   - Identify development activities/areas with the potential to generate pollutants, such as vehicle maintenance, fueling, trash and debris collection, dewatering discharge, and top soil or other material stockpiles. Note whether any of these activities will occur offsite.
   - Provide a simplified site landscape plan that indicates the types and amounts of vegetation to be used and when and where the vegetation will be planted. Distinguish between temporary vegetative cover and permanent site landscaping.
   - Indicate on the site plan all areas of non-disturbance and/or retention of existing vegetation.
   - For structural erosion and sediment control BMPs, provide a detail of installation methods, including any sizing calculations (flow volumes, rates, etc.) or reference to BMPs outlined in the Standard Drawings or in the *ODOT Erosion Control Manual*.
   - Provide drainage calculations, when required by the City Engineer.

611.03.C ESCP REVIEW AND APPROVAL WHEN REQUIRED BY CITY PERMIT

- The City Engineer may deny a plan if it is determined that the plan does not meet the minimum ESCP requirements stated above and/or standard industry practices.
- Review of ESCPs will look for the following approval criteria:
  - Efforts to minimize area of disturbance.
  - Use of combination of BMP types, not just sediment controls. Good plans will include at least one type of BMP from each BMP group in the manual (site entry, perimeter, stormwater, erosion prevention, etc.).
  - Use of stabilized construction entrances away from the low points of sites. Use of multiple entrances for large sites.
  - A specific construction schedule.
  - Description of stormwater controls prior to storm sewer or infiltration system installation.
  - Description of vehicle storage, maintenance, and fueling practices. Designation of staging areas, if appropriate.
  - Description of designated and protected materials storage and stockpile areas.
  - Description of site inspection and maintenance requirements for all BMPs after any storm event.
- Approval of the ESCP is based on meeting the minimum requirements outlined in Subsection 611.03.B, in accordance with the anticipated site conditions and schedule. Approval of an Erosion and Sediment Control Plan by the City does not relieve the applicant's responsibility to ensure that the approved erosion control BMPs are constructed and maintained to contain sediment and pollutants on the construction site.
- During the construction period, measures in the ESCP shall be upgraded as needed for unexpected storm events and to ensure that sediment and sediment-laden water does not leave the site. Approval of a plan may be granted with or without restrictions. Restrictions on a plan may include, but shall not be limited to, the following:
  - Work is conducted only during a specified time of the year.
  - Only a portion of the work is approved.
  - Oversight by an erosion control professional is mandated.

1. NEIGHBORHOOD EROSION AND SEDIMENT CONTROL PLAN

   a. Any individual or group may submit an erosion and sediment control plan for multiple lots. Plans shall be submitted to the City Engineer for review and approval. This group plan shall be referred to as a "Neighborhood Erosion and Sediment Control Plan." In such case, the group of lots will be evaluated as if they were one lot.

   b. If an individual lot in a Neighborhood Erosion and Sediment Control Plan is sold to new owners, the new owners may either join the neighborhood plan (with the approval of the other neighborhood owners), or will need to submit their own erosion and sediment control plan if erosion potential still exists on the parcel. If a lot is sold and the new owner does not join the Neighborhood Erosion and Sediment Control Plan, then the plan must be revised and the new owner must submit an individual plan.

611.03.D ESCP DEVELOPMENT AND IMPLEMENTATION

1. The three principal parties involved in implementing an ESCP are the Designer, the Applicant or Designer's Inspector, and the Contractor. In addition to being responsible for reviewing the project's applicable NPDES 1200-C or CN permit and knowing what is required, each has the following corresponding project responsibilities, which include, but not limited to the following:

a. Designer Responsibilities:

- Research construction project site conditions.
- Ensure that topography and drainage are clearly delineated on the ESCP.
- Understand the scope of the construction project including detour facilities, duration of construction, and time of year construction will commence.
- Develop supplemental specifications as required to specify practices necessary to control erosion and contain sediment on site.
- Provide an ESCP with proper erosion control items to address erosion and sediment throughout project construction.
- Regularly update knowledge of the latest technology in commercial erosion control materials and methods.
- Ensure that the specified erosion control products are readily available.

b. Applicant or Designer's Inspector Responsibilities:

- Have knowledge and understanding of the project ESCP and Pollution Control Plan (PCP).
- Ensure that the Contractor submits revisions to the ESCP and presents the revised ESCP at the pre-construction meeting.
- Ensure that the Contractor updates the ESCP as construction progresses.
- Ensure that the Contractor maintains the erosion control facilities as needed.
- Ensure that the Contractor completes monitoring reports weekly or after more than 0.5 inches (in) of rain in a 24-hour period during active projects and once every 2 weeks during inactive projects of more than 7 days, if required by the City.
- Understand Sections 00280 (Erosion and Sediment Control) and 01030 (Seeding) of the *ODOT Standard Specifications for Construction* for public improvement projects under City Contract.
- Understand how to properly implement best management practices (BMPs) to control erosion and contain sediment.
- Ensure that the Contractor and project complies with the NPDES 1200-C or CN Permit.
- Be familiar with the Standard Drawings for erosion control.

c. Contractor Responsibilities:

- Become knowledgeable about the latest technology to control erosion and contain sediment.
- Be knowledgeable of site conditions.
- Understand the ESCP and Sections 00280 (Erosion and Sediment Control) and 01030 (Seeding) of the *ODOT Standard Specifications for Construction* for public improvement projects under City Contract.
- Revise the ESCP to meet conditions of construction (i.e., phasing, timing, weather) and present the revisions at the pre-construction meeting.
- Develop a an ESCP that includes a site plan and narrative, describing methods of erosion and sediment control to be used to minimize erosion and sediment from project operations related to disposal sites, borrow pit operations, haul roads, equipment storage sites, fueling operations and staging areas.
- Construct BMP's as described in the project ESCP and specifications.
- Minimize clearing of vegetation and look for opportunities to minimize erosion, offering ideas to ODOT inspectors for approval.
- Monitor erosion control devices.
- Maintain erosion control facilities and modify when required to stay in compliance with NPDES 1200-C or CN Permit.
- Update the ESCP as work progresses and modify plan as conditions change.

- ❖ Ensure that permanent seeding is done within the time frames set forth in Section 01030 (Seeding) of the ODOT Standard Specifications for Construction for public improvement projects under City Contract.

611.03.E CITY INSPECTION OF EROSION CONTROL MEASURES

1. City Initial Inspection: On a site development or any other type of project, the erosion and sediment control measures shall be installed before the start of any permitted activity. The applicant shall coordinate with the City Engineer for a pre-construction conference before beginning any site clearing or grading.

2. City Final Inspection: A final erosion control inspection will be required before the removal of erosion and sediment control measurements.

611.03.F MAINTENANCE

1. The applicant shall maintain the facilities and techniques contained in the approved erosion and sediment control plan so they will continue to be effective during the construction phase, post construction phase, establishment of permanent vegetation, or any other permitted activity.

2. If the facilities and techniques approved in an erosion and sediment control plan are not effective or sufficient as determined by the City site inspection, the applicant shall submit a revised plan within three (3) working days of written notification by the City Engineer. On approval of the revised plan by the City Engineer, the applicant shall immediately implement the additional facilities and techniques included in the revised plan.

3. In cases where erosion is likely to occur, the City Engineer may require the applicant to install interim control measures before submitting a revised erosion and sediment control plan.

4. The erosion and sediment control measures shall remain in place and be maintained in good condition until all disturbed soil areas are permanently stabilized by installation and establishment of landscaping, grass, or mulching, or are otherwise covered and protected from erosion.

611.03.G WET WEATHER MEASURES

1. On sites where vegetation and ground cover have been removed, vegetative ground cover shall be planted on or before September 1, with the ground cover established by October 15. As an alternative if ground cover is not established by October 15, the open areas shall be protected through the winter with mulch, erosion blankets, or other method(s) approved by the City's authorized representative.

END OF DIVISION