RESOLUTION No. 22/23-04
CITY OF DAYTON, OREGON

A Resolution Adopting Public Works Design Standards Update No. 13

WHEREAS, on October 6, 2006, the Dayton City Council adopted Resolution #06/07-11, A Resolution Adopting City of Dayton Public Works Design Standards (hereafter called "Standards"), and amended on February 5, 2007, by Resolution #06/07-27, A Resolution Adopting Public Works Design Standards Update No. 1; and on January 7, 2008, by Resolution #07/08-17, A Resolution Adopting Public Works Design Standards Update #2; and Resolution 07/08-31, A Resolution Adopting Public Works Design Standards Update #3; and Resolution 09/10-31, A Resolution Adopting Public Works Design Standards Update #4; and Resolution 12/13-35, A Resolution Adopting Public Works Design Standards Update #5; and Resolution 13/14-5, A Resolution Adopting Public Works Design Standards Update #6; and Resolution No. 15/16-10 A Resolution Adopting Public Works Design Standards Update #7; and Resolution No. 17/18-9 A Resolution Adopting Public Work Design Standards Update #8; and Resolution No. 19/20-2 A Resolution Adopting Public Work Design Standards Update #9; and Resolution No. 19/20-19 A Resolution Adopting Public Work Design Standards Update #10; and Resolution No. 20/21-12 A Resolution Adopting Public Work Design Standards Update #11; and Resolution No. 21/22-29 A Resolution Adopting Public Work Design Standards Update #12; and

WHEREAS, the Standards are subject to change as both the City's needs change and the industry standards change, or if errors are discovered in the document; and

WHEREAS, certain information in the Standards needs to be updated or changed.

The City of Dayton resolves as follows:

1) **THAT** Update No. 13 to the City of Dayton Public Works Design Standards, (attached hereto as Exhibit A and by this reference incorporated herein) is hereby adopted; and

2) **THAT** this resolution shall become effective immediately upon adoption.

ADOPTED this 17th date of October 2022.

In Favor: **Frank, Holbrook, Mackin, Maguire, Marquez, Sandoval-Perez, Wytoski**

Opposed: **None**

Absent: **None**

Abstained: **None**

Elizabeth Wytoski

Elizabeth Wytoski, Mayor

10/25/22

Date of Signing

ATTESTED BY:

Patty Ringnalda

Patty Ringnalda, City Recorder

10/17/22

Date of Enactment

Attachment - Exhibit A

City of Dayton

PUBLIC WORKS DESIGN STANDARDS

Last Updated ~~*June*~~ *2022*
Originally adopted September 2006

CITY OF DAYTON
PUBLIC WORKS DESIGN STANDARDS

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Public Works Design Standards

Division 1

General Requirements

of substitute items will be by the Public Works Director or his/her designee, and shall be final. In addition to the review criteria for "equal" items, the written request for review of a substitute item shall document whether use of the proposed substitute item will require any changes to adapt the design to the proposed substitute item (and to what extent), and shall identify the timeframe required to complete such design changes, and that there will not be any cost or other impact to the City due to any such required design changes.

33) Survey Cut Sheets: Sheets of tabulated survey data, indicating stationing, structures, fittings, angle points, beginning of curve, points on curve, end of curves, staking offset, various elevations and offset utility cuts.

34) Traveled Way: That portion of the roadway for the movement of vehicles, exclusive of shoulder and auxiliary lanes.

35) UGB: Urban Growth Boundary.

1.5 LOCATION OF UTILITIES WITHIN RIGHT-OF-WAY OR EASEMENT

a. The standard details indicate the general required location for each utility within the public right-of-way.

b. In general, new franchise utilities are to be installed within street frontage PUEs where such easements exist *(unless otherwise approved by the Public Works Director on a case-by-case basis)*.

c. Installation of franchise or private utilities in a common trench with public water, sanitary sewer or storm drain mainlines is prohibited.

1) Unless otherwise approved by the Public Works Director and the City Engineer, a minimum of 5 feet of horizontal separation must be maintained between public and private or franchise utilities except at crossings, as well as between water or fire service lines and private or franchise utilities.

d. Franchise Utility Limitations in City Easements. Franchise utilities or private utilities shall not be placed in City utility *(ie. water, sewer or storm)* easements, unless specifically directed in writing to do so by the Public Works Director, subject to separation requirements in excess of minimums as dictated by the Public Works Director

e. Franchise utility plans shall be submitted to Public Works Director and the City Engineer for review prior to installation. All franchise utility street crossings shall be installed at right angles to the street centerline, and all crossings of water, sewer or storm mainlines or service lines/laterals shall be as close to perpendicular as feasible.

~~e.~~1) Plowing In of Utilities Prohibited in ROW or City Easements. Use of

cable/conduit plowing for installation of franchise or private utilities within public right-of-ways or City utility easements is prohibited, unless specifically authorized by the Public Works Director on a case-by-case basis. Any such authorization shall be based on a demonstration by the applicant that there are no existing City or franchise utilities crossing the proposed plow alignment, or within 10 feet parallel with the proposed plow alignment.

f. 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.

g. Utility/Infrastructure Modifications Required Due to Changes on Private Property.

1) If changes are made to private property which requires modifications to and/or relocation of City utilities/infrastructure which is installed on private property *(ie. changes including but not limited to changes in finish grade, changes in surface type, change in use of the property, construction of structures, etc.)*, such modifications and/or relocation shall be completed by the property owner or Developer at their sole expense, as directed by the City.

2) When modifications to and/or relocation of City utilities/infrastructure are required due to changes on private property, such modifications and/or relocation shall comply with current City standards, and shall be reviewed and approved in accordance with these PWDS.

1.6 PROVIDING FOR NEW & FUTURE DEVELOPMENT

a. All public improvements shall be designed as a logical part of the development of the surrounding area, as required or approved by the City Engineer and Public Works Director.

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

c. To & Through. Utilities and street improvements shall be extended to the boundaries of the development *(ie. to and through)* so as 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.

d. The City may require over-sizing of utility lines to accommodate future growth of the City. Water, sewer and storm drain mainlines shall be sized to comply with recommendations in the applicable master plan documents or maps.

b. Drawing Submittal: The drawing submittal shall include the following as applicable unless otherwise approved by the City Engineer. The following is a general overview of drawing requirements, but is not intended to be exclusive. All requirements of the individual divisions of the standards shall be satisfied.

Since projects subject to a Type B Public Works Construction Permit vary greatly in size and complexity, not all provisions in this section will apply to all projects. For instance, small projects in improved areas which do not involve any street improvements or extensions of water, sewer or storm drain mainlines will not need to provide profiles for these facilities. To assist the design engineer, the minimum elements required of all designs subject to a Type B Public Works construction permit are designated as summarized in the sentence below.

****The elements in this section 1.10 which are marked by an (**) are required to be included on the drawings for all projects subject to a Type B Public Works construction permit (see PWDS G.5).** All other elements not so designated are only required if the project involves improvements or infrastructure referenced in the non-designated paragraphs or sentences. If there are questions due to the unusual nature of a project, these should be discussed with the Public Works Director at the predesign conference (PWDS 1.9.b).

1) **Drawing Sheet Size. Construction drawings shall be submitted on 22" x 34" blackline sheets unless otherwise approved by the City Engineer. All drawings submitted for review and/or approval shall be stapled and bound into sets *(unless pdf submittals are allowed by Public Works Director & the City Engineer)*.

2) **City plan review fees as required.

3) ****Variance/Deviation Summary Required**. A written summary of all deviations from the PWDS requirements, and written justification for any variance requests *(see section 1.12)*. It is the responsibility of the design engineer to submit a written request for any proposed deviations or variances from City standards *(see PWDS 1.12.a.3)*. ~~(moved text up from below)~~

~~3)~~4) **Cover Sheet *(with all information required under PWDS 1.10.d)*

~~4)~~5) **Overall drainage, utility and street/site lighting plan.

~~5)~~6) Site grading plan where applicable.

~~6)~~7) Site layout & dimensioning plan, including property dimensions, all parking areas, access driveways, fire lanes, ADA compliant pedestrian access routes, as well as building locations, separations & setbacks, etc.

~~7)~~8) Fire vehicle access plan where applicable *(commercial, industrial, public, parking lot, private street, common driveway, flaglot, MHP, RV park, PUD, etc.)*.

~~8)~~9) Plan and profile for the following public utilities:

a) Streets
b) Water as specified
c) Sanitary sewers
d) Storm drains

~~9)~~10) **Erosion control plans *(reflecting erosion control measures during construction, and also reflecting a post construction site runoff plan as required by general City or County stormwater permits, or by project DEQ stormwater or water quality permits)*.

~~10)~~11) **Details to be Included on Drawing Sets. Standard details shall be included on the construction drawings. Details shall be placed in numerical order on the detail sheets, for ease of reference during construction.

~~11)~~12) **Stamped storm drainage calculations, including storm drainage basin maps.

~~12)~~13) A geotechnical report for the development site and other impacted properties is required for sites with (a) any existing or proposed fills, (b) existing slopes steeper than 3H:1V, (c) existing or proposed retaining walls on the development property or on contiguous properties, (d) if stormwater infiltration is proposed, or (e) where there are other geotechnical concerns identified by the City Engineer or the Public Works Director.

~~13)~~14) **A current title report which includes a list of all existing easements, restrictions, and other encumbrances on all property where construction will occur, including full copies of deeds, easements or other restrictive documents referenced in the title report (*a pdf copy of* each *title report with embedded hyperlinks to the referenced documents may be provided in lieu of a hard copy*).

~~14)~~15) **Recorded copies of all easements and right-of-way dedications required in conjunction with the project, with the exception noted under PWDS 1.9.i.3 for subdivisions or partitions where all public utilities will be constructed prior to the recording of a final plat. Easements shall be worded such that no trees, permanent structures or improvements including parallel fences or parallel utilities shall be placed or constructed on the easement. Easements shall be a constant width between manholes, valves or other in-line structures, unless otherwise required by the Public Works Director and/or the City Engineer *(ie. for example, where required to avoid leaving a sliver of property between the easement boundary and adjacent property lines or right-of-ways)*. Easement width shall be based on the deepest portion of the line between such structures. See the Appendix for standard easement forms.

~~15)~~16) **Proposed utility plans from all franchise utilities *(final review)*.

~~16)~~17) **Engineer's unit price construction cost estimate acceptable to the City Engineer or unit price bid results (*estimate to be submitted with initial review*

drawings and shall be updated as applicable when final review drawings are provided). Cost estimates shall include all work covered under the PWDS *(excluding work covered by buildings permits for structures)*. In addition to all grading, streets, water/sanitary sewer/storm drainage, driveways, parking, etc. to be constructed with the project, estimates shall include line items for street lighting and franchise utility trenching & conduit, as well as trenching & installation of street lighting conduits, junction boxes and pole bases as applicable.

~~17)~~18) Design Vehicle Turning Radius. For all developments (*other than single family subdivisions and/or partitions conforming with OFC requirements*), provide a summary of the largest design vehicle (*including emergency/fire vehicles*) which will need to access the development (*including vehicle size & dimensions*), as well an exhibit showing turning-radius wheel-path templates for the design vehicle (*auto-turn or equivalent*).

a) The development team shall be responsible to coordinate with the Fire Code Official regarding the size and turning radius of the largest emergency/fire vehicle which will need to access the site, and provide this information to the Public Works Director in conjunction with drawings submitted for review.

~~18)~~19) The submittal may also be required to include a traffic study and a traffic control plan.

~~19) **A written summary of all deviations from the PWDS requirements, and written justification for any variance requests *(see section 1.11)*. It is the responsibility of the design engineer to submit a written request for any proposed deviations or variances from City standards.~~

c. General

1) **A title block shall appear on each sheet of the drawing set and shall be placed in the lower right-hand corner of the sheet, across the bottom edge of the sheet or across the right-hand edge of the sheet. The title block shall include the name of the project, the sheet title and number, the name of the engineering firm, engineer's stamp *(either signed by the engineer, or marked as preliminary as noted under PWDS 1.3.a.1)*, date and revision blocks. Revision blocks shall be filled in on each drawing sheet containing revisions from previously submitted or reviewed drawings.

2) ***By City convention and to minimize confusion regarding directions, for areas northerly of Palmer Creek, "plan" north (for purposes of design drawings) is considered to be parallel with the numbered streets (1st Street through 9th Street)*. North arrows *(true north and plan north where applicable)* shall be shown on each sheet containing plan views and adjacent to any other drawing which is not oriented the same as other drawings on the sheet.

cuts/fills.

3) A site plan and grading plan is required for projects subject to site design review, including all commercial, industrial, or multi-family developments.

4) The grading plan shall show proposed finished grade and parcel corner elevations, with the existing and proposed contours shown at maximum one (1) foot intervals and extended a minimum of 100 feet beyond the improvements. Extremely flat sites will require contour intervals closer than 1 foot as necessary to clearly illustrate proposed grading and drainage slopes and limits.

5) The grading plan shall show all drainage systems and proposed erosion control facilities, including swales along property lines as required to intercept uphill surface runoff and convey it to an approved point of disposal.

g. Drainage Calculations

1) **A summary of drainage and detention calculations, including basin maps, shall be presented in a clear, concise and complete manner on the site grading or drainage plan sheets, or a separate sheet.

a) These calculations shall address all runoff into the drainage system and downstream capacity.

~~b) Where applicable, include information *(on the drawings as noted above)* such as the design rainfall intensities used, basin areas, runoff coefficients used, design flow and pipe capacity at key points along the storm system improvements including where flow from upstream property enters the site, downstream capacity at the connection to existing system, etc., as well as key information relating to any required detention, such as detention volume required, detention volume provided, predesign in-flow rate & design storm, design out-flow rate & design storm, overflow elevation, orifice size, head above orifice at design flow, overflow route capacity, etc.~~

b) Where applicable, include information *(on the drawings as noted above)* such as:

- Design methodology *(rational or SBUH)*,
- Design storms & design rainfall intensities used,
- Basin areas,
- Runoff coefficients used,
- Design flow and pipe capacity at key points along the storm system improvements, including where flow from upstream property enters the site *(add note if there is no existing or future upstream flow into the system)*,
- Downstream capacity at the connection point to existing system, etc.,

as well as key detention system information, such as:

- Detention volume required,
- Detention volume provided,
  - Where drain rock is used for detention storage, include the volume of rock, rock void ratio, and total volume of rock void space,
- Predesign flow rate & design storm,
- Post construction design runoff to detention system & design storm,
- Design out-flow rate & design storm,
- Overflow elevation & location,
- Orifice size & elevation,
- Orifice capacity, including head above orifice at design flow,
- Overflow route capacity *(overflow route to be shown or identified on the drawings)*, etc.

c) If required by the City, areas contributing flow to each inlet must be computed separately and each inlet with contributing area shall be designated and shown on an accompanying contour map work sheet.

h. Plan Views

1) General: **Information required on the overall utility plan shall be shown on the plan views as applicable, including tax lot & address numbers of all existing lots or existing parcels shown. In addition, the following shall be shown:

a) **Utilities and vegetation in conflict with the construction or operation of the street and public utilities. Vegetation to include trees greater than 6 inches in diameter *(measured at 4½ feet above soil line-DBH)* and landscape plantings within the right-of-way and easement areas.

b) Public and franchise or private utilities to be relocated.

c) Match lines with sheet number references.

d) **All existing survey monuments within or adjacent to work areas.

e) Additional information as outlined below or as required by the City based on unique or unusual features of the project.

f) Show Future Curblines where Applicable. Where existing streets are not fully improved, or where less than full street improvements are being constructed, show the location & alignment of future curblines and intersection curb radii, so that the location of utilities being installed are clearly defined in relation to the future street improvements *(this requirement also applies to water/sewer/storm mainline improvements which are constructed without streets*

checking the plan views with the profile.

c) **Location of all waterlines, hydrants, water meters, backflow devices, etc. shall be dimensioned from right-of-way centerline, easement boundary, adjacent property corner or other means so that its location is clearly defined.

d) Waterline stationing shall be independent of the street stationing, unless otherwise approved by the City Engineer on a case-by-case basis where waterline profiles are not required.

e) Size, depth, pipe material and class, length of water pipe and class of backfill shall be clearly shown or called out on the plan view, unless this information is shown on a profile view.

6) Site Layout & Dimensioning Plan *(plan view)*

a) The site layout & dimensioning plans shall show all property dimensions, all parking lot and site access improvements and dimensions, including all vehicular & pedestrian access routes *(including fire lanes)*, curbs, as well as building locations, separations & setbacks, etc., as well as other applicable information.

7) Fire Vehicle Access Plan *(plan view)*

a) Where fire lanes are required, provide fire vehicle access plan drawing(s) illustrating the fire truck routes along all fire lanes and turnarounds within the project, to all hydrants, and to within 150 feet of the exterior wall of any building *(OFC 503.1.1)* unless a distance exception is approved in writing by the Fire Code Official.

b) Include dimensions and widths along all fire lanes & turnarounds, as well as widths and dimensions for fire lane easements & turnarounds. Ensure that fire lane widths & clearances shown account for any bollards provided to protect hydrants, buildings or other structures.

c) Show & label all vehicular gates to be provided, with notes to provide Knox boxes or other entry means approved by the Fire Code Official.

d) Designate location of no parking signs and fire curb painting.

e) Show & label all fire hydrants *(public & private)* and FDCs, as well showing or noting curb painting at fire hydrant & FDC locations *(ie. 10 feet each way from hydrants per Detail 503 & ORS 811.550(16))*.

f) If not included on the drawings, a separate worksheet exhibit shall be provided for review illustrating the fire truck turning-radius wheel-path templates *(autoturn or similar)* along all fire lanes and turnarounds

1.11 EASEMENTS, ETC.

a. **Utility easements to the City *(in a form acceptable to the City and conforming to the PWDS requirements)* shall be provided and recorded for any City utilities outside of public street right-of-ways. ~~The minimum utility easement widths and property line offset requirements are referenced in subsequent PWDS sections for Storm Drain, Sanitary Sewer and Water. Other recorded easements/instruments affecting City access and/or interests *(ie. fire lane easements, detention easements & maintenance agreements, grease interceptor maintenance agreements, common driveway maintenance agreements, etc.)* shall also be in a form acceptable to the City and conforming to the PWDS requirements. See also Easement Procedure Summary on cover page of Appendix D.~~

1) Easement Widths. The minimum utility easement widths and property line offset requirements are referenced in subsequent PWDS sections for Storm Drain, Sanitary Sewer and Water. The developer's engineer shall verify that widths and extents of easements *(to the City)* fully comply with standards per PWDS 5.15.d *(water)*, PWDS 4.15.d *(sewer)*, PWDS 3.12.d *(storm)* or PWDS 2.31.c *(common driveways/fire lanes)* based on the final approved design.

2) Other recorded easements/instruments affecting City access and/or interests *(ie. fire lane easements, detention system easements & maintenance agreements, grease interceptor maintenance agreements, common driveway maintenance agreements, etc.)* shall also be in a form acceptable to the City and conforming to the PWDS requirements.

3) **See also Easement Procedure Summary on cover page of Appendix D.**

b. **Legal Description & Exhibit Map. All recorded easement or right-of-way dedication documents shall include a legal description of the easement or ROW area and a "to-scale" exhibit map, except for easements created by a plat, in which case the recorded easement documents may reference the easement as shown on the plat.

1) ~~(with t~~Exhibit Maps. The easement or ROW boundary & area shall be clearly shown and labeled on the exhibit map, and include~~ing~~ all information/callouts required to illustrate the information contained in the legal description, including point of beginning, bearings and distances if applicable, as well as deed callouts or lot/parcel numbers~~, tax lot numbers~~ and street names as required to clearly show the location of the affected properties.~~), except for easements created by a plat, in which case the recorded easement documents may reference the easement as shown on the plat~~

a) In addition to deed callout or lot/parcel numbers, exhibit maps shall also list the tax lot number & address of the properties shown *(both grantor & grantee property)*, as supplemental information for reference & orientation.

2) Legal descriptions and exhibit maps shall be submitted for City review and approval prior to recording.

~~3)~~a) Per ORS 93.600, use of a tax lot number ONLY~~only~~ as a legal description for property is not legally adequate for use in a recorded document.

~~4)~~3) Exhibit maps not drawn and plotted to scale, or not containing the information required above, will be returned for revision.

~~b.~~c. Prohibited within Easements Granted to the City. Property owners shall not plant, build, construct, or create *(nor permit others to plant, build, construct, or create)* any fills, trees, buildings or other structures, including fences or parallel utilities, on or within an easement granted to the City which might interfere with the use by the City of the easement for the defined purposes, or which might interfere with the normal operation, inspection, access to or maintenance of the utilities within the easement, including excavation for repairs or replacement if necessary. In addition to permanent structures, prohibited structures shall include sheds, decks, footings or overhanging portions of structures which are located outside of the easement.

1) Access gates acceptable to the Public Works Director shall be installed in fences which the City allows to be constructed across the easement granted to the City.

2) The property owner shall not construct cuts or fills within or on the easement area without express written approval by the City, since this will interfere with the use of the easement for the purposes for which it was granted. Fills will make the utilities less accessible for inspection and/or maintenance, and cuts may result in inadequate cover over said utilities, and either will result in access points *(manholes, inlets, valves, cleanout or meter boxes, etc.)* no longer being at the proper grade. Any such approval by the City *(which approval may be granted or withheld at the City's sole discretion)*, shall be contingent on the property owner performing all work required by the City in order to mitigate impacts due to such cuts or fills, including reconstructing or resetting the utilities and appurtenances as directed by the City at the property owner's expense. It is understood and agreed that the City may remove *(or require removal by the Grantor)* any physical obstructions including buildings, overhangs, fences, trees, shrubbery or fill material, and abate any use of the easement if the City finds that the physical obstruction or use will interfere with the City utility or the City's ability to access, maintain or repair the City utility, and that such removal or abatement may be completed *(including if removal by property owner is required)* without recompense to the property owner(s) *(excerpt to the extent that such recompense or reimbursement may be specifically included in the recorded easement documents)*.

3) The City acknowledges that the property owner may generally use the

easement area for ~~permitted parking and/or~~ access driveways and/or permitted parking *(except that parking is not allowed in fire lane easement areas)*, or similar uses which are allowed by the City.

~~c.~~d. **Street Frontage PUE. Easements shall include minimum eight (8) foot public utility easements (PUE) for franchise utilities along all lot lines fronting public or private streets, as well as easements for fire hydrants, sewer & storm drainage property line cleanouts & water meters where set behind the sidewalk, cluster mail box pads, and sidewalks at driveway crossings *(when they must be widened or jogged back to meet ADA standards)*, pedestrian ramps at intersections, city street light poles, etc. which may be located behind sidewalks and just outside of the public right-of-way.

1) PUEs created by a plat should include wording similar to the following *(plat wording to be acceptable to the both Public Works and the County Surveyor)*. "We hereby create a utility easement as shown along the public right-of-ways for franchise utilities and also dedicate to the City of Dayton along said utility easement a waterline, sanitary sewer, storm drain and public sidewalk easement."

2) Construction of a building or a structure within the PUE is prohibited, including footings or overhanging portions of structures located outside the easement. If the City allows a retaining wall or a fence to be constructed within or across a PUE, an encroachment license agreement shall be executed and recorded against the property stipulating that the property owner will be responsible for any restoration costs associated with removal and reconstruction of said retaining wall or fence if such removal is required to service, maintain or repair utilities installed within the PUE, whether by the City or by any franchise utility company.

3) Where easements for City water, sewer or storm drain mainlines are proposed or exist along street frontages, new PUEs shall be located outside of City utility easements *(except at crossings)*, to prevent future installation of franchise or private utilities within the City easements parallel with City pipelines.

~~d.~~e. **Private Easements. Private utility easements a minimum of ten (10) feet wide *(centered on the utility pipe and offset from common property lines)* shall be provided for all franchise utilities, private water, sanitary sewer and storm drains, ditches or channels outside of public right-of-ways and outside the boundaries of the property being served, or which are ~~is~~ extended across the development property in order to provide service to other properties. Private access easements shall be provided for any driveway, sidewalk or path crossing property other than the one being served, and shall include provisions defining who is responsible for repair and/or maintenance costs.

Acquisition of such private easements shall be the sole responsibility of the entity

requesting or installing the private utility pipes, ditches or channels, or driveways. ~~While the City does not dictate the specific form required for use on the private easements noted above, the easement forms used shall define which properties the private easement is to the benefit of, shall include provisions that the easement cannot be extinguished without explicit written authorization from the City, and include language that the easement will not be extinguished by the doctrine of merger *(unless the properties are consolidated into a single legal lot of record)*.~~

1) Extension of private water, sanitary sewer and storm drain laterals across adjacent private property is typically only allowed where it is the only feasible method of providing utility service to a development property.

2) Any proposal for extension of private water, sanitary sewer and storm drain laterals across adjacent private property instead of from a street frontage shall not be allowed as a substitute for the PWDS requirement to extend mainline utilities across the frontage of development property *(ie. to & through)* in order to provide for such services, as required under PWDS 1.6.c, d & e.

3) Required Language for Private Easements. While the City does not dictate the specific form required for use on the private easements noted above, the easement forms used shall
(A) define which properties the private easement is to the benefit of *(by legal description & also as shown on exhibit map)*,
(B) include provisions that the easement cannot be extinguished without explicit written authorization from the City, and
(C) include language that the easement will not be extinguished by the doctrine of merger *(unless the properties are consolidated into a single legal lot of record)*.

~~e.~~f. **Recorded copies of all required easements, dedications and/or agreements *(both public & private)* shall be submitted to the City Engineer and the Public Works Director prior to start of construction, with the exception noted under PWDS 1.9.i.3 for subdivisions or partitions where all public utilities will be constructed prior to the recording of a final plat. All recording costs shall be borne by the Developer.

~~f.~~g. When requested by Public Works or the City Engineer, a digital drawing shall be submitted containing the final alignment & boundaries of all new easements associated with the development. The drawing shall be in Autocad format, and shall include lot lines, right-of-way lines and easement lines each on separate layers.

which are designed and permitted under these PWDS, at the developer's expense.

5) These inspection and construction observation requirements are not applicable to individual sidewalk, driveway or service lateral permits for single residences. If the project scale is such that the retention of an independent engineer-of-record is not warranted, the Developer may request that the City provide these services. If the City agrees to provide these services, the Developer shall be responsible to reimburse the City for any costs incurred for these inspection and/or construction observation services.

b. City Activities

1) Services provided by the City shall include:

a) Liaison between the engineer-of-record and the City;

b) Monitoring of work progress and performance testing as deemed desirable;

c) The performance of administrative and coordination activities as required to support the processing and completion of the project;

d) The issuance of stop work orders upon notifying the engineer-of-record and/or the Contractor of the City's intention to do so.

e) Operate all valves, including fire hydrants, on existing waterlines.

2) In addition, the City shall be notified a minimum of 48 business hours *(2 business days)* prior to the following tests and inspections so that a City representative may be present to witness the inspections or tests. Testing shall be started and completed during normal City business hours.

a) Streets *(public streets, private streets/fire lanes)*

(1) Curb inspection;
(2) Subgrade testing and/or proof rolls;
(3) Base rock testing & proof rolls;
(4) AC pavement placement and testing;

b) Sanitary Sewers

(1) Mandrel testing of sewer mainlines;
(2) Air testing of sewer mainlines;
(3) Vacuum testing of sewer manholes;
(4) Video inspection of sewer mainlines;

c) Storm Drains

(1) Mandrel testing of ~~flexible pipe~~ storm drains mainlines;

d) Water Distribution System

(1) Pressure tests of water mainlines, service lines to meters or backflow devices, hydrants, etc.;
(2) Disinfection of water mainlines, service lines, hydrants, etc. *(see App. B notes for procedures)*.
(3) Bacteriological Testing *(see App. B notes for procedures)*.

c. Developer's Engineer-of-Record's Activities

1) The engineer-of-record must be registered to practice engineering in the State of Oregon. Material testing which is not performed by the engineer-of-record must be accomplished by a recognized testing firm or another registered engineer.

2) ***The engineer–of-record must personally perform all activities marked by an (*) and must supervise all individuals performing other delegated activities.**

3) The following minimum activities are required of the developer's engineer-of-record:

a) *Execute a form accepting responsibility and verifying that he/she has been retained as engineer-of-record during the construction of the project *(ie. the Developer-City Construction Agreement)*:

b) *Attend preconstruction conference and ensure that approved construction drawings are distributed to contractor, subcontractors and franchise utility companies.

c) Obtain and use a copy of City-approved construction drawings and specifications during construction;

d) Coordinate to ensure that the City is notified 48 business hours *(2 business days)* before the start of construction or resumption of work after shutdowns, except for normal resumption of work following Sundays or holidays.

e) Call to the City's attention within two (2) working days all drawing changes, material changes, stop work orders or errors or omissions in the approved drawings or specifications.

f) Maintain records which contain at least the following information and submit copies to the City on a weekly basis:

(1) Any Site Visits during the previous week

(a) Date and time of site visits
(b) Weather conditions, including temperature
(c) A description of construction activities

(2) Statement of directions to change drawings, specifications, stop work, reject materials or other work quality actions;

(3) Public agency contacts which result in drawing changes or other significant actions;

(4) Perceived problems and action taken;

(5) Final and staged inspections *(notify & coordinate with City to allow City representative to attend during regular business hours)*;

(6) Records of all material, soil and compaction tests.

g) The engineer of record shall either (1) provide all surveying services necessary to stake the project prior to and during construction and as necessary to prepare as-built drawings when the project is complete, or (2) confirm that these surveying services are being provided separately *(by the developer or by the contractor)*, all in conformance with City Standards.

(1) Construction staking shall be adequate to ensure that all streets, sidewalks, water, sewer, storm drainage and other improvements & utilities are properly installed to design alignments & grades, as well as with respect to easements, right-of-ways and property lines.

(2) All construction staking shall be all be clearly marked on lathe in the field for reference by the Contractor, inspectors, etc. during construction.

h) Review and approve all pipe, aggregate, concrete, A.C. and other materials submittals to ensure their compliance with City Standards, and provide any submittal review comments to the City Engineer and/or Public Works Director;

i) *Approve all drawing or specification changes in writing and obtain City approval prior to the performance of the work;

j) Provide periodic construction observations of construction activities as required to ensure end products meet City specifications;

k) *Perform *(or verify that they are performed)* material, compaction and other tests required to ensure City specifications are met;

l) Periodically check that curb, storm drain work and pavement grades are in substantial conformance with approved drawings;

m) For pavement construction, perform the following stage construction observations and record the date that each is verified:

(1) Curbs are built to line and grade;

(2) Subgrade meets grade and compaction specifications;

(3) Base rock meets grade and compaction specifications;

(4) Leveling course meets grade and compaction specifications;

(5) Wearing course meets grade and compaction specifications.

n) For sanitary and storm drain construction, perform the following stage construction observations and record the date that each is verified:

(1) Sewers are installed to proper line and grade;

(2) Trenches are properly backfilled and compacted;

~~(3) Construction staking is adequate to ensure that the sewer is properly installed with respect to easement, right-of-way and property lines;~~

~~(4)~~(3) Air testing and video inspections are performed according to standard procedures.

o) For grading, verify that the grading plan, as staked, will result in acceptable slopes along exterior property lines, proper onsite and offsite drainage, and erosion control.

p) When the engineer-of-record believes that the project is complete *(based on his/her inspections with the Contractor)*, the engineer-of-record shall notify the City that the project is ready for final inspection.

(1) In conjunction with this notification, the engineer-of-record shall also provide the City with a complete and detailed summary of any items which remain to be completed.

(2) Prior to requesting followup inspections, the engineer-of-record and contractor shall provide the City with verification that all items on any previous checklists/punchlists have been completed *(submittal of a hand annotated copy of the previous checklist/punchlist is acceptable)*.

q) File a completion report which contains:

(1) The original of the project completion certification verifying that the work under the Public Works permit was completed in substantial conformance with the approved construction

Division 2

Streets

160N, Linq 150EX or approved equivalent), or woven fabric *(Propex Geotex 200ST, Mirafi 500X, Linq GTF200, or approved equivalent)*. Slit film fabrics are not allowed.

a) Minimum for non-woven: grab tensile strength of 113 lb; tear strength of 41 lb, puncture strength of 223 lbs; AOS of 30.

b) Minimum for woven: grab tensile strength of 180 lb; tear strength of 68 lb, puncture strength of 371 lbs; AOS of 30.

4) Drainage Fabric. Unless heavier fabric is specified or noted on the drawings, drainage fabric shall be conform with Type 2 Drainage Geotextile (OSSC/ODOT/APWA 02320), non-woven fabric *(Propex Geotex 601, Mirafi 160N, Linq 150EX or approved equivalent)*. Slit film or woven fabrics are not allowed.

a) Minimum for non-woven: grab tensile strength of 160 lb; tear strength of 56 lb, puncture strength of 310 lbs; AOS of 40.

b) Minimum for woven: grab tensile strength of 250 lb; tear strength of 90 lb, puncture strength of 495 lbs; AOS of 40.

5) Riprap Fabric. Unless heavier is specified or noted on the drawings, fabric under riprap shall be conform with Type 2 Riprap Geotextile (OSSC/ODOT/APWA 02320), non-woven fabric *(Propex Geotex 1071, Mirafi 1120N, Linq 275EX or approved equivalent)*. Slit film or woven fabrics are not allowed.

a) Minimum for non-woven: grab tensile strength of 200 lb; tear strength of 80 lb, puncture strength of 430 lbs; AOS of 40.

b) Minimum for woven: grab tensile strength of 315 lb; tear strength of 110 lb, puncture strength of 620 lbs; AOS of 40.

g. **Pavement Markings.**

1) Public Streets & Walkways, City Owned Parking Lots. All stop bars, crosswalk striping and other roadway or parking lot marking and emblems shall be 125 mil thick pre-formed skid resistant thermoplastic with intermix glass beads *(Premark BD by Ennis-Flint, or OptaTrac by Geveko Markings)*.

2) Installation of thermoplastic markings shall be by methods and by a contractor approved by Public Works Director.

3) Paint may be used for curb painting where required *(fire hydrants, no parking, etc.)*, and for private parking areas, private accesses and private streets *(except for stop bars at public street intersections)*.

spaces required is based on the total number of marked or metered parking spaces in the block perimeter.

1) Accessible on-street parking spaces shall conform with the requirements of PROWAG, and shall conform with City parking space or ADA dimensions, whichever is more stringent.

2) Accessible on-street parking spaces shall be located as close to an accessible curb ramp as possible. Unless the accessible on-street parking spaces are provided adjacent to the intersection *(ie. at the block end)*, an accessible curb ramp shall be installed at the accessible parking location.

3) Access aisles adjacent to head-in or angled on-street parking shall be a minimum of 8 feet in width. Parallel accessible on-street parking will require a 5 feet wide access aisle between the parking space and the curb.

4) Access aisles shall extend the full length of the parking spaces they serve, where access aisles are required by PROWAG standards. Access aisles *(a minimum of 8 feet in width)* shall extend from the accessible on-street parking space to the accessible curb ramp.

5) Slopes within the accessible on-street parking space and access aisle shall not exceed 2% in any direction.

2.28 PARKING LOTS & LOADING ZONES

a. Minimum pavement sections for parking lots or loading zones ~~over compacted subgrade~~ shall conform to the following, over compacted subgrade:

PARKING LOT MINIMUM PAVEMENT SECTIONS		
Classification	Pavement Thickness (inch)	Baserock Thickness (inch)
Parking Lot Access Route & Delivery/Loading Zones	3 (AC)	10
Parking Lot	2½ (AC)	7
The minimum pavement sections shown assume competent compacted subgrade and normal light traffic loading, and may not be adequate for all locations, soil conditions or types of development. The developer and/or design engineer shall be responsible to verify adequacy of proposed sections for the use intended. See PWDS 2.30.f for requirements where use of durable non-paved surfaces is proposed.		

b. Access routes through parking lots which are to be used (1) by delivery trucks, service vehicles or fire trucks, or (2) by automobiles in excess of 500 vehicles per day, shall

conform to the minimum access route section outlined above.

c. Layout Dimensions. The dimensions for the design and layout of parking facilities shall conform to the minimum requirements shown on the Standard Details. In the event of discrepancies between the minimums in the PWDS standard details and the minimums in the development code, the larger minimums will typically apply as determined by the City *(ie. for instance, if minimum parking space dimensions in the PWDS are greater than minimums listed in the development code, the larger space requirements will control since the greater size will still comply with the minimum under the development code. The same applies to minimum drive aisle widths required in the development code, the PWDS or the Oregon Fire Code)*.

d. Minimum Slopes. Parking lots and associated driveways shall maintain adequate drainage facilities to prevent water ponding or ice formation, and to prevent stormwater from sheet flowing across sidewalks. In general, this requires a minimum cross slope of two percent (2%) perpendicular with contour lines, except where flatter slopes are required for ADA compliant pedestrian walkways. In no case shall cross slopes less than one percent (1%) be allowed at any point. All drainage facilities shall conform to the requirements of Division 3 of these Design Standards.

e. Curb Radius. Curves and corners within the parking facilities shall have a minimum curb radius of 15 feet except for emergency access lanes, where a minimum curb radius of 28 feet shall be required, unless a smaller radius is approved by the Fire Code Official *(OFC 503.2.4 & OFC Fig D103.1)*.

f. Bumper guards or wheel barriers shall be installed so that no portion of the largest design ~~a~~ vehicle projects or encroaches into the right-of-way or over the adjoining property *(assuming 3 foot truck bumper overhang)*.

g. Curb Style. Curbs abutting head-in parking stalls shall be a Type C or Type A curbs, unless wheel stops are provided *(with front [vehicle side] of wheel stop set 2 feet from the curbline or edge of the pavement)*. Extruded curbs may typically be used elsewhere.

h. Sidewalk/Walkway Width with Head-In Parking. Sidewalks or walkways abutting head-in parking stalls shall be a minimum of 6 feet wide *(excluding curb width)*, unless wheel stops are provided *(front [car side] of wheel stop to be set 2 feet from the face of curb~~line or edge of the sidewalk~~)*.

i. Overhang Allowance, Standard Parking Space Reduction. For purposes of sizing single loaded parking stalls *(without wheel stops)* which abut 6-inch curbs and 6 foot wide sidewalks or planter areas, a maximum 1 foot bumper overhang may be assumed for standard size parking stalls *(ie. standard parking stall length may be reduced by a maximum of 1 foot from the length listed on the Standard Details)*.

1) Length of compact parking stalls are not to be reduced.

j. Lighting. Parking lots and associated access driveways shall be provided with security lighting configured to minimize glare onto adjacent property *(see PWDS*

1.10.e.1 j). Wall pack and/or bollard lights may be utilized as the sole source of driveway & parking lot lighting only in locations where they will not need to shine over vehicles to light the parking lot, and it is demonstrated that wall pack lights will not shine onto adjacent property.

k. Delivery and/or loading zones shall be sized & configured as required under local zoning/land use regulations, and shall have limits marked & be signed for such use.

1) If any on-street delivery/loading zone is proposed, such area is NOT allowed to infringe on or block standard vehicular travel lanes along public streets or public alleys, unless specific & detailed approval is granted for a delivery/loading zone on an alley *(under the applicable land use approval or variance process)*, including conditions specifying the maximum time vehicles can be parked in the loading zone, and specifying times, if any, when use of the loading zone is not allowed.

2) In no case shall delivery/loading zones be allowed to block designated fire lanes.

3) The limits of any on-street loading zone shall be marked on the pavement with durable pavement markings per City standards. Paint may be used to mark the limits of loading zones located outside of public right-of-ways.

~~2)~~4) If a delivery/loading zone in an alley is approved as noted above, and if it will block or partially block vehicular travel lanes, construction drawings shall be submitted for approval showing the dimensioned location and size of the proposed delivery loading zone, and shall call out signage designating the maximum time any single vehicle can be parked in the loading zone *(based on time limits as dictated by the City)*.

2.29 DRIVEWAY SPACING & LOCATION

a. No more than one driveway per property shall be permitted in residential zones except for duplexes *(which can have two driveways)*.

b. Where possible, driveways for corner properties *(corner lot)* shall be located on the lowest classification street and as far from the intersection as possible.

c. Driveways on through lots shall be located on the lowest classification street.

d. Residential driveways of adjoining properties shall have a minimum of 15 feet clear between the edges of the driveways.

e. Location of all driveways serving commercial, industrial or multifamily facilities shall be approved by the City.

f. Driveways shall be separated from an intersection by a minimum of 30 feet or one-half the lot frontage, whichever is greater.

2.30 DRIVEWAYS, DRIVEWAY APPROACHES, ALLEYS

a. Driveways shall conform to the City of Dayton Standard Details. Curb removal for driveways shall be by saw cutting or grinding that produces a smooth surface.

b. Sidewalks crossing driveway approaches shall be concrete per City standards.

c. Driveway approaches shall be constructed to meet current ADA and PROWAG standards at all locations where sidewalks cross or will cross the driveway.

d. Driveway approaches on curbed streets shall be constructed of concrete, and shall be a minimum of 6-inches thick *(8-inch minimum for commercial type driveways)*. Driveway approaches on turnpike *(non-curbed)* segments may be either concrete or asphalt.

e. Driveways Not to Block Drainage. Driveways shall be constructed so that they do not block drainage along the street.

f. Driveways, etc. to be paved. All driveways, parking areas and vehicle maneuvering areas shall be paved with asphalt, concrete or comparable surfacing *(LUDC 7.2.303.09.A)*, except where the use of durable non-paving material is approved by the City on a case-by-case basis, where proposed or required to reduce surface water runoff and protect water quality.

   1) Durable non-paved surfaces shall be subject to review and approval by the Public Works Director, and will require a maintenance agreement acceptable to the City be recorded against the property.

   2) The type of durable non-paved surface proposed shall allow for the installation of permanent marking of parking spaces, driving lanes, fire lanes & turnarounds, etc. *(ie. where permanent surface painting is not feasible, permanent colored surface delineators specifically designed for use with the durable non-paved surface proposed shall be provided and installed)*.

~~g. New alleys shall be paved.~~

~~h. Alleys (or unimproved street ROW) Used as Driveways. Existing alleys or unimproved street right-of-ways used as driveways for new structures (*whether or not land use approval is required*) shall be paved to City standards from the improved public street from which vehicular access is taken, along the entire portion of the alley or unimproved ROW used as a driveway (*including turning/backing areas as applicable*).~~

~~i.~~g. In cases where non-paved surfaces are allowed, driveways and alleys shall be provided with a minimum 10 foot paved or concrete extension of the approach beyond the back of sidewalk location in all cases *(from back of future sidewalk location for turnpike streets)*. ~~Per LUDC 7.2.303.09.A, new driveways shall be paved completely with asphalt or concrete *(except for durable non-paved approved as noted above)*.~~

h. Common Use, Commercial & Industrial Driveways.

1) Common/Multiple use, commercial or industrial type driveways *(~~and~~ as well as any driveway exceeding 10% slope)* shall be paved completely *(see provisions under PWDS 2.31 for fire lane paving)*.

2) Common driveways serving multiple lots and flag lot driveways over 150 feet in length shall be provided with an emergency turnaround meeting the requirements of the Public Works Director, or as required by the Oregon Fire Code.

~~j.~~i. Single family residential driveways: Driveway shall be a minimum of 12 feet wide and a maximum of 24 feet wide at the property line (LUDC 7.2.303.09.C). See other applicable provisions under PWDS 2.30~~.d, g & m~~ for residential driveway apron requirements on turnpike streets.

~~k. Common driveways serving multiple lots and flag lot driveways over 150 feet in length shall be provided with an emergency turnaround meeting the requirements of the Public Works Director, or as required by the Oregon Fire Code.~~

j. New alleys shall be paved.

k. Alleys (or unimproved street ROW) Used as Driveways. Existing alleys or unimproved street right-of-ways used as driveways for new structures (*whether or not land use approval is required*) shall be paved to City standards from the improved public street from which vehicular access is taken, along the entire portion of the alley or unimproved ROW used as a driveway (*including turning/backing areas as applicable*).

l. Maximum slope of driveways shall not exceed 15%.

m. The angle between a driveway centerline and the parallel vehicle travel lane shall be between 75 degrees and 105 degrees.

n. Driveways to Accommodate Future Street Improvements. For driveways connecting to a street that has not been improved to its ultimate width, the driveway profile (*ie. vertical profile*) shall be designed to allow for future street widening without reconstruction of the driveway. Driveways on turnpike or streets narrower than standard shall be constructed such that the surface of the driveway matches the future back of sidewalk elevation (*ie. future back of sidewalk elevation to be based on design street width and cross slope per current City standards, assuming the future street will be centered in the future right-of-way unless otherwise directed by the City*). This requirement applies both to new driveways and to existing driveways reconstructed in conjunction with street improvements. See also 2.30~~.e~~ provisions above regarding driveway grades constructed so that it does not block drainage along the street.

o. Setback to Garage. Unless otherwise approved in writing by the City, garages shall be set back a minimum of 20 feet from property lines, or from the edge of an access easement where common driveways cross properties, or from the edge of a driveway or sidewalk which serves multiple units on the same property *(ie. in order to accommodate full size pickups or service vehicles without encroaching into a vehicle*

travel path or sidewalk).

2.31 PRIVATE STREETS, COMMON DRIVEWAYS ~~AND~~, FLAGLOTS, FIRE LANES

a. Private streets serving 3 or more single family lots or parcels shall be constructed to the same cross sectional specifications *(AC & rock sections)* as public streets for similar uses.

1) The width of private street shall match the minimum width specified for public streets serving similar uses, unless narrower widths are approved by the City in conjunction with the land use approval process *(residential private streets shall meet the minimum width for residential cul-de-sacs, depending whether on-street parking is proposed on one side or both sides).* For private streets approved without on-street parking, the minimum width shall not be less than 24 feet minimum *(except where wider widths are required by the OFC).*

2) Private streets or common driveways shall be provided with sidewalks or pedestrian walkways *(serving all structures)* meeting PWDS requirements and as required by City code and/or planning approval.

3) Private streets shall be located within a separate tract *(5 feet minimum wider than the street & sidewalk widths)* under the common ownership or under the control of all lots/parcels taking legal access from the private street, and shall have a recorded maintenance agreement and a recorded fire lane easement conforming to OFC requirements.

4) Unless otherwise approved by the City Engineer and the Fire Code Official, cross slope for common driveways, private streets and fire lanes shall not exceed limits for public streets *(typically 5% maximum).*

b. A turn-around shall be required for any private residential street, common driveway, fire lane or flagstem driveway which has only one outlet and which is in excess of 150 feet long, or which serves more than two residences, or as required by the Oregon Fire Code. Non-residential private streets serving more than one ownership shall provide a turn-around if in excess of 200 feet long and having only one outlet, or as required by the Oregon Fire Code. Turn-arounds for private streets shall be either a circular turn-around with a minimum paved radius of 35 feet, or a tee or hammerhead turnaround conforming to the standard details, or as required by the Oregon Fire Code.

c. Pavement sections and widths for private streets, common driveways, flaglot drives or partition access easements serving single family lots or parcels shall conform to the following *(driveways for commercial, industrial or multi-family developments shall conform with commercial driveway & parking lot access requirements – see details)*:

Division 3

Stormwater Management

g. **Manholes**

1) Except as modified herein, precast concrete pipe manhole sections, transition sections, eccentric cones, flat slab tops, and adjusting rings shall conform to the requirements outlined under Division 4, Sanitary Sewers and as shown in the standard details.

2) Storm manholes shall be equipped with permanent factory installed steps to provide a continuous ladder of 12-inch center-to-center rung spacing. Steps shall be same as specified for sanitary sewer manholes. Steps shall not be required for manholes 4 feet or less in depth *(rim to invert)*.

3) Manhole castings for storm manholes shall have 16-hole lids.

4) Unless otherwise required by the Public Works Director, connections to existing storm manholes shall comply with the requirements for manhole taps on sanitary sewer manholes, as outlined under Division 4, Sanitary Sewers and as shown in the standard details *(except for vacuum testing requirement)*.

5) Pollution/Flow Control Manholes

a) Unless otherwise required by the Public Works Director, pollution/flow control manholes shall be provided with a 24-inch diameter casting and lid, with a separate access hole over the orifice.

h. **Mainline Storm Cleanouts**

1) Except as modified herein, mainline storm cleanouts *(where approved by the City)* shall conform to the requirements outlined under Division 4, Sanitary Sewers and as shown in the standard details.

2) A 3,300 psi concrete collar is required for cleanouts located outside of paved areas. The shaft or chimney of the cleanout shall be a minimum of 8-inches in diameter.

i. **Concrete (Cast-in-Place)**

1) All concrete shall conform to the requirements of OSSC (ODOT/APWA) 00440, Commercial Grade Concrete, 3300 psi min @ 28 days, max 5" slump, 4.5% air (±1.5%).

j. **Underground Warning Tape**

1) Warning tape shall conform with the requirements noted on the standard details and standard construction notes *(6-inch width, green color & "Caution: Buried Storm Line Below" or approved equivalent printed continuously down the length of the tape)*.

~~1)~~2) Underground warning tape shall be detectable or non-detectable acid and alkali resistant safety warning tape. The tape shall consist of a minimum 4.0 mil (0.004") thick, virgin low density polyethylene plastic film formulated for extended use underground. The tape shall be in accordance with the APWA national color code and shall be permanently imprinted in lead free black pigments suitable for direct burial.

~~2) The tape shall be safety green and shall be provided with the legend "CAUTION BURIED STORM DRAIN LINE BELOW" or approved equivalent printed continuously down the length of the tape.~~

k. **Toning Wire**

1) A continuous insulated 12 gauge solid core copper toning wire shall be supplied with storm~~non-metallic~~ pipe *(both public & private)*. Insulation shall be green in color for storm piping.

2) Wire shall penetrate into manholes and catch basins within 18 inches of the rim elevation.

l. **Warning Tape**

1) Warning tape shall conform with the requirements noted on the standard details and standard construction notes *(6-inch width, color & "Caution: Buried ___ Below" wording as required for pipeline being installed)*.

m. **Bore Casings and Accessories**

1) Carrier pipe used in bore casings shall be Ductile Iron or PVC as specified herein.

2) Bore casing and carrier pipe design and installation shall conform to the requirements outlined under Division 5, Water Distribution.

3.9 GENERAL DESIGN CONSIDERATIONS

a. **General Requirements**

1) The design of storm drainage systems shall include provisions to adequately control runoff from all public and private streets and the roof, footing, and area drains of residential, multifamily, commercial and industrial developments, and to provide for the future extension of the storm drainage system to serve the entire drainage basin.

2) All storm water runoff shall be conveyed to an approved point of disposal. In the case of private development, the developer shall pay all costs associated with designing and constructing the facilities necessary to meet this requirement.

cause downstream damage.

3.12 STORM DRAIN ALIGNMENT AND LOCATION

a. General

1) Generally, storm drains shall be laid on a straight alignment between catch basins and between manholes.

~~1)~~a) Where approved by the City Engineer & the Public Works Director, l~~L~~ines 15-inch in diameter and smaller may be laid on horizontal curves conforming to the street curvature provided the radius of the horizontal curve is not less than 200 feet.

~~2)~~b) Variance for horizontal curves on larger size pipes shall be reviewed by the City Engineer on a case by case basis.

~~3)~~2) 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 main or lateral storm drains and avoid conflicts with parallel utilities without abrupt changes in vertical grade of main or lateral storm drains.

b. Storm Drain Location in Relation to Water and Sewer Lines and Other Utilities

1) Public storm drainage lines shall be separated from all other parallel public utilities by a minimum of 5 feet between utility centerlines, but in all cases a minimum of 3 foot clear separation shall be provided.

2) Installation of franchise or private utilities in a common trench with storm drain lines shall be prohibited.

c. Storm Drain Location in Street Right-of-Ways

1) Unless otherwise approved by the City Engineer and the Public Works Director, storm drain lines shall generally be located in the street right-of-way within six (6) feet of the face of curb.

2) Variance for horizontal curves on larger size pipes shall be reviewed on a case by case basis for approval by the City Engineer.

d. **Storm Drain Location in Easements, Easement Widths, Maintenance Access Requirements**

1) Minimum Easement Widths: Unless otherwise specified or authorized by the City, minimum easements widths for storm drains shall be as follows:

MINIMUM STORM DRAIN EASEMENT WIDTHS		
Storm Drain Diameter	Depth to Invert	
	~~<~~ ≤ 6 feet	> 6 feet
10 - 15 inches	12 feet	12 feet plus 2 feet for each foot *(or fraction thereof)* deeper than 6 feet to invert.
18 - 24 inches	16 feet	16 feet plus 2 feet for each foot *(or fraction thereof)* deeper than 6 feet to invert.
> 24 inches	20 feet	20 feet plus 2 feet for each foot *(or fraction thereof)* deeper than 6 feet to invert.
Note: Easements shall be a constant width between manholes or other in-line structures. Easement width shall be based on the deepest portion of the line between such structures.		

2) Open channels located outside of public right-of-ways shall be provided with an easement widths as follows:

a) Channel width less than 14 feet at top of banks: Channel width plus 12 feet on one side and 2 feet on the other.

b) Channel width greater than 14 feet at top of banks: Channel width plus 12 feet on both sides.

3) Public storm drains in easements will be allowed only after all reasonable attempts to place the mains in a right-of-way have been exhausted. All easement installations must be approved in writing by the City Engineer and the Public Works Director on a case-by-case basis.

4) Offset. When storm drains in easements are approved by the City, the storm line shall be offset a minimum of 6 feet from any property line or easement boundary, or 1/3 the required easement width *(rounded up to the nearest foot)*, whichever is greater.

5) Easement locations for public storm drain lines serving a PUD, apartment complex or commercial/industrial development shall be in parking lots, private drives or similar open areas which will permit an unobstructed vehicle access for maintenance by City forces.

6) Maintenance Access Requirements. Where required by the Public Works Director, public storm drain lines or detention systems located outside of developed street right-of-ways *(public or private)* will require maintenance access similar to that required for sewers under PWDS 4.15.d *(ie. all-weather access lanes required along mainlines and/or for access to manholes including flow control manholes, inlets or other structures, maintenance agreement, etc.)*.

7) City standards require that easements granted to the City shall not be used for any purpose which would interfere with the unrestricted use for storm drain purposes. Under no circumstances shall a building or structure or tree be placed over a storm drain pipe or easement, nor shall any parallel fences or parallel utilities be constructed within the easement (*access gates acceptable to the City shall be installed in fences which the City allows to be constructed across City easements*). Prohibited structures shall include decks, as well as footings or overhanging portions of structures located outside the easement.

8) Common placement in the easement of a sanitary sewer and storm drain line may be allowed under certain conditions subject to approval by the City Engineer and the Public Works Director. Easements wider than the minimum may be required.

9) Franchise Utility Limitations in City Easements. Franchise utilities shall not be placed in City utility easements unless approved in writing by the Public Works Director, subject to separation requirements in excess of minimums as dictated by Public Works Director.

10) Common easements will be reviewed on a case-by-case basis. Separation of utilities must meet City, Oregon State Department of Environmental Quality (DEQ) and OHA-DWS requirements.

11) Public Works Review/Approval Required prior to Recording. All easements must be furnished to the City Public Works and City Engineer for review and approval prior to recording. All recording costs shall be borne by the Developer.

3.13 STORM DRAIN MINIMUM PIPE SIZE

a. Public mainline, lateral or connector pipe storm drains shall not be less than 10-inches inside diameter, and shall begin at a structure and terminate at an approved point of disposal.

b. Per 3.8.b (table), driveway culverts *(or any other pipe specifically approved with an open inlet end)* shall be a minimum of 12-inches diameter. Larger diameters shall be provided where required for flow capacity or where required to match the size of adjacent existing street crossings or storm drain pipes.

i. Storm drains on slopes of 20 percent or more shall be anchored with concrete anchor walls or other restraining methods approved or specified by the City.

j. Where velocities greater than fifteen (15) feet per second are attained, the pipe material shall be ductile iron and special provision shall be made to protect manholes against erosion and displacement by shock. This may be accomplished by installing one additional manhole to decrease the slope or to split a 90° horizontal direction change into two 45° incremental changes.

3.16 UNDERGROUND WARNING TAPE & TONING / TRACER WIRE

a. Detectable or non-detectable acid and alkali resistant safety warning tape shall be provided along the full length of all service laterals and all mainlines not located under sidewalks or paved portions of public streets.

b. Underground warning tape shall be placed a minimum of 12-inches and a maximum of 18-inches below the finish ground surface, and shall be continuous the entire length of the service laterals installed from the mainline to the back of the PUE. Where required for mainlines not located under sidewalks or paved portions of public streets, the warning tape shall be continuous between manholes or cleanouts.

c. All storm piping *(both public lines and private lines serving parking lots, detention basins, etc.)* shall have an electrically conductive tracer wire, 12 gauge minimum size single strand insulated copper with green sheathing, installed in the trench for the purpose of locating the pipe in the future. The tracer wire shall run the full length of the installed pipe with each end accessible from the surface through a manhole, cleanout or catch basin.

3.17 MANHOLES AND CATCH BASINS

a. General

1) All junctions between storm drains shall be made at manholes, catch basins or detention basins.

2) Manholes or junction boxes shall be required at the following locations or as determined by the City Engineer:

   a) All changes in horizontal or vertical alignment. Minor horizontal curvature in pipe less than 15 degrees may be allowed, *(without manholes or cleanouts)*, depending on pipe size, street alignment, degree of curvature and reason. Maximum joint deflection shall be per manufacturer's recommendation.

   b) All connections unless otherwise noted herein.

   c) All changes in pipe size.

d) At a spacing no greater than five hundred (500) feet.

3) For new storm mainline and/or new catch basin construction, catch basin laterals of 10 feet or less in length and 10 inches in diameter or less may connect to the main line with a shop fabricated 90 degree "T", provided the connections is located not more than one hundred (100) feet from a manhole or cleanout on the main line and the main line is a minimum of 15-inches or larger in diameter.

4) In lieu of connecting to manholes, catch basins or junction boxes, storm drain laterals draining private property may be connected directly to the public main line, provided the private storm lateral diameter is 8-inches or less and is no more than half the diameter of the main line. Unless otherwise approved by Public Works Director, the connection to the mainlines shall be with an Inserta-Tee connection so as to provide a strong, leak-proof joint. The lateral shall not project inside the main line.

b. **Catch Basins**

1) General

a) Side inlet grated catch basins shall be used at all locations. Exceptions will be considered on a case by case basis.

b) Catch basins may be used for the junction of pipes 15-inches in diameter ~~or less where the depth from rim to invert is less than 4 feet~~.

c) Maximum Catch Basin Depth. As noted on standard details, catch basins shall typically not be deeper than 4 feet from the gutter grade to the outlet pipe invert. Deviation requires a written request & justification from the design engineer, and approval by the City Engineer.

~~c)~~d) Catch basins shall be designed to completely intercept the 5 year design storm gutter flow.

2) Catch Basin Locations

a) Maximum Gutter Length Drained. The maximum length of curb and gutter which may be drained by a catch basin is 500 feet.

b) Maximum Area Drained. The maximum impervious area which may be drained by a catch basin is 20,000 square feet.

c) Descending Stub Streets or Curbs Ends. Catch basins shall be installed where the improvement ends on all streets and/or curbs terminating on a descending grade, and piped to an approved point of disposal.

~~d) Catch basins on corners shall not be located in front of handicap access ramps.~~

~~e)~~d) Catch basins in the middle of blocks shall be located within 5 feet of the extension of a common property line.

~~f)~~e) Catch basins shall be installed at all low spots, whether on private or public property, and shall be connected to a storm drainage facility.

f) Catch Basins in Relation to Pedestrian Ramps.

(1) Catch basins shall not be located in front of pedestrian access ramps.

(2) Catch basins shall be set to minimize gutter flows across new pedestrian access ramps to the extent practicable, as determined by the Public Works Director and City Engineer.

Catch Basin Uphill of Pedestrian Ramps. A catch basin shall be set on the uphill side of pedestrian ramps, unless otherwise approved on a case-by-case basis.

g) Maintenance of Private Catch Basins. In order to ensure compliance with City requirements regarding stormwater discharge, all catch basins on private property (*parking lots, etc.*) which drain to a public storm system shall be provided with a recorded agreement allowing for inspection entry by Public Works Director, unless catch basins are located within a City easement, or otherwise covered by a detention system maintenance agreement. Maintenance of private catch basins and private stormwater systems shall be an ongoing responsibility of the property owner, whether or not a maintenance agreement is recorded.

3) Drop Across Catch Basin Structure

a) The vertical drop across flow-through storm drain catch basins shall not be less than 0.1 feet.

c. **Manholes**

1) Manhole Size

a) Manhole size shall conform to the requirements outlined under Division 4, Sanitary Sewers and the standard details.

2) Manhole Location

a) Manholes shall be installed at all pipe junctions where the depth from

rim to invert exceeds 4 feet or where the pipe is 18-inches in diameter or greater. Exceptions will be reviewed on a case by case basis.

3) Drop Across Manhole Structure

a) The vertical drop across storm drain manholes shall conform to the requirements outlined under Division 4, Sanitary Sewers.

b) Match Crowns. Where storm pipes of different sizes enter the same manhole, the design shall generally provide that the crowns of the smaller incoming pipes are set at or above the same elevation as the outlet pipe crown. Deviation requires a written request & justification from the design engineer, and approval by the City Engineer.

c) Opposing Inlet Pipes with Significantly Differing Slopes. In cases where two pipes discharge into a manhole from opposite directions and one pipe has a slope more than 4% steeper than the pipe opposite, the invert of the pipe with the lower slope shall be set a minimum of 0.35 feet or ½ the pipe diameter, whichever is greater, above invert of the steeper pipe.

4) Rim Elevation

a) The rims of all manholes located within paved or other hard surfaced areas *(or where paved pads are required around manholes per standard details)* shall be set to finished grade. Manholes outside of these areas shall be set above finish grade as shown on the standard details.

b) Concrete riser rings shall be used to bring casting to grade. The height from the top of the cone or flattop section to the rim shall not exceed 18 inches.

d. **Mainline Storm Cleanouts**

1) Mainline storm cleanouts will not be approved as substitutes for manholes or terminal catch basins. Cleanouts shall only be allowed at the upper end of main storm lines less than 150 feet long which will be extended on the same grade and alignment during the next construction phase of a multiphase development, and which do not have any laterals.

2) All mainline cleanouts will be considered on a case-by-case basis and approved by the City Engineer and the Public Works Director. In all cases, plan and profile showing the alignment and depth of the anticipated future extension from the proposed cleanout to the next manhole shall be submitted prior to approval of cleanouts.

piped detention system, and a standard manhole shall be provided at the upstream end.

(2) Pipe type shall be based upon the depth of cover and loading conditions as specified herein.

b) Arched Bottomless Chambers. Where open-bottom arched subsurface stormwater detention chambers are proposed, they shall be designed as off-stream storage basins (PWDS 3.18.d.1.b), and licensed as infiltration systems by DEQ as applicable.

(1) Fabric Base Liner. Where sediment or debris can enter the chambers *(ie. an isolation row)*, a double layer of continuous geotextile fabric *(without seams)* shall be provided on top of the angular stone foundation rock, extended laterally beyond the base legs of the arched detention chambers for a distance per manufacturer's recommendations, to allow the chambers to be cleaned of silt or debris with a hydro-cleaner/jet-vac as applicable.

(2) Cleaning Access. A manhole shall be provided at the downstream end of each isolation chamber row, to allow for hydro-cleaner access and sediment/debris removal.

(3) Chamber Outlet Pipe Invert. The chamber system shall be configured with the outlet pipe invert even with or lower than the fabric base liner, so that sediment and debris can be pulled from the chambers during cleaning. Details or notes defining this configuration shall be included on the design drawings.

Where a chamber outlet cap with a 24" outlet is necessary in order to match the base liner invert *(as is necessary for many chamber styles)*, it is acceptable to install an eccentric reducer on the outlet pipe stub to reduce the pipe size to that appropriate for the design flowrates *(12" minimum typical where cleaning is required)*.

(4) Inspection/Maintenance Access - Inspection ports and/or maintenance access points shall be provided at intervals meeting manufacturer's recommendations *(upstream end and midpoint of each chamber row as a minimum)*.

(5) Piped Cross Connections. If parallel chambers are proposed without each row having a piped inlet, cross connection pipes between chamber rows shall be provided *(at each end of each chamber)*. The cross connection pipes may be raised above the chamber floor to prevent sediment from flowing from the isolation chamber to the remaining chambers.

2) No domestic drinking water wells are present within 500 feet of the injection system.

3) The injection system does not exceed a depth of 100 feet and the bottom of the infiltration structure is a minimum of 10 feet above the highest seasonal groundwater level.

c. It should be noted that DEQ standards consider water draining from building roof areas *(that has not been mixed with any other stormwater)* differently, in that it can be discharged in a dry well without the same level of treatment required for other types of runoff, although it must still comply with the City and DEQ criteria above and receive DEQ approval prior to final City approval or construction.

3.21 STORM DRAIN SERVICE LATERALS

a. As a minimum criterion, construction of the storm service laterals shall be of the same quality and meet the same requirements as the public storm drain with regard to materials, watertightness, and location. In addition, these storm drains shall conform to the State and local plumbing codes and restrictions.

b. Storm drain laterals shall be installed for any residential lots which do not have finish grades that slope 2% minimum from the back of the building envelope to the top of the fronting curb *(ie. so as to allow both the roof and footing drains to flow to the fronting curb weep holes)*. In all cases, storm drain lines shall be provided as required to prevent roof drainage or concentrated surface drainage from flowing across pedestrian access routes or onto adjacent properties.

c. Storm Lateral Connection Location.

1) Storm drainage service laterals shall not tie into public storm manholes unless approved by City Engineer and Public Works Director on a case-by-case basis. Where allowed, lateral inverts shall provide a minimum of 0.5 feet fall across the manhole, or the lateral shall match crowns with the outlet pipe, whichever is higher.

2) Connection of a storm lateral to a public catch basin is allowed, subject to approval by the Public Works Director.

~~c.~~d. An easement shall be recorded for any storm lateral which encroaches on or crosses any property other than one being served.

~~d.~~e. Storm Service Lateral Cleanouts.

1) A cleanout *(set in a cleanout box conforming with City standard details)* shall be installed at the right-of-way or easement line for all storm drain service laterals. The storm drain service lateral shall extend beyond the property line/storm easement boundary cleanout to the back of any PUE fronting the

right-of-way or easement, or to the far side of easements for public utilities, whichever is further.

2) Where storm laterals are required or shown along flagstem or common use driveways *(or which cross property other than that being served)*, the pipe shall be extended to the end of the driveway or to the boundary of the lot being served *(whichever is farther)* in conjunction with the development infrastructure construction.

3) For long storm laterals, a cleanout to City standards shall be installed on the upstream side of any intermediate property lines crossed *(including on the upstream side of the property line where the lateral crosses onto the property being served)*, as well as at maximum 100-foot intervals beyond the right-of-way or easement cleanout, and at bends as required by the Oregon Plumbing Specialty Code (OPSC).

e.f. Minimum Diameter. For laterals connected to storm mainlines, manholes or catch basins, tThe minimum inside diameter of a storm drain lateral shall be four (4) inches and shall be equal to or greater than the building drain or private site storm drain diameter. Typical minimum diameter for multi-family, commercial or industrial properties shall be 6-inch *(in part to avoid the need to cut public streets in the future, if a more intense use is proposed for the property, which results in increased flows)*.

f.g. Additional storm laterals must be stubbed into the property lines sufficient to serve all residential parcels *(including those which can be further partitioned in the future)* where such service or future partition would require that new streets be cut to install such services, or where the service line must cross intervening property to provide such future service.

g.h. Curb/Gutter Marking. Where storm drain laterals tied to storm mainlines in the street, the top of curb and the gutter pan shall be stamped at the point of the service crossing as required by the standard details and standard notes.

h.i. Storm Laterals Crossing Other Property. Unless otherwise approved by Public Works Director on a case-by-case basis, where storm drain laterals are necessary to serve/drain parcels which are located to the rear of and above (*in elevation*) another parcel which fronts a right-of-way that contains a storm drain mainline, the storm drain lateral serving the upper parcel must be directly connected to such storm mainline, and shall not daylight through a curb weephole.

1) In all cases, tThe storm lateral from the rear parcel shall be located within a private utility easement granted by the lower property owner, where it crosses the lower property.

2) In addition to any cleanouts required by the OPSC, there must also be a cleanout installed at the right-of-way boundary where the lateral serving the upper property exits the lower property into the right-of-way *(ie. property line cleanout at the ROW line)*.

Division 4

Sanitary Sewer

2) Restrained joint PVC pipe shall be used in locations and configurations as required by the City Engineer *(Diamond Lok-21, Eagle Loc 900, TerraBrute CR, CertaLok C900 or approved equal, as approved by the City Engineer and Public Works Director for the specific application)*.

d. **Ductile Iron Pipe**

1) Ductile iron pipe shall be centrifugally cast in conformance to AWWA C-151.

2) Ductile iron sewer pipe shall be minimum Class 50 thickness for non-pressure applications, Class 52 for pressure applications.

3) All ductile iron pipe and fittings shall be cement-mortar lined and seal coated in accordance with AWWA C-104.

4) All ductile iron pipe and fittings buried underground shall be coated on the outside with a standard coating of black bituminous paint a minimum of 1 mil thick unless otherwise specified.

e. **Joints**

1) Joints for pipe shall be push-on joints using factory installed elastomeric ring gaskets. The gaskets shall be securely fixed into place by the manufacturer so that they cannot be dislodged during joint assembly.

2) The gaskets shall be of a composition and texture which is resistant to common ingredients of sewage and industrial wastes, including oils and groundwater, and which will endure permanently under the conditions of the proposed use.

f. **Pipe Fittings & Couplings~~Aeeessories~~**

1) Fittings shall be of the same material as the pipe, molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations as required.

2) Flexible, Mechanical Couplings and Adapters *(gravity applications)*

a) Flexible, mechanical couplers and adapters shall be used for connecting plain ends of non-compatible types or sizes of pipe and for the installation of cut-in tee connections and other fittings into existing lines.

b) Couplers and adapters shall be supplied with stainless steel bands.

c) Flexible mechanical couplers and adapters shall be as manufactured by MaxAdaptor Coupling *(by Gripper Gasket LLC)* or approved equal, consisting of an EPDM rubber gasket, high impact polyamide (nylon)

securing cage & stainless steel securing clamp assembly & hardware.

3) Pressure Pipe Couplings

a) Pressure couplings shall be limited in their application to connection of new pipe work to existing pressure sewer pipelines, temporary installations, and where specifically approved by the City Engineer.

b) Mechanical joint couplings shall have minimum pressure ratings that will accommodate maximum pressures which will be experienced during hydrostatic and leakage testing.

c) Couplings on pressure sewer force mains shall meet the requirements as for water mainline pipe, except as otherwise required or approved by the City Engineer on a case-by-case basis.

g. **Manholes**

1) General

a) Precast concrete pipe manhole sections, transition sections, eccentric cones, flat slab tops, and adjusting rings shall conform to the requirements of ASTM C-478 except as modified herein. Reinforcing in transition sections shall be equal to the requirements of that specified for wall sections of the larger diameter.

b) Unless otherwise approved, all joints between manhole sections shall be keylock or O-ring type conforming to ASTM C-443.

c) Precast base sections shall be of monolithic construction and shall be manufactured such that the base riser section is integral with the base slab.

d) The bottom of the precast base section shall be a minimum of six (6) inches thick, and contain a minimum of 0.32 sq. inches of reinforcing steel each way in the top of the slab.

e) Sanitary sewer manhole bases shall be provided with core-drilled openings and flexible manhole-to-pipe connectors for the connection of stubouts.

2) Manhole Steps

a) Sanitary sewer manholes shall be equipped with permanent factory installed steps to provide a continuous ladder of 12-inch center-to-center rung spacing. Steps shall not be required for manholes 4 feet or less in depth *(rim to invert)*.

rubber check valve by Tideflex.

6) External Mastic Wrap on Manhole Joints & Pickholes.

a) External mastic wrap joint seal *(9-inch minimum width)* shall be installed on all manhole barrel joints and pickholes after assembly, prior to backfilling *(Bidco External Joint Wrap BW-9T by Telleborg, or equal)*.

b) External mastic wrap joint seal *(9-inch minimum square)* shall be installed over all pickholes after grouting and prior to backfilling *(Bidco External Joint Wrap BW-9T by Telleborg, or equal)*.

c) Clean MH Exterior Prior to Mastic Wrap Installation. The exterior of the manhole barrels adjacent to each joint shall be clean (*under the mastic wrap*) to ensure a good seal. A wire brush shall be used to clean the exterior surface under the mastic wrap as required to remove all dirt, loose particles or deleterious material.

d) Plastic Pallet Wrap for Use Over Joint Wrap Mastic. The mastic wrap over manhole joints shall be held in place with plastic stretch wrap *(ie. pallet wrap plastic)* to hold the mastic wrap~~tape~~ in place during backfilling *(ie. to protect the external mastic wrap from displacement during backfill installation &/or compaction)*. Plastic wrap shall be installed immediately after the mastic wrap is placed *(a minimum of three layers of plastic wrap shall be used over each joint or pickhole covered)*.

h. **Mainline Cleanouts**

1) Mainline cleanouts shall consist of a lid and frame of heavy duty cast iron construction with closed lid design. A 3,300 psi concrete collar is required for cleanouts located outside of paved areas.

2) A 3,300 psi concrete collar is required for cleanouts located outside of paved areas.

3) The shaft or chimney of the cleanout shall be a minimum of 8-inches in diameter, except for 6-inch lines, which shall have a chimney diameter of 6-inches.

i. **Underground Warning Tape**

1) Warning tape shall conform with the requirements noted on the standard details and standard construction notes *(6-inch width, green color & "Caution: Buried Sewer Line Below" or approved equivalent printed continuously down the length of the tape).*

~~1)~~2) Underground warning tape shall be detectable or non-detectable acid and alkali resistant safety warning tape. The tape shall consist of a minimum 4.0 mil (0.004") thick, virgin low density polyethylene plastic film formulated for extended use underground. The tape shall be in accordance with the APWA national color code and shall be permanently imprinted in lead free black pigments suitable for direct burial.

~~2) The tape shall be safety green and shall be provided with the legend "CAUTION BURIED SANITARY SEWER LINE BELOW" or approved equivalent printed continuously down the length of the tape.~~

j. **Toning / Tracer Wire**

1) A continuous insulated 12 gauge solid core copper toning wire shall be supplied with non-metallic pipe. Insulation shall be green in color for sewer piping.

2) Wire shall penetrate into manholes within 18 inches of the rim elevation.

~~k. Warning Tape~~

~~1) Warning tape shall conform with the requirements noted on the standard details and standard construction notes *(6-inch width, color & "Caution: Buried Below" wording as required for pipeline being installed).*~~

~~l.~~k. **Bore Casings and Accessories**

1) Carrier pipe used in bore casings shall be Ductile Iron or PVC as specified herein.

2) Bore casing and carrier pipe design and installation shall conform to the requirements outlined under Division 5, Water Distribution.

4.9 GENERAL DESIGN CONSIDERATIONS

a. **General Requirements**

1) Sanitary sewer systems shall be designed and constructed to achieve total containment of sanitary wastes and maximum exclusion of infiltration and inflow.

2) Sewers shall be designed to convey the peak instantaneous wet weather flows anticipated over the design period without surcharging.

3) Gravity Flow: Where possible, all sanitary sewers shall be designed to flow by gravity to an existing or new sewer without sewage lift stations.

4) To & Through. As a condition of sewer service, all developments will be

pipe centered at the point of crossing per OAR 333-061-0050(9).

c. **Sewer Location in Streets**

1) Unless otherwise approved or required by the City Engineer and Public Works Director, sanitary sewers shall generally be located in the street right-of-way five (5) feet from the street centerline on the low side of the street *(sewer mainlines shall typically be installed on the uphill / high side of centerline in areas where the area below the sewer alignment consists of steep slopes or other areas with stability concerns, as determined by the City Engineer or Public Works Director)*.

a) Unless otherwise approved by the City Engineer and Public Works Director, horizontal alignment of new sewer mainlines shall be parallel with the centerline of the right-of-way.

~~1)~~b) In general, manholes or cleanouts shall be located outside of gutter areas or other locations where surface water inflow is likely to occur during storm events.

2) Where sewer alignments cross the street centerline, the design shall demonstrate that the requirements of ORS 92.044(7) are satisfied with relation to street centerline monuments *(ie. utility infrastructure is not to be placed within 1 foot of a survey monument location shown on a plat)*.

3) If streets have curved alignments, the minimum distance between manholes or sewer lines and the curb face shall be as listed below. For streets improved to less than full width, the location shall be measured from the future curb location. The intent is to prevent a conflict with new storm drain lines while still providing for the least number of manholes required to transverse the curve.

a) Center of manhole to curb face: 6-feet minimum.

b) Sewer centerline to curb face: 6-feet minimum.

d. **Sewer Location in Easements, Easement Widths, Maintenance Access Requirements**

1) Offset: When sewers in easements are approved by the City, the sewer line shall be offset a minimum of 6 feet from any property line or easement boundary, or 1/3 the required easement width *(rounded up to the nearest foot)*, whichever is greater.

2) Sewers in easements will be allowed only after all reasonable attempts to place the mains in a right-of-way have been exhausted. All easement installations must be approved in writing by the City Engineer and Public Works Director on a case-by-case basis.

recording. All recording costs shall be borne by the Developer.

7) Minimum Easement Widths: Unless otherwise specified or authorized by the City, minimum easements widths for sanitary sewers shall be as follows:

MINIMUM SANITARY SEWER EASEMENT WIDTHS		
Sewer Diameter	Depth to Invert	
	~~<~~ ≤ 6 feet	> 6 feet
8 - 10 inches	15 feet	15 feet plus 2 feet for each foot *(or fraction thereof)* deeper than 6 feet to invert.
12 - 15 inches	20 feet	20 feet plus 2 feet for each foot *(or fraction thereof)* deeper than 6 feet to invert.
> 15 inches	25 feet	25 feet plus 2 feet for each foot *(or fraction thereof)* deeper than 6 feet to invert.
Note: Easements shall be a constant width between manholes or other in-line structures. Easement width shall be based on the deepest portion of the line between such structures.		

8) Easement widths shall vary from the minimum by even foot increments. Sewers with a nominal inside diameter of 24 inches or larger will require wider easements than outlined above.

9) Common placement in the easement of a sanitary sewer and storm drain line may be allowed under certain conditions subject to approval by the City Engineer and Public Works Director. Easements wider than the minimum may be required.

10) Franchise Utility Limitations in City Easements. Franchise utilities shall not be placed in City utility easements unless approved in writing by the Public Works Director, subject to separation requirements in excess of minimums as dictated by Public Works Director.

11) Common easements will be reviewed on a case-by-case basis. Separation of utilities must meet City, Oregon State Department of Environmental Quality (DEQ) and OHA-DWS requirements.

12) Public Works Review/Approval Required prior to Recording. All easements must be furnished to the City Public Works and City Engineer for review and approval prior to recording. All recording costs shall be borne by the Developer.

e. **Sewer Location in Relation to Streams and Drainage Channels**

1) Generally, the top of all sanitary sewers entering or crossing streams shall be

3) Manholes shall not be located in the curb or in the gutter. Placement of manholes behind the curb shall be reviewed on a case-by-case basis for approval. Consideration shall be given to those sewer or public utility lines which already exist behind the curb.

4) Two manholes shall be installed when the horizontal deflection angle between two inlet pipes is an acute angle less than or equal to 80°. The intent of this requirement is to prevent side sewer connections from discharging into manholes against the direction of flow through the manhole. Such manholes shall be spaced a minimum of 10 feet clear from each other.

e. **Manhole Rim Elevation**

1) The rims of all manholes located within paved or other hard surfaced areas *(or where paved pads are required around manholes per standard details)* shall be set to finished grade. Manholes outside of these areas shall be set above finish grade as shown on the standard details.

2) Concrete riser rings shall be used to bring casting to grade. The height from the top of the cone or flattop section to the rim shall not exceed 18-inches.

3) The rims of all manholes located outside of paved or other hard surfaced areas shall be set 6-inches above surrounding finish grade. Finish grade shall be defined as the final ground surface after grading and landscaping, as shown on the standard manhole rim adjustment details.

4) Manholes within easements shall have lockdown lids only where specifically required by Public Works Director.

f. **Drop Across Manhole Structure**

1) Generally, the minimum vertical drop across a 4-foot diameter manhole is required as shown below *(drop across larger diameter manholes shall be increased to provide the equivalent channel slope across the manhole)*.

a) Straight through runs: 0.1' minimum drop

b) Bends greater than 45°: 0.2' minimum drop

c) For laterals connected to manholes, see PWDS 4.18 *(prior written approval required)*.

2) Maximum vertical drop across a 4-foot diameter manhole shall not exceed 18-inches with a beaver slide channel *(drops of more than 18-inches invert to invert require an inside drop assembly)*.

3) Match Crowns. Where sewer pipes of different sizes enter the same manhole, the design shall generally provide that the crowns of the smaller incoming pipes be set at or above the same elevation as the outlet pipe crown.

Deviation requires a written request & justification from the design engineer, and approval by the City Engineer.

4) Opposing Inlet Pipes with Significantly Differing Slopes. In cases where two pipes discharge into a manhole from opposite directions and one pipe has a slope more than 4% steeper than the pipe opposite, the invert of the pipe with the lower slope shall be set a minimum of 0.35 feet or ½ the pipe diameter, whichever is greater, above invert of the steeper pipe.

5) Manhole Flow Channels

a) Flow channels in manholes shall be of such shape *(semi-circular bottoms)* and slope to provide smooth transition between inlet and outlet sewer size/ invert to minimize turbulence and to ensure that the manhole channels are self-cleaning.

b) Flow channel height shall be to the crowns of the sewers. Benches beside flow channels shall be sloped from the manhole wall toward the channel to prevent accumulation of solids.

c) Beaver slide channels shall be shaped to allow the insertion of a 6-inch diameter by 3-foot long TV camera into the downstream sewer.

g. **Drop Manholes**

1) Drop manholes shall only be used in extreme cases of slope difference between existing and proposed sewer lines or when very special conditions exist such as a conflict with existing facilities which cannot be relocated. All drop manhole installations must be approved in writing by the Public Works Director on a case-by-case basis.

2) Drop assemblies shall be provided for pipe lines 12 inches in diameter and smaller when entering a manhole with an invert more than 18 inches above the invert of the outlet line. The vertical displacement shall be measured at the inside manhole walls and not the manhole centerline. Pipe lines larger than 12-inches shall be introduced into the manhole at the manhole invert, unless otherwise approved by the Public Works Director on a case-by-case basis.

3) When allowed, inside drop manholes shall be a minimum of 60 inches in diameter. All inside drops shall be constructed with pipe per the standard details, with stainless steel support structures. No partitions will be allowed.

h. **Manhole Taps**

1) When an existing manhole is tapped to install a new sewer which will drain into the manhole, the crown of the new sewer shall generally match the crown of the existing pipes.

the satisfaction of the City) compliance with these requirements.

3) Contractor shall be responsible for all costs related to maintaining sewer flows, as well as all costs for cleanup, damages and fines resulting from any sewerage spill or overflow associated with any methods used to convey sewage flows during construction.

4.18 SEWER SERVICE LATERALS

a. General

1) Sewer service laterals are building sewers as defined above.

2) An easement shall be recorded for any sewer lateral which encroaches on or crosses any property other than one being served.

3) Sewer Lateral Connection Location. Sewer service laterals shall not tie into manholes unless approved by City Engineer and Public Works Director on a case-by-case basis. Where allowed, lateral inverts shall provide a minimum of 0.5 feet fall across the manhole, or the lateral shall match crowns with the outlet pipe, whichever is higher.

4) As a minimum criterion, construction of the sewer service lateral shall be of the same quality and meet the same requirements as the public sewer with regard to materials, watertightness, and location. In addition, these sewers shall conform to the State and local plumbing codes and restrictions. No roof, surface, foundation, or stormwater drain lines shall be connected to the public sewers or service laterals.

5) Separate/Additional Sewer Service Laterals.

a) Each legal lot of record shall be provided with a separate sewer service lateral connected to the public sewer main or approved private sewer main. Combined sewer service laterals will be permitted only when the property cannot legally be further divided. An example of this is a residential lot with a house and detached garage or shop with plumbing fixtures.

b) Duplexes, Condos, etc. Separate sewer service laterals shall be installed to serve each side of duplex lots. Separate sewer service laterals shall be installed to serve each unit of condominiums, or to serve each unit of developments with separate detached dwelling units *(except where otherwise approved by the Public Works Director for RV & MH parks, separate detached accessory dwelling units on single family lots which can connect to the primary structure sewer service, etc.)*.

c) Additional sanitary sewer laterals must be stubbed into the property lines sufficient to serve all residential parcels *(including those which can be further partitioned in the future)* where such service or future partition would require that new streets be cut to install such services, or where the service line must cross intervening property to provide such future service.

~~5)~~6) Curb/Gutter Marking. Where sanitary sewer laterals connect to sewer mainlines in the street, the top of curb and the gutter pan shall be stamped at the point of the service crossing as required by the standard details and standard notes.

~~6)~~7) Perpendicular. Unless otherwise approved in writing by the City Engineer and the Public Works Director on a case-by-case basis, sewer service laterals shall be installed from the mainline to the property line perpendicular to the street centerline. Permanent installation of sewer service laterals parallel with the right-of-way is generally prohibited, except where extenuating circumstances exist which meet the variance criteria.

~~7)~~8) Backwater Valve. For reference only, OPSC 710.1 requires that a private backwater check valve be installed on the private building sewer when a drainage fixture is installed on a floor level that is lower than the top of the nearest upstream manhole or cleanout structure. In all cases, this backwater valve shall be installed on the private side of the property line cleanout *(backwater valve is typically installed between the cleanout just outside the building and the building wall)*.

While this backwater valve is a private item covered under the OPSC *(ie. not under Public Works jurisdiction for inspection or maintenance)*, property owners and homebuilders may wish to consider using a backwater valve designed to allow inspection, cleaning and maintenance to be performed from the surface *(such as the Clean Check by Rectorseal)*. Failure to install a backwater valve per OPSC requirements will not result in any liability by the City *(for either cleanup or repairs)* in the event there is a sewage backup into a building which would have been prevented by an operable backwater valve installed as required by the OPSC. Any backwater valve shall be installed so that it remains accessible at all times for inspection, maintenance and replacement of valve parts.

b. Minimum Sewer Lateral Diameter and Slope

1) The minimum inside diameter of any sewer service lateral shall be four (4) inches, and shall be equal to or greater than the building plumbing stub *(building drain)* diameter.

2) The minimum inside diameter of sewer service laterals to serve multifamily dwellings or serving commercial ~~buildings~~ or industrial buildings or

properties shall be six (6) inches *(in part to avoid the need to cut public streets in the future, if a more intense use is proposed for the property, which results in increased flows)*. Where sizing larger than the minimum is necessary, fFixture unit equivalents shall be determined in accordance with the Oregon Plumbing Specialty Code (OPSC).

~~3) Minimum sizes and slopes for sewer service laterals, based on the fixture unit equivalents, shall be in accordance with the Oregon Plumbing Specialty Code (OPSC).~~

~~4)~~3) Sewer service laterals for townhouses and similar cluster housing developments shall be installed on a uniform slope from the main line sewer connection to a point five (5) feet from the end of the building drain conforming to the above requirements.

c. Service Lateral Cleanouts

1) A cleanout *(set in a cleanout box conforming with City standard details)* shall be installed at or near the right-of-way line or sewer easement boundary line for all sanitary sewer service laterals, at a location acceptable to Public Works Director. The sanitary sewer service lateral shall extend beyond the property line/sewer easement boundary cleanout to the back of any PUE fronting the right-of-way or easement, or to the far side of easements for public utilities, whichever is further.

a) Where sewer laterals are required or shown along flagstem or common use driveways *(or which cross property other than that being served)*, the pipe shall be extended to the end of the driveway or to the boundary of the lot being served *(whichever is farther)* in conjunction with the development infrastructure construction.

2) For long sewer service laterals, a cleanout to City standards shall be installed on the upstream side of any intermediate property lines crossed *(including on the upstream side of the property line where the lateral crosses onto the property being served)*, as well as at maximum 100-foot intervals beyond the right-of-way or easement cleanout, and at bends as required by the Oregon Plumbing Specialty Code (OPSC).

3) Unless otherwise approved by the City Engineer, sewer service laterals shall have at least four (4) feet of cover from finish grade *(typically sidewalk grade)* at the right-of-way or easement line. Generally, the topography of the property will dictate how deep the service line must be.

d. Existing Sewer Service Laterals

1) The City is under mandate from the Oregon Department of Environmental Quality (DEQ) to reduce infiltration and inflow (I/I) of storm runoff and groundwater into the City's sanitary sewer system. A significant portion of

Plumbing Specialty Code (OPSC) Section 1106 cannot be met.

1) A manhole is required at the connection to the City system.

2) A monitoring/metering manhole may be required at the property line upstream from the manhole connection at the City main *(see PWDS 4.16.i)*. A recorded access easement & maintenance agreement with the City will be required for each such monitoring/metering manhole.

b. These provisions of the PWDS do not, nor are they intended to supersede the Oregon Plumbing Specialty Code (OPSC), but are intended to allow the design engineer flexibility in the design of private sewer systems where the OPC minimum slope requirements cannot be satisfied.

c. PWDS 4.18, Sewer Service Laterals, must be used for sewer service lines in the system with the following exceptions:

1) The minimum size sewer line upstream of the monitoring manhole structure shall be six (6) inches.

d. See requirements and criteria under PWDS 4.18.f relating to private sewer pump stations.

4.20 UNDERGROUND WARNING TAPE & TONING / TRACER WIRE

a. Detectable or non-detectable acid and alkali resistant safety warning tape shall be provided along the full length of all service laterals and all mainlines not located under sidewalks or paved portions of public streets.

b. Underground warning tape shall be placed a minimum of 12-inches and a maximum of 18-inches below the finish ground surface, and shall be continuous the entire length of the service laterals installed from the mainline to the back of the PUE. Where required for mainlines not located under sidewalks or paved portions of public streets, the warning tape shall be continuous between manholes or cleanouts.

c. All sanitary piping *(both public lines and private lines within right-of-way or easements)* shall have an electrically conductive tracer wire, 12 gauge minimum size single strand insulated copper with green sheathing, installed in the trench for the purpose of locating the pipe in the future. The tracer wire shall run the full length of the installed pipe, with each end accessible from the surface through a manhole or cleanout.

Division 5

Water Distribution

5.3 SPECIAL ITEMS

a. The design of the following are considered special items and are not covered in detail in these Standards:

1) Water Distribution Pump Stations *(capable of providing design flows with largest single pump out of service).*
2) Reservoirs
3) Public Wells
4) Water Treatment Plants
5) Pressure Regulating Devices
6) Flow Measurement Devices
7) Relining of the Existing Water Mains
8) Chemical Addition or pH Adjustment
9) Bridge Crossings
10) Creek or Stream Crossings

b. Review and approval of the above special items by the City Engineer and Public Works Director shall be required. When requested by the City, full design calculations shall be submitted for review prior to approval. Special items may also require review and approval by the OHA-DWS as applicable.

5.4 APPROVAL OF ALTERNATE MATERIALS AND METHODS

a. Any alternate material or method not explicitly approved herein will be considered for approval on the basis of the objectives set forth in Paragraph 5.1, Purpose. Persons seeking such approval shall make application in writing to the City Engineer and Public Works Director. Approval of any major deviation from these Standards shall be in written form. Approval of minor matters will be made in writing, if requested. Any and all such requests shall be submitted in writing to the Public Works Director prior to City approval of the design drawings.

b. Any alternate must meet or exceed the minimum requirements set forth in these Design Standards *(also see "equal" & "substitute" definitions under PWDS 1.4)*.

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

d. Any deviations or special problems shall be reviewed on a case-by-case basis and approved by the City Engineer and Public Works Director. When requested by the City, full design calculations shall be submitted for review with the request for approval.

5.5 CONSTRUCTION DRAWINGS

j. **Mainline Blowoffs**

1) Mainline blowoffs shall conform with Standard Details.

a) **Primer Required**. For all PVC pipe with solvent cement joints, use of purple primer *(IPS Weld-On P70 Industrial Grade or equal)* is mandatory *(see also OPSC 605.12.2)*, with gray medium body PVC cement *(IPS Weld-On 711 Industrial Grade or equal)*.

~~1)~~2) Minimum allowable blowoff size shall be as outlined under Section 5.12. Blowoffs shall be sized to provide adequate flushing velocities as approved by the City Engineer.

~~2)~~3) Unless otherwise shown or authorized by the City Engineer, all blowoffs shall be provided with valve boxes and/or meter boxes as shown in the Standard Details.

k. **Mainline Tapping Tees**

1) Tapping tees used for making connections to existing, in-service lines shall be all stainless steel construction *(including stainless steel flange)* with full perimeter gasket, and shall have Class 125 outlet flanges. In all cases, the tapping tee shall be designed for use with the existing pipe materials and O.D. equivalent.

2) All tapping valves shall be resilient wedge gate valves furnished with a fusion bonded epoxy coating inside & outside conforming to the requirements of AWWA C-550.

3) Any company performing mainline taps shall be prequalified with the City prior to performing any work on a project.

4) Contractors shall coordinate all taps with City Public Works and perform work with Public Works staff present.

l. **Underground Warning Tape**

1) Warning tape shall conform with the requirements noted on the standard details and standard construction notes *(6-inch width, blue color & "Caution: Buried Water Line Below" or approved equivalent printed continuously down the length of the tape)*.

~~1) Warning tape shall conform with the requirements noted on the standard details and standard construction notes *(6-inch width, color & "Caution: Buried Below" wording as required for pipeline being installed)*.~~

2) Underground warning tape shall be detectable or non-detectable acid and alkali resistant safety warning tape. The tape shall consist of a minimum 4.0 mil (0.004") thick, virgin low density polyethylene plastic film formulated for extended use underground. The tape shall be in accordance with the APWA

national color code and shall be permanently imprinted in lead free black pigments suitable for direct burial.

~~3) The tape shall be safety blue and shall be provided with the legend "CAUTION BURIED WATER LINE BELOW" or approved equivalent printed continuously down the length of the tape.~~

m. **Toning / Tracer Wire**

1) A continuous insulated 12 gauge solid core copper toning wire shall be supplied with non-metallic pipe. Insulation shall be blue in color for potable water piping.

2) Additional wire shall be supplied as necessary to allow the toning wire to be looped up at all valve boxes on all lines.

n. **Concrete (Cast-in-Place) Thrust Restraint**.

1) All concrete shall conform to the requirements of OSSC (ODOT/APWA) 00440, Commercial Grade Concrete, 3300 psi min @ 28 days, max 5" slump, 4.5% air (±1.5%).. Concrete mix design shall be submitted to the City for review and approval prior to use.

2) If hand mixed sack-crete type concrete is proposed by the Contractor and approved by the Public Works Director, it shall be a 4000 psi minimum mix *(approved by the City prior to use)*, mixed with the minimum amount of water necessary for workability *(5" slump or stiffer)*.

3) In no case will dry sack-crete *(either in bags or as loose mix)* be considered as an acceptable substitute for an approved concrete mix, placed as specified herein or on the drawing details.

o. **Bore Casings and Accessories**

1) Carrier pipe used in bore casings shall meet the minimum specifications contained herein. Casing pipe shall be of a size to permit proper construction of the carrier pipe to the required lines and grades.

2) Casing shall be welded smooth steel pipe conforming to the requirements of ASTM A-53 or approved equal, with a minimum yield strength of 35,000 psi.

3) Minimum casing size and wall thickness shall as outlined below. Casing wall thickness shall conform to these requirements or the requirements of the agency having jurisdiction, whichever is more stringent. Contractor shall be responsible for verifying the bell OD or casing spacer diameter required of actual carrier pipe provided or bore grades specified, as bell diameters or casing spacer requirements may vary between manufacturers. Casing diameter shall be increased as required to allow trimming of casing spacers on grade critical bores,

provide a minimum of five (5) foot clear on all sides around any meter box/vault, hydrant, ARV or similar structure located on private property.

5) Easement locations for public water mainlines serving a PUD, apartment complex or commercial/industrial development shall be in parking lots, private drives or similar open areas which will permit an unobstructed vehicle access for maintenance by City forces.

6) Maintenance Access Requirements. Where required by the Public Works Director, public waterline located outside of developed street right-of-ways will require all-weather maintenance access similar to that required for sewers under PWDS 4.15.d *(ie. all-weather access lanes along mainlines and/or for access to valves, meters, hydrants or other structures; maintenance agreement, etc.)*.

7) City standards require that easements granted to the City shall not be used for any purpose which would interfere with the unrestricted use for water mainline purposes. Under no circumstances shall a building or structure, trees or ornamental landscaping be placed over a water mainline or easement, nor shall any parallel fences or parallel utilities be constructed within the easement (*access gates acceptable to the City shall be installed in fences which the City allows to be constructed across City easements*). Prohibited structures shall include decks, as well as footings or overhanging portions of structures located outside the easement.

8) Common placement in the easement of water and sewer or storm drain line may be allowed under certain conditions subject to approval by the City Engineer and Public Works Director. Easements wider than the minimum will be required.

9) Franchise Utility Limitations in City Easements. Franchise utilities shall not be placed in City utility easements unless approved in writing by the Public Works Director, subject to separation requirements in excess of minimums as dictated by Public Works Director.

10) Common easements will be reviewed on a case-by-case basis. Separation of utilities must meet City and OHA-DWS requirements.

11) Public Works Review/Approval Required prior to Recording. All easements must be furnished to the City Public Works and City Engineer for review and approval prior to recording. All recording costs shall be borne by the Developer.

e. **Waterline Phased Construction**

1) Water mains installed by phased construction, which will be extended in the future, shall terminate with a mainline valve, blow off and permanent thrust restraint system which allows the mainline valve to be connected to without taking the line out of service.

5) Additional water service lines must be stubbed into the property lines sufficient to serve all residential parcels which can be further partitioned in the future where such future partition would require that the streets be cut to install such services, or where the service line must cross intervening property to provide such future service.

6) Where water service lines are connected to water mainlines in the street, the top of curb and the gutter pan shall be stamped at the point of the service crossing as required by the standard details and standard notes.

7) Perpendicular. Unless otherwise approved in writing by the City Engineer and the Public Works Director on a case-by-case basis, water service lines shall be installed from the mainline to the property line perpendicular to the street centerline. Permanent installation of water service lines with the right-of-way is generally prohibited, except where extenuating circumstances exist which meet the variance criteria.

8) Private pressure reducing valves (PRV) may be required by Public Works Director in certain areas *(to be installed on the private side of water meters)*. The installation, maintenance and repairs of such devices shall be entirely the responsibility of the property owner.

b. **Water Service Sizes**

1) Standard service line sizes are 1-inch, 1½-inch, 2-inch, 4-inch, 6-inch and 8-inch *(4" service line required for 3" meters)*. Service lines will be reviewed for effects on the distribution system and shall not be greater in size than the distribution main.

MINIMUM SERVICE SIZE	
Type of Service	Minimum Service Size
Single residential service [1]	1-inch
Triple residential service (triplexes only)	1½-inch
Commercial/Industrial type Service [2]	1½" minimum

Notes:
[1]. The next larger service size may be required for residential lots large enough to be partitioned into additional lots without a water main extension.
[2]. Commercial or industrial type service pipe smaller than 1½" requires prior approval by the City Engineer & Public Works Director *(it should be noted that, with approval from Public Works Director, reducers can be installed at the meter setter location as applicable if smaller meters are desired, and where maximum demand flows are demonstrated to be within operating limits of the smaller meter)*.

2) Service piping from the main to the meter shall be equal to or greater than the meter size. See documentation required in water meter sizing subsection below.

3) Commercial or industrial type services shall not be smaller than 1½-inch *(reducers may be installed at the meter location to accommodate a smaller meter)*. For new streets or streets being cut for service installation, far side commercial or industrial services 2-inches or smaller diameter shall be installed in a 4-inch minimum size PVC sleeve.

4) For other than single family residential use, or for commercial/industrial type meters, or f~~F~~or 1½-inch and larger meters, applicable calculations~~, documentation and drawings as applicable~~ must be submitted with the expected flow requirements and proposed usage, as summarized under water meter sizing criteria below. Water service size from the main to the meter shall not be smaller than the required meter size.

5) Private Water Service Pipe Size Limits *(beyond meter)*. Typically, the water service line on the private side of the meter may not be larger than one nominal pipe size greater than the meter size. Larger sizes shall be approved by Public Works prior to installation, to ensure that water usage and flowrates do not exceed the recommendations for the meter being provided.

c. **Tapping requirements**

1) Tapping requirements for water service lines shall be as outlined below.

WATER SERVICE TAPPING REQUIREMENTS		
Service Size	Mainline Type	Tapping Requirements
1"	All pipe types	Service Saddle
1½"	All pipe types	Service Saddle
2" & larger	All pipe types	Mainline tee *(or tapping saddle)* with flanged valve

d. **Water Service Location**

1) Domestic & Irrigation Services

a) The service lines shall extend from the main to the meter location shown on the standard details. An angle meter stop and meter box shall be located at the termination of the service line.

b) The meter stop shall be located such that the front of the meter box is the distance behind the curb or sidewalk as shown on the standard details.

c) In general, individual service connections shall terminate in front of the property to be served. Double services shall be located on each side of a common side property line.

(3) All components of the Forward Flow Test Port *(including connections, valves, etc., but excluding the fire hoses & flow measurement equipment)* shall remain in place to allow subsequent "Forward Flow Tests" to be conducted without any system modifications *(ie. the annual flow tests as required per NFPA 25.13.6.2.1)*.

(4) If the Forward Flow Test Port is installed inside a building, drains adequate to handle the full test flows shall be provided, unless provisions are included to direct the test flows to the exterior of the building in a location which will not cause damage to public or private property.

e) Service taps on fire service lines are prohibited.

5.20 WATER METERS

a. General

1) Except as otherwise required, all water meters within the service area of the City of Dayton will be furnished and installed by City forces at the request and expense of the customer. The service line, meter box and all piping & fittings within the meter box must be installed by the developer.

2) All meters 1½-inches and larger shall be installed by a contractor retained by the developer, under the on-site inspection and subject to the approval of Public Works Director.

3) All meters 3-inch and larger shall be calibration tested after installation and prior to being placed in service. Testing shall be done by a qualified and trained water meter tester at the developer's expense. All test results shall be submitted to Public Works Director for review and approval.

4) A backflow preventer meeting City & State standards shall be provided and installed by the Contractor at locations acceptable to Public Works Director.

5) Water Meter Sizing.

a) Meter Sizing Documentation Required. For other than single family residential use, or for commercial/industrial type meters, or for 1½-inch and larger meters, calculations, documentation and drawings as applicable must be submitted with the expected flow requirements and proposed usage, including a complete listing of fixture unit counts for all plumbing fixtures to be served by the proposed meter.

~~a)~~b) Fixture unit equivalents and demand curves *(used in determining the design flow rates to size water meters for other than separate single*

family uses) shall be established in accordance with the Oregon Plumbing Specialty Code *(OPSC table 610.3~~Appendix A, table A103.1~~ & Charts A103.1(1) & A103.1(2))*.

The size of water meter required shall be based on standards determined by the Public Works Director *(based on OPSC fixture unit demand curves unless use of peak design demand flow is required for industrial type uses)*, and will be based on use of the City's standard compound water meter for maximum accuracy.

c) City meter sizing criteria will include factors to minimize excessive velocities in the water system, including velocities through meters and water service lines *(in order to reduce the risk of water hammer induced pipe breakages on the public and/or private side of the meter, and to maximize the useful lifespan of the water meters installed)*.

Unless otherwise determined by the Public Works Director, default meter sizing *(and associated SDC charges)* will be based on the "High-Normal Flow Rate" *(for Compound Class II meters)* in Table 6-1 of AWWA M22 3rd Edition *(Sizing Water Service Lines and Meters)* published by the American Water Works Association *(AWWA)*.

(1) In no case shall velocities greater the 10 feet per second be allowed through water meters *(see also OPSC 610.12 & A107.1)*. In general, meters on systems serving a flushometer valve for a toilet or a urinal shall not be less than 1-inch diameter *(Note: larger than 1-inch meter size is typically required where multiple flushometer valve fixtures are served)*.

d) Turbine style water meters will only be allowed where approved by the Public Works Director on a case-by-case basis *(at his/her sole discretion)*, where projected flow patterns support the use of a turbine meter.

(1) In cases where the Public Works Director allows the use of a turbine meter in place of a standard compound meter, any reduction in meter size *(due to the use of such turbine meter)* will not result in a reduction of applicable SDC fees.

(2) If turbine meters are allowed, and changes in future flow patterns result in reduced meter accuracy, the Public Works Director may require that the turbine meter be changed to a standard compound meter, at the customer's expense.

Standard Detail Drawings & Sample Test Report Forms

Appendix A

Note:
1) Per PWDS 1.10.b.9, the applicable City standard details shall be included on construction drawings submitted for City review and approval. See also PWDS 1.3.a.3 for detail sheet stamping requirements where engineered drawings are required.
2) Per PWDS 1.2.b, the standard details are intended to assist but not to substitute for competent work by design professionals where applicable. As noted in the PWDS, the standard details illustrate the minimum requirements and materials required by the Public Works Department for the construction of certain standard system components, and are thus not considered to be final documents until incorporated into a design approved by the City,

STORM PIPELINE TV INSPECTION REPORT

Date:	Client: City:					Basin No.	
Technician:	Inspector:		Weather:	Cleaned By:		Report No.	Tape No.
From M.H. #: Street:	Pipe Dia. (in)	Joint Length (ft)	Section Length (ft)	Joint Type:	Pipe Material	To M.H. #: Street:	

PIPELINE DATA:

Cleanliness:______________

Alignment:______________

Grade:______________

Age:______________

%Est. Leaking Joints:________

Other:______________________

____

PROBLEM CODE LEGEND:

BP = Broken Pipe
CC = Circumferential Crack
LC = Longitudinal Crack
G = Break in Grade
L = Leak
PJ = Pulled Joint
PT = Protruding Tap
ST = Service Tap
SL = Service Left
SR = Service Right
RT = Roots
U = Unpassable

PIPE MATERIAL **LEGEND:**

AC = Asbestos Cement
CIP = Cast Iron Pipe
C(M) = Conc., Mortor Joint
C(R) = Conc., Rubr. Gasket Jnt
DI = Ductile Iron Pipe
PVC = Polyvinylchloride Pipe
TC = Terra Cotta
VC = Vitrified Clay

TURNAROUND:

Requested (Date/time):________

Authorized (Date/time):______

Footage	Problem Code	Comments	I/I (gpm)

SEWER PIPELINE TV INSPECTION REPORT

Date:	Client: City:					Basin No.	
Technician:	Inspector:		Weather:	Cleaned By:		Report No.	Tape No.
From M.H. #: Street:	Pipe Dia. (in)	Joint Length (ft)	Section Length (ft)	Joint Type:	Pipe Material	To M.H. #: Street:	

PIPELINE DATA;

Cleanliness: _____

Alignment: _____

Grade: _____

Age: _____

%Est. Leaking Joints: _____

Other:_____

_____

Footage	Problem Code	Comments	I/I (gpm)

PROBLEM CODE LEGEND:

BP = Broken Pipe
CC = Circumferential Crack
LC = Longitudinal Crack
G = Break in Grade
L = Leak
PJ = Pulled Joint
PT = Protruding Tap
ST = Service Tap
SL = Service Left
SR = Service Right
RT = Roots
U = Unpassable

PIPE MATERIAL **LEGEND:**

AC = Asbestos Cement
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DI = Ductile Iron Pipe
PVC = Polyvinylchloride Pipe
TC = Terra Cotta
VC = Vitrified Clay

TURNAROUND:

Requested (Date/time):_____

Authorized (Date/time):

Standard Construction Notes

Appendix B

Notes:

1) The developer's engineers can request the standard construction notes in digital format from the City Engineer.
2) Per PWDS 1.10.d.1.f, all applicable City standard notes are to be included on construction drawings submitted for City review and approval. Supplemental notes may be added at the discretion of the design engineer.

minimum 1 week *(5 work days)* notice to any transit district or school district of any traffic impacts on streets which are on bus routes *(Contractor to verify routes)*, and verify that arrangements are made for alternate routes.

27. Garbage/Recycle Notification. Contractor shall provide a minimum 1 week advance notice for the garbage/recycle collector, and make arrangements for the garbage and/or recycle receptacles at all properties to be placed at a location where they can be collected on the appropriate day(s).

28. Construction Staking. Contractor shall ensure that surveying services are provided necessary to stake the project prior to and during construction, in conformance with City Standards. Construction staking shall be adequate to ensure that all streets, sidewalks, water, sewer, storm drainage and other improvements & utilities are properly installed to design alignments & grades, as well as with respect to easements, right-of-ways and property lines. All construction staking shall be all be clearly marked on lathe in the field for reference by the Contractor, inspectors, etc. during construction. Even when GPS is used during construction, adequate staking shall be provided to allow verification of locations, alignments, depths, etc.

EXISTING UTILITIES & FACILITIES:

~~28.~~29. ATTENTION: Oregon law requires you to follow rules adopted by the Oregon Utility Notification Center. Those rules are set forth in OAR 952-001-0010 through OAR 952-001-0090. You may obtain copies of the rules by calling the center. *(Note: the telephone number for the Oregon Utility Notification Center is ~~(503) 232-1987~~811)*.

~~29.~~30. The location and descriptions of existing utilities shown on the drawings are compiled from available records and/or field surveys. The engineer or utility companies do not guarantee the accuracy or the completeness of such records. Contractor shall field verify sizes and locations of all existing utilities prior to construction.

~~30.~~31. Existing Survey Monuments. The Contractor or developer shall retain a surveyor to research, locate and mark all existing property and street monuments within or adjacent to the work areas prior to construction. Any survey monuments that will be disturbed during construction of the project shall be referenced *(prior to construction)* and replaced *(following construction)* by a Registered Land Surveyor at the Contractor's expense. The monuments shall be replaced within a maximum of 90 days, and the County Surveyor shall be notified in writing and/or a survey document recorded as required by ORS 209 140, ORS 209.150 and/or ORS 209.155 as applicable.

~~31.~~32. Contractor shall field verify location and depth of all existing utilities where new facilities cross or are closely parallel to the existing facilities. All utility crossings marked or shown on the drawings shall be potholed using hand tools or other non-invasive methods prior to excavating or boring. Contractor shall be responsible for exposing potential utility and other conflicts far enough ahead of construction to determine necessary grade, alignment or depth modifications without delaying the work or requiring otherwise unnecessary materials, fittings or structures. If grade, alignment or depth modification is necessary, Contractor shall notify the Design

Engineer, and the Design Engineer shall obtain approval from the City Engineer prior to construction. .

~~32.~~33. All existing facilities shall be maintained in-place by the Contractor unless otherwise shown or directed. Contractor shall take all precautions necessary to support, maintain, or otherwise protect existing utilities and other facilities at all times during construction. Contractor to leave existing facilities in an equal or better-than-original condition and to the satisfaction of the City Engineer.

~~33.~~34. Except where otherwise shown on the drawings and explicitly approved in writing by the City, existing City utilities crossed, intercepted by or in the vicinity of new utility lines or facilities *(of the same system)* shall be connected to the new City utility system at locations as required by the City Engineer and Public Works Director. Existing City utility lines which are parallel with, or which are replaced or superseded by the new utility lines *(as determined by the City)*, shall be abandoned or removed as part of the project *(and existing facilities or structures served by the abandoned lines shall be connected to the new system as applicable)*, as required by the City Engineer and Public Works Director.

~~34.~~35. Utilities that are abandoned in place, or interfering portions of utilities, shall be removed by the Contractor to the extent necessary to accomplish the work. The Contractor shall plug the remaining exposed ends of abandoned utilities *(grout or concrete plugs, if used, shall be installed to fill the full pipe diameter for a distance of two times the pipe diameter back from the pipe end)*.

~~35.~~36. Contractor shall remove all existing signs, mailboxes, fences, landscaping, etc., as required to avoid damage during construction and replace them to existing or better condition.

~~36.~~37. Unless otherwise approved by the City, all springs, field tiles or drain lines intercepted or exposed during construction shall be connected to catch basins or new storm lines, except for field tiles or drain lines which are removed completely during construction, or are located and plugged at 50 foot maximum intervals uphill of the location intercepted *(grout plugs, if used, shall have a length of two times the pipe diameter)*. Any abandoned drain tiles downstream of the intercepting trenches shall be plugged with grout for a distance of two times the pipe diameter back from the pipe end.

~~37.~~38. Any septic tanks encountered during construction shall be pumped out. Contractor shall break bottom of tank out and backfill with pea gravel unless otherwise required by public agencies having jurisdiction. Septic tank removal to be in accordance with County Sanitarian requirements.

~~38.~~39. Any wells encountered *(which are not specifically designated as being for continued use as approved by the City)* shall be abandoned per the Oregon Water Resources Department (WRD) requirements, and a copy of the notice submitted to WRD shall be provided to the Public Works Director and the City Engineer. Locations and designation of all ~~abandoned~~ wells *(abandoned or designed for continued use)* shall be noted and clearly shown on the as-built drawings.

~~39.~~40. Any fuel tanks encountered shall be removed and disposed of per State of Oregon DEQ requirements, and notice provided to the Public Works Director and the City Engineer. Locations of abandoned fuel tanks shall be noted and clearly shown on the as-built drawings. Backfill with compacted granular material.

GRADING, PAVING & DRAINAGE:

~~40.~~41. Contractor to review soils/geotechnical report prepared by _____ (dated __/20__), and conform to all recommendations listed in the report or requirements shown on these plans, whichever is more stringent.

~~41.~~42. The Contractor shall be responsible for managing construction activities to insure that public streets and right-of-ways are kept clean of mud, dust or debris. Dust abatement shall be maintained by adequate watering of the site by the Contractor.

~~42.~~43. Unless otherwise noted, all grading, rocking and paving to conform to OSSC (ODOT/APWA) Specifications, 2021 edition.

~~43.~~44. Clear and grub within work limits all surface vegetation, trees, stumps, brush, roots, etc. Do not damage or remove trees except as approved by the engineer or as shown on the drawings. Protect all roots two inches in diameter or larger on trees which are not scheduled for removal.

~~44.~~45. Strip work limits, removing all organic matter which cannot be compacted into a stable mass. All trees, brush and debris associated with clearing, stripping or grading shall be removed and disposed of off-site. Fills are not to be placed prior to approval of stripping limits and depths and concurrence of such approval by the City.

~~45.~~46. Clearing & stripping areas near water bodies or on sloped terrain shall follow best management practices to prevent erosion or runoff at any time.

~~46.~~47. Immediately following fine grading operations, compact subgrade to 95% of the maximum dry density per AASHTO T-180 test method *(Modified Proctor)*. Subgrade must be inspected and approved by the City prior to placing embankments or base rock.

~~47.~~48. Engineered fills shall be constructed and compacted in 6" lifts over approved subgrade. All fills within public right-of-ways and easements shall be engineered, with each lift compacted to 95% of the maximum dry density per AASHTO T-180 test method *(Modified Proctor)*.

~~48.~~49. All fills outside of public right-of-ways which are within potential building envelopes shall be engineered and comply with the Oregon Structural Specialty Code, with each lift compacted to 90% of the maximum dry density per AASHTO T-180 test method *(Modified Proctor)*. Fills outside of building envelopes which are over 12-inches in depth shall also be engineered and compacted.

~~49.~~50. Unless otherwise shown on the drawings, straight grades shall be run between all finish grade

elevations and/or finish contour lines shown. Finish pavement grades at transition to existing pavement shall match existing pavement grades or be feathered past joints with existing pavement as required to provide a smooth, free draining surface.

~~50.~~51. Contractor is responsible for coordinating with the City for the following proof-rolls *(witnessed by the City, with a fully loaded rock truck)*. Performance of proof-rolls summarized below are required for all public street, fire lane or common use driveway improvements. Performance of a proof-roll does not replace the requirement for density testing where specified or where required by City standards.
--Subgrade proof-roll: prior to fabric or baserock placement.
--Curbline proof-roll: prior to placement of curb & gutter.
--Finished rock proof-roll: prior to paving.
If the subgrade is disturbed after the subgrade proofroll, or if inclement weather *(ie. significant rain)* occurs between the time any proof roll is performed and baserock placement, curb placement or paving, another proof roll may be required by the City.

~~51.~~52. Crushed granular baserock shall conform to the requirements of OSSC (ODOT/APWA) 02630.10 (Dense Graded Base Aggregate), with no more than 10% passing the #40 sieve and no more than 5% passing the #200 sieve, and shall be approved by the City prior to placement.

~~52.~~53. Granular Baserock Compaction. Compact granular baserock to 95% of the maximum dry density per AASHTO T-180 test method *(Modified Proctor)*. Prior to placing AC pavement, written compaction test results for baserock and trench backfill must be received by the City, and a finished rock grade proof-roll *(witnessed by the City)* must be performed.

~~53.~~54. Paving of streets shall not be allowed until after completion of all of the following as a minimum, including submittal of acceptable written test results to the City where applicable:
--all required testing, inspection and proofroll of baserock;
--installation and testing of new water, sewer and storm drain lines under paved areas *(including trench compaction testing and submittal of test results to the City)*;
--review and approval of the franchise and/or private utility plans by the City Engineer; and
--installation of all franchise utilities or sleeves located under or crossing paved areas, curbs or sidewalks.

55. Pavement Mix Design. A~~.~~C~~.~~ Pavement shall conform to OSSC (ODOT/APWA) 00744 (hot mixed Asphalt Concrete Pavements (ACP)) ~~for standard duty mix~~, and shall be approved by the City prior to placement. Unless otherwise approved in writing by the City *(prior to paving)*, base course paving shall be 3/4 inch ~~dense graded~~ mix and wearing/leveling course paving shall be 1/2 inch ~~dense graded~~ mix *(Level 2 JMF for local streets/parking lots/fires lanes, and Level 3 JMF for collector/arterial streets)*.

~~54.~~56. Pavement Compaction. AC Pavement shall be compacted to a minimum of 91% of maximum density *(at all locations)* as determined by the Rice standard method, based on nuclear density testing.

~~55.~~57. Pavement Joint Locations & Offsets. Per OSSC 744.44, place ACP in panel widths to minimize the number of transverse and longitudinal joints to a minimum. For multi-lift paving, offset the longitudinal joints and transverse *(end)* joints in one panel by at least 6-inches from the joints in the panel immediately below (OSSC 744.44.a). Longitudinal pavement panel joints/seams shall be at or within 6 inches of the centerline of the street unless otherwise approved by Public Works Director and agency with jurisdiction. Where approved, joints offset from centerline shall be installed at or within 6 inches of lane lines or fog lines. In no case shall longitudinal pavement joints be allowed in travel lanes or adjacent to travel lane wheel paths.

~~56.~~58. Where offsets between pavement lifts cannot be provided, or where new paving abuts existing pavement *(extension or widening)*, a bench grind along the joint shall be provided per City standard details, with a strip of pre-tacked paving fabric centered over the joint between the first and second lift.

~~57.~~59. Pavement surface shall be a smooth, well-sealed, tight mat without depressions or bird baths. Bony or open graded pavement surfaces shall be repaired to the satisfaction of the City, prior to final acceptance of the work.

~~58.~~60. ACP mixtures shall be placed only when the surface is dry and weather conditions are such that proper handling, finishing and compaction can be accomplished. In no case shall ACP mixtures be placed when the surface temperature is below the minimum established under 2021 OSSC (ODOT/APWA) 00744.40 (Season and Temperature Limitations) or the project specifications, whichever is more stringent.

~~59.~~61. Contractor shall protect new pavement against traffic as required, until it has cooled sufficiently to avoid tracking.

~~60.~~62. All existing or constructed manholes, cleanouts, monuments, gas valves, water valves and similar structures shall be adjusted by the Contractor to match finish grade of the pavement, sidewalk, landscaped area or median strip wherein they lie.

~~61.~~63. Street pavement widening cross slope shall be a minimum of 2% and a maximum of 5% except at intersections, where the street cross slopes shall not exceed 2% maximum *(intersection defined from end of curb radius both directions)* to comply with ADA and PROWAG standards. Prior to placing curbs, Contractor shall field verify pavement widening cross slope and contact City if the design pavement widening cross slope is not within the limits stated above.

~~62.~~64. All street signs, traffic control signs, curb & pavement painting/marking or striping, and/or reflectors shall be installed *(in conformance with City and MUTCD standards)* prior to requesting final inspection by the City. Signs or barricades at the end of streets, sidewalks or bike lanes shall conform with City standards and be acceptable to the Public Works Director.

~~63.~~65. Pavement Markings. Stop bars shall be provided at all stop signs, located behind the pedestrian crossing at a location acceptable to Public Works Director. All stop bars, crosswalk striping

and other roadway marking and emblems shall be 125 mil thick pre-formed skid resistant thermoplastic with intermix glass beads *(Premark BD by Ennis-Flint, or OptaTrac by Geveko Markings)*. Installation shall be by methods and by a contractor approved by Public Works Director.

~~64.~~66. Unless otherwise shown on the drawings, no cut or fill slopes shall be constructed steeper than 2H:1V maximum.

~~65.~~67. All planter areas shall be backfilled with approved top soil minimum 8" thick. Stripping materials shall **not** be used for planter backfill.

~~66.~~68. Contractor shall seed and mulch all exposed slopes and disturbed areas which are not scheduled to be landscaped, including trench restoration areas. Mulch shall be either hydromulch or finely chopped fescue or rygrass mulch conforming with OSSC (ODOT/APWA) Section 01030.15

As noted in the OSSC, CEREAL GRAIN STRAW *(wheat or similar)* IS NOT AN ACCEPTABLE SUBSTITUTE without specific written approval.

~~67.~~69. Grading shown on the drawings is critical to functioning of detention system and shall be strictly followed.

~~68.~~70. Contractor shall coordinate and ensure that detention volumes are inspected and approved by public agencies having jurisdiction prior to paving and landscaping.

~~•~~ Curbs & Sidewalks

~~69.~~71. Unless otherwise shown or indicated on the drawings, 6-inches nominal curb exposure used for design of all parking lot and street grades.

~~70.~~72. Unless otherwise approved in writing by the City and any other agency with jurisdiction, monolithic curb & sidewalk *(other than pedestrian ramps)* shall not be placed in the public right-of-way *(ie. curb concrete & sidewalk concrete shall be placed separately)*. Joint material shall be placed at spacing and locations as noted on the standard details.

~~71.~~73. Construction of all curbs & sidewalks shall conform to the applicable requirements of OSSC (ODOT/APWA) Section 00759, Miscellaneous Portland Cement Concrete Structures, including placement, curing, finishing and the repairing of minor defects. Major defects *(as determined by the City)* will require removal and replacement of the defective portions as directed.

~~72.~~74. Where new curbing connects to existing curbing or is installed along existing streets or pavement, the gutter grade shall match the existing street grades so as to allow drainage from the street to the gutter, as well as through any transitions or connections between old & new curbs. The Contractor shall notify the City in writing of any grade discrepancies or problems prior to curb placement. Curbs that are placed too high or too low shall be

removed and replaced as directed by the City

~~73.~~75. Finish sidewalk grades at transition to existing sidewalks shall match existing sidewalk grades as required to form a continuous, smooth, free draining surface. The Contractor shall notify the City in writing of any grade discrepancies or problems prior to sidewalk placement.

~~74.~~76. Each lot shall be provided with a minimum two 3–inch diameter weep holes per lot in curbs on each frontage to provide for lot drainage. As a minimum, one weep hole shall be located 5 feet from the property line on the low point in the lot frontage at the time of curb construction. Weep holes shall also be provided as required for existing drainpipes whether or not shown on the drawings, for additional drainpipes shown on the drawings, as well as on both sides of driveway aprons. Contractor shall install drainpipe *(smooth wall PVC or ABS)* from each weep hole to the back of sidewalk location prior to acceptance of the curbing by the City *(drain pipe under sidewalks shall extend 12-inches behind back of sidewalk and be capped)*, and shall connect to existing drain piping where such piping exists within or adjacent to the right-of-way or easement. Where storm drain laterals for lots are constructed to curb weepholes in conjunction with subdivision or development improvements *(ie. where storm drain laterals from storm mainline is not provided)*, the Contractor shall install 3" x 4" eccentric reducers just past the back of sidewalk to transition to 4-inch PVC rain drain lines as applicable.

~~75.~~77. Weep holes installed in existing curbs shall be core drilled and sealed as required by Public Works Director.

~~76.~~78. New or replacement curbs shall be stamped with an 'S', 'D' or a 'W' at the point where each sanitary sewer, storm drain or water service lateral crosses the curb, respectively. Letters shall be a minimum of 2-inches high. Existing curbs crossed by new services shall have letters routed or cut into the concrete, unless otherwise approved in writing by the City.

~~77.~~79. Contractor shall construct handicap access ramps at all intersections in accordance with current ADA and PROWAG requirements.

~~78.~~80. Concrete. All curbs, sidewalks and driveway approaches shall be constructed using batch plant concrete 3300 psi min @ 28 days, max 5" slump, 4.5% air (±1.5%), and shall be cured with Type 1 or Type 1D clear curing compound. All sidewalks shall fully comply with all ADA and PROWAG standards.

--Standard sidewalks shall be a minimum of 4-inches thick.

--All pedestrian ramps and standard residential driveways shall be a minimum of 6-inches thick.

--Commercial or industrial use driveways and alley approaches shall be minimum 8-inches thick.

--Multi-Use paths shall be a minimum of 6-inches thick *(any pathways used for maintenance vehicle access to utilities shall be reinforced with #4 bar at 12" OC EW, unless 8" concrete thickness is provided)*.

~~79.~~81. Curb & sidewalk concrete shall be placed only during periods when it will not be damaged by

rain *(protect unhardened concrete from precipitation)*. Concrete shall not be placed on frozen baserock. Do not begin concrete placement until temperature in the shade is a minimum of 35°F and rising, and stop placement if air temperature falls below 35°F. Protect concrete from freezing for a minimum of 5 days after placement per OSSC (ODOT/APWA) 0000440.40.d & 00756.40 or the project specifications, whichever is more stringent.

~~80.~~82. Contraction joints shall be installed directly over any pipes that cross under the sidewalk, to control cracking. In general, cracks in new curbs or sidewalks *(at locations other than contraction joints)* are not acceptable, and cracked panels shall be removed & replaced unless otherwise approved by Public Works Director.

~~81.~~83. Contractor shall conduct a flood test of all new or replacement pedestrian ramps after concrete is cured to demonstrate that the ramp does not hold water. After water is poured into the ramp area, the inspector shall check the ramp 15 minutes later to determine if water is ponding in the ramp or gutter area. If water is ponding in the ramp or gutter area and the pond is more than 1-foot in length or ¼-inch in depth, the Contractor shall be required to make repairs in an approved manner at his/her sole expense.

~~82.~~84. Where trench excavation or other work requires removal of *(or causes damage to)* PCC curbs and/or sidewalks, the curbs and/or sidewalks shall be sawcut and removed at a tooled joint unless otherwise authorized in writing by the City. Any sawcut lines shown on the drawings are schematic and not intended to show the exact alignment of such cuts.

~~83.~~85. Unless otherwise approved in writing by Public Works Director, areas along curbs and public sidewalks shall be backfilled with approved topsoil, as well as being seeded and mulched *(or hydroseeded)*.

PIPED UTILITIES:

~~84.~~86. Contractor shall coordinate and pay all costs associated with connecting to existing water, sanitary sewer and storm sewer facilities.

~~85.~~87. Unless otherwise noted, materials and workmanship for water, sanitary sewer and storm sewer shall conform to OSSC (ODOT/APWA) Specifications, 2021 edition.

~~86.~~88. The Contractor shall have appropriate equipment on site to produce a firm, smooth, undisturbed subgrade at the trench bottom, true to grade. The bottom of the trench excavation shall be smooth, free of loose materials or tooth grooves for the entire width of the trench prior to placing the granular bedding material.

~~87.~~89. **Pipe Bedding and Trench Backfill**. All pipes shall be bedded with minimum 6-inches of 3/4" minus granular backfill *(crushed rock)* bedding and backfilled with compacted 3/4" minus granular backfill in the pipe zone *(granular backfill shall extend a minimum of 12-inches over the top of the pipe in all cases)*. Granular trench backfill shall be used under all improved areas, including sidewalks.

~~88.~~90. Granular backfill shall be ¾"-0 conforming to OSSC (ODOT/APWA) 02630.10 (Dense Graded Base Aggregate), with no more than 10% passing the #40 sieve and no more than 5% passing the #200 sieve.

~~89.~~91. Granular Trench Backfill Compaction. Granular trench bedding and granular backfill in the pipe zone shall be compacted to be firm and unyielding, even though compaction testing is not required in this zone. Granular trench backfill above the pipe zone shall be compacted to 92% of the maximum dry density per AASHTO T-180 test method *(Modified Proctor)*, and shall tested in lifts for deeper trenches.

~~90.~~92. **Trench Foundation Stabilization**. If trenches are over- excavated for any reason, over-excavation shall be filled to the design trench subgrade *(ie. to the bottom of the 6" thick pipe bedding layer)* with compacted, well-graded granular backfill as specified *(the use of open graded rock for trench foundation stabilization is prohibited unless it is completely encapsulated in geotextile fabric & approved in writing by the City)*.

~~91.~~93. Temporary thrust restraint on pressure pipelines shall be provided at all locations where necessary due to construction sequencing shown on the drawings, required by City standards or chosen by the Contractor. The adequacy of the temporary thrust restraint shall be the Contractor's sole responsibility, but shall be acceptable to the City and any other agency with jurisdiction. Any movement of the pipe or fittings during pressurization of the pipeline or connection shall be considered evidence that the temporary thrust restraint is not adequate, and the pipeline or connection shall be depressurized and the thrust restraint increased as necessary. Re-pressure testing or re-chlorination, if deemed necessary at the sole discretion of the City, shall be completed at the Contractor's expense.

~~92.~~94. Contractor shall arrange for and pay all costs to abandon existing sewer and water services not scheduled to remain in service.

~~93.~~95. All piped utilities abandoned in place shall have all openings closed with concrete plugs with a minimum length equal to 2 times the diameter of the abandoned pipe.

~~94.~~96. The end of all utility stubs shall be marked with a painted 2-x-4, extending 2 feet minimum above finish grade *(painted white for sanitary sewer, green for storm)*, and wired to pipe stub. Tracer wire shall be extended (and attached) to the top of the 2-x-4 post. Type of utility *(ie. sewer, storm, etc.)* and depth below grade to pipe invert shall be clearly & permanently labeled on the marker post.

~~95.~~97. Contractor shall provide all materials, equipment and facilities required for testing all utility piping in accordance with City construction specifications.

~~96.~~98. **Tracer (Toning) Wire**. All water, sanitary and storm sewer piping shall have an electrically conductive insulated 12 gauge solid core copper tracer wire the full length of the installed pipe using blue wire for water and green for storm and sanitary piping.
--Tracer wire shall be taped to the top of the pipe at 10 foot maximum intervals and shall be extended up into all valve boxes, and manholes and catch basins and accessible from the

surface.

-- All tracer wire splices shall be made with corrosion resistant waterproof wire nuts *(DBR direct bury splice kit by 3M Company, or equal)*.

--Tracer wire penetrations into manholes shall be within 18 inches of the rim elevation and adjacent to manhole steps. The tracer wire shall be tied to the top manhole step or otherwise supported to allow retrieval from the outside of the manhole or catch basin.

~~97. **Warning Tape.** Detectable or non-detectable acid and alkali resistant safety warning tape shall be provided along the full length of all water, sanitary sewer and storm drain service laterals and along the full length of all water, sanitary sewer and storm drain mainline segments not located under sidewalks or paved portions of public streets. Underground warning tape shall be continuous the entire length of service laterals installed from the mainline to the back of the PUE.~~

~~98.~~99. **6-inch Wide Warning Tape**. All underground water, sanitary and storm sewer piping shall have a 6-inch wide warning tape installed in the upper reaches of the trench as shown on Detail 301 *(color & "Caution: Buried ___ Below" wording as required for water, sewer, storm drain, etc.)*. Underground warning tape shall be continuous the entire length of mainlines, and along service laterals installed from the mainline to the back of the PUE as applicable.

~~99.~~100. No trenches in roads or driveways shall be left in an open condition overnight. All such trenches shall be closed before the end of each work day and normal traffic flows restored.

~~100.~~101. Before mandrel testing, TV inspection or final acceptance of gravity sewer or storm pipelines, all trench compaction shall be completed and all sewers and storm drains flushed & cleaned to remove all mud, debris & foreign material from the pipelines, manholes and/or catch basins.

~~101.~~102. Where future extensions are shown upstream of new manholes *(sewer or storm)*, catch basins or junction boxes, pipe stubs *(with gasketed caps)* shall be installed at design grades to a point 2' minimum outside of the structure.

~~102.~~103. Timing for Trench Work on Existing Public Streets. Unless authorized in writing by the City prior to the start of the work: trenching within existing paved streets shall be backfilled and repaved within 14 days of the start of excavation unless the trenches are completely plated or repaired with cold patch; trenches within each block or intersection shall be permanently repaved within 21 days of the start of excavation *(including completion of all inspections, testing & corrective work required by City standards prior to paving)*. These timeframes apply independently and separately to each block or intersection where trenching work occurs.

~~103.~~104. Interior Debeading. Where butt-fused HDPE is used for gravity flow applications, fusion joint bead projections shall be removed from the interior of all fused pipe as each joint is fused, by means of a mechanical cutting head, for all pipe 18-inches in diameter (IPS) or less. The de-beading cut shall be flush with inside circumference of the pipe.

~~•~~ Water

~~104.~~105. City forces to operate all valves on existing public water mains, on the public side of water meters, or at the connection of fire service lines to public water mains.

~~105.~~106. No person other than Public Works staff shall operate or flow test fire hydrants without first obtaining written authorization from the Public Works Director. This hydrant use restriction shall not apply to fire department/fire district staff in the performance of their regular duties. All hydrant flow tests shall be performed with Public Works staff present unless otherwise approved by the Public Works Director. Opening or operating fire hydrants with any tool other than a standard hydrant wrench designed for that purpose is prohibited.

~~106.~~107. All water mains shall be C-900 PVC (DR 18) or Class 52 ductile iron. All fittings 4-inches through 24-inches in diameter shall be ductile iron fittings in conformance with AWWA C-153 or AWWA C-110. The minimum working pressure for all MJ cast iron or ductile iron fittings 4-inches through 24-inch in diameter shall be 350 psi for MJ fittings and 250 psi for flanged fittings.

~~107.~~108. All water mains to be installed with a minimum 36 inch cover to finish grade unless otherwise noted or directed. Service lines to be installed with a minimum 30 inches cover within the right-of-way. Deeper depths may be required as shown on the drawings or to avoid obstructions.

~~108.~~109. Unless otherwise approved by the City Engineer, all valves shall be flange connected to adjacent tees or crosses *(where such fittings are installed adjacent to valves)*. In-line valves shall be MJ x MJ.

~~109.~~110. All buried valves shall be provided with new valve boxes, including new valves installed by the Contractor, or existing valves which are excavated around as part of the work, and existing valves which are located within newly paved, newly concreted or newly graveled surfaces. Valve boxes shall conform to Standard Details. Reuse of existing valve boxes will only be allowed is they fully conform with current standard details, are accurately centered on the valve nut, are clean of excess rock or debris around the valve nut, and are approved in writing by the City on a case-by-case basis.

~~110.~~111. Permanent thrust restraint *(concrete thrust blocks)* shall be provided on all bends, tees and other direction changes per local jurisdiction requirements and as specified or shown on the drawings. All concrete shall conform to the requirements of OSSC (ODOT/APWA) 00440, Commercial Grade Concrete, 3300 psi min @ 28 days, max 5" slump, 4.5% air (±1.5%). Concrete mix design shall be submitted to the City for review and approval prior to use. If hand mixed sack-crete type concrete is proposed by the Contractor and approved by the Public Works Director, it shall be a 4000 psi minimum mix *(approved by the City prior to use)*, mixed with the minimum amount of water necessary for workability *(5" slump or stiffer)*. In no case will dry sack-crete mix *(either in bags or as loose mix)* be considered as an acceptable substitute for an approved mixed concrete.

~~111.~~112. It shall be the Contractor's responsibility to coordinate with the City for visual

inspection and verification of all thrust restraint and thrust blocking prior to covering or backfilling.

~~112.~~113. Where approved by the City prior to construction, temporary thrust restraint may be used at mainline connections where it is not possible *(prior to pressurization of the connection and placing the waterline in service)* to install permanent concrete thrust blocks, straddle blocks or other permanent thrust restraint as required or shown/noted on the drawings. Trenches at the temporary thrust restraint location shall be left open and not backfilled *(but plated as necessary or required)* until the permanent thrust restraint is installed and approved by the City. Unless otherwise approved in writing by the City, permanent thrust restraint shall be installed by the end of the next working day after installation of the temporary thrust restraint, but in no case later than the third calendar day following installation of the temporary thrust restraint.

~~113.~~114. Unless otherwise approved by the City, water service pipe on the public side of the meter shall be CenCore blue HDPE tubing *(CTS, SDR 9, 200 psi)* conforming to AWWA C901 (ASTM D2239 & D2737) with 2-3/8"long style compression inserts *(AY McDonald 6133T CTS insert stiffener or equal)* and Q style compression fittings.

~~114.~~115. Unless otherwise noted, water service pipe on the private side of the meter shall be Schedule 40 PVC or as approved by the OPSC.

116. **Primer Required**. For all PVC pipe with all solvent cement joints, use of purple primer *(IPS Weld-On P70 Industrial Grade or equal)* is mandatory *(see also OPSC 605.12.2)*, with gray medium body PVC cement *(IPS Weld-On 711 Industrial Grade or equal)*.

~~115.~~117. Domestic, irrigation and fire backflow prevention devices and vaults shall conform to requirements of public and/or private agencies having jurisdiction. It is the responsibility of the premise owner and/or water user to provide a thermal expansion tank or other means approved by the Oregon Plumbing Specialty Code (OPSC) to address thermal expansion concerns in the private water system piping downstream of any backflow device or pressure regulator where applicable *(see PWDS 3.22.c & OPSC 608.2&3)*. The premise owner and water user is hereby notified of these thermal expansion concerns, and that it is the responsibility of the premise owner and/or water user to address these concerns.

~~116.~~118. The Contractor shall be responsible for having backflow devices tested and certified prior to final acceptance of the work.

~~117.~~119. The Contractor shall coordinate with the owner(s) of property being served for permits and installation of conduit(s) and wire as necessary to power required sump pumps in meter vaults and/or in backflow vaults, and any required freeze protection, or as necessary to monitor any tamper switches required in backflow vaults or enclosures. Installation and activation of any such power and/or signal wires is required prior to acceptance by the City.

~~118.~~120. The Contractor installing each vault or enclosure shall be responsible to install *(or*

coordinate the installation of) the conduit and wires required to serve each such vault or enclosure.

~~119.~~121. The work shall be performed in a manner designated to maintain water service to buildings supplied from the existing waterlines. In no case shall service to any main line or building be interrupted for more than four (4) hours in any one day. Contractor shall notify the City and all affected residents and businesses a minimum of 24 business hours *(1 business day)* prior to any interruption of service.

~~120.~~122. Water Mainline Couplings. Where shown on the drawings or required by the City, restrained sleeve couplings shall be Krauz Hymax Grip Couplings or approved equal (Romac Alpha Coupling). Unrestrained mainline couplings shall be long-style epoxy coated DI sleeve couplings, or Hymax Wide Range Coupling *(short body couplings not allowed)*.

~~121.~~123. **Sanitary Sewer & Waterline Crossings**. Where new waterlines cross below or within 18-inches vertical separation above a sewer main or sewer service lateral, center one full length of waterline pipe at point of crossing the sewer line or sewer lateral. Unless otherwise approved in writing by the Public Works Director, existing sewer mains and/or service laterals within this zone shall be replaced with a full 12 foot length of new pipe *(D2241 PVC-DR 32.5, C-900 PVC-DR 18 or CL 50 ductile iron)*, centered at the crossing in accordance with OAR 333-061 and local jurisdiction requirements. Connect to existing sewer lines with approved flexible reinforced couplings *(MaxAdaptor Coupling by Gripper Gasket LLC or approved equal)*. Example: For an 8-inch waterline with 36-inches cover, 4-inch service lateral inverts within 5.67-feet *(68-inches)* of finish grade must have this pipe centered at the crossing.

~~122.~~124. Contractor shall install temporary chlorination & sample taps, restrained caps/plugs and blowoffs as required on new waterlines for flushing, pressure testing, chlorination and bacteriological testing *(configuration to be acceptable to the City or other agency with jurisdiction)*. Chlorination and sample taps shall be located within 18-inches of the end of each mainline segment to be chlorinated & tested, and configured to ensure that all portions of the pipelines are adequately disinfected.

~~123.~~125. Pressure Testing. All waterlines, services and appurtenances shall be pressure tested for leakage. All testing shall conform to requirements as outlined on City testing forms contained in the PWDS. The hydrostatic test shall be performed with all service line corporation stops open and meter stops closed, and with all hydrant line valves open. Prior to the start of each pressure test, the position of all mainline valves, hydrant line valves and service line corporation stops in the test segment shall verified.

~~124.~~126. Cleaning & Flushing. After the pressure test and prior to disinfecting, the water lines shall be thoroughly flushed through hydrants, blow offs or by other approved means.

~~125.~~127. Disinfection & Bacteriological Testing. All water mains and service lines shall be chlorine disinfected per local jurisdiction requirements, AWWA C-651 or OAR 333-061 *(25 mg/L minimum chlorine solution, 24 hours contact time)*, whichever is more stringent. Unless

otherwise approved by the Public Works Director, a City representative shall witness the application of the chlorine solution and the chlorine testing at the end of the 24 hour contact period. After the 24 hour chlorine contact period, the free chlorine concentration shall be checked, and if it is found to be 10 mg/L or more, the chlorine solution shall be drained *(otherwise the line shall be rechlorinated)*, the waterline flushed with potable water, and a minimum of two consecutive samples taken at least 24 hours apart shall be collected from the waterline for microbiological analysis *(ie. one sample immediately after flushing, and another sample a minimum of 16 hours later)*. Contractor to pay for laboratory analysis of water samples taken under the supervision of the City. If the results of both analyses indicate that the water is free of coliform organisms, the waterline may be placed in service. Should the initial treatment prove ineffective, the flushing & chlorination shall be repeated until confirmed tests show acceptable results. Contractor shall coordinate with Public Works Director to ensure that both a high level chlorine test kit and a chlorine residual test kit is available at the site during testing.

~~126.~~128. Disinfection of Connections. For connections which cannot be disinfected with the waterline mainlines as noted above, all fittings, valves and appurtenances, including tool surfaces which will come in contact with potable water, shall be thoroughly cleaned by washing with potable water and then swabbed or sprayed with a one percent (1%) hypochlorite solution *(10,000 mg/L)* in accordance with the requirements of AWWA C-651 and OAR 333-061.

~~127.~~129. Disposal of Chlorinated Water. The chlorine residual in water from testing, disinfection or flushing activities shall be neutralized in accordance with DEQ standards prior to discharge to the storm system or ditch discharging to surface waters. Care should be exercised to balance the amount of dechlorinating chemical against the chlorine present. Where required by Public Works Director, the Contractor shall provide a field chlorine residual test kit to verify adequate dechlorination of water being discharged.

~~128.~~130. Capping of Chlorination Taps, Pressure Test Taps, Temporary Sample Taps, etc. Unless otherwise approved or required by the City, all extra pipe and fittings attached to chlorination, pressure test or temporary sampling taps shall be removed and the corporation stop capped at the mainline tap or saddle after the new waterline is placed in service *(to avoid depressurizing the mainline after disinfection)*. Wrap each capped corporation stop in plastic prior to backfilling. The location of all such capped corporation stops shall be shown on the Contractor's record drawings.

~~129.~~131. Unless otherwise shown on the drawings AND explicitly approved in writing by the City, any existing waterlines abandoned in place shall be physically disconnected from valves and other connection points to the existing water system. A blind flange or restrained MJ plug *(as applicable)* shall be installed on the back side of all valves from which abandoned waterlines are disconnected. Remove valve boxes from abandoned valves prior to repaving or surface restoration.

~~•□~~ Sewer & Storm Manholes

~~130.~~132. All precast sanitary sewer manholes shall be provide with integral rubber boots. Lockdown lids shall be used on manholes outside of public right-of-way only where specifically required by Public Works Director.

~~131.~~133. All connections to existing manholes shall be made by core-drilling the existing manhole structure and installing a rubber boot. Connections to manholes shall be watertight and shall provide a smooth flow into and through the manhole. Small chipping hammers or similar light tools which will not damage or crack the manhole base may be used to shape channels. Use of large pneumatic jackhammers shall be prohibited.

~~132.~~134. Grouting & Channels to be Smooth. All interior joints, penetrations & any exposed lifting holes shall be grouted following manhole assembly. The grouting and channels of all manholes shall be smooth and uniform, and shall not retain water or debris. Any grout or concrete splatters *(in channels, on channel benches, on walls or on steps)* shall be removed by the Contractor.

~~133.~~135. Unless otherwise approved in writing by the Public Works Director and the City Engineer, manhole steps shall be installed in any manhole which does not have existing steps, and which is connected to or otherwise altered in any way.

~~134.~~136. Manhole channel depths *(sewer & storm)* shall be to the heights shown on the drawings, but in no case shall be the channel depth be less than 2/3 of the pipe diameter. Flow channels in manholes shall be of such shape *(semi-circular bottoms)* and slope to provide smooth transition between inlet and outlet sewer size/ invert to minimize turbulence and to ensure that the manhole channels are self-cleaning. Channels, as well as shelves between the channels and the manhole walls, shall be sloped to drain per plan details.

~~135.~~137. For all sanitary sewer manholes, external mastic wrap joint seal *(9-inch minimum width)* shall be installed on all manhole barrel joints & pickholes after assembly, prior to backfilling *(Bidco External Joint Wrap BW-9T by Telleborg, or equal)*. The exterior of the manhole barrels adjacent to each joint shall be clean *(under the mastic wrap)* to ensure a good seal *(use wire brush to clean the exterior surface under the mastic wrap to remove all dirt, loose particles or deleterious material)*. The mastic wrap shall be held in place with plastic stretch wrap *(ie. pallet wrap plastic, 3 layers minimum)* during backfilling *(ie. to protect the external mastic wrap from displacement during backfill installation &/or compaction)*. Plastic wrap shall be installed immediately after the mastic wrap is placed.

~~136.~~138. MH Rim Elevations. Contractor shall be responsible to verify manhole finish rim elevations match with finish grade or are set above finish grade as required to conform with City standard details. Manhole rim elevations shall be adjusted as required to conform with this requirement.

~~137.~~139. MH Inflow Inserts. All sanitary sewer manholes in low areas which are subject to flooding or water ponding *(including all lawn, landscape or gravel areas, or low areas of*

parking lots, or manholes closer than 4 feet clear of parking lot curblines or existing/future street curbs, adjacent to ditches, etc.) shall be provided with inflow protector lid inserts *(whether or not such MH inserts are specifically noted on each applicable drawings sheet)*. Manhole inflow inserts shall be of ABS or HDPE plastic, and shall include integral lifting lugs on each side of the insert allowing removal with a manhole hook *(lift straps are not an acceptable alternate)*, a factory installed closed cell neoprene rubber gasket bonded to the underside of the insert rim. Unless waived in writing by Public Works Director *(case by case basis)*, a clog-free vent-valve valve *(rubber check by Tideflex)* shall be provided on each unit. Inserts shall be ManPan manhole inserts or approved equal.

~~138.~~140. Vacuum Testing (New MHs). All sanitary sewer manholes shall be vacuum tested following completion of paving or final surface restoration.

~~139.~~141. Vacuum Testing (Existing MHs). Existing sanitary sewer manholes to which new pipes are connected *(or where existing pipe connections are modified)* shall be sealed as required and pass a vacuum test prior to final approval.

~~140.~~142. Manhole Testing & Witness. All testing shall conform to requirements as outlined on City testing forms contained in the PWDS. Unless otherwise approved in writing by the Public Works Director, Public Works staff shall be present for all manhole testing. Visible groundwater infiltration or leakage constitutes a failed manhole test, whether or not the vacuum test is successful.

~~141.~~143. Manhole Cleaning. All manholes shall be thoroughly cleaned prior to being placed in service and/or accepted by the City, including removal of any debris, excess grout in manhole channels or on manhole steps, etc.

~~•~~ Sewer & Storm Warranty Inspections

~~142.~~144. Re-inspection of the sanitary sewer systems by cleaning & TV inspection shall be performed during the last month of the warranty period, as well as visual inspection of all sanitary sewer manholes during the wet weather season *(any visible groundwater infiltration or leakage constitutes a failed manhole test, and will require warranty correction)*. Based on the results of the TV inspections and/or the City's warranty inspections, additional warranty tests may include mandrel testing or low pressure air testing. The results of these test(s) will be used by Public Works Director to determine if final acceptance of the system is warranted and what corrective work is required prior to final acceptance. The cost of these re-inspections and any corrective work shall be the responsibility of the Developer. The warranty period will not be considered to be complete, and maintenance bonds will not be released until after all warranty inspections are finished and any resulting corrective work is completed.

~~•~~ Sanitary Sewer

~~143.~~145. Unless otherwise shown, sanitary sewer pipe shall be PVC in conformance with ASTM D3034, SDR 35. All other appurtenances and installation to conform to the City specifications.

~~144.~~146. Sanitary sewer laterals for single family residential & each side of duplexes shall be a minimum of 4-inches in diameter *(6-inch minimum for all multi-family, industrial or commercial type ~~other~~ laterals)*, and shall include toning wire and warning tape per standard details.

~~145.~~147. Gravity Sewer Couplings. Couplings for new PVC sewer pipe connecting to other PVC or solid wall HDPE pipe shall be gasketed solid sleeve PVC slip couplings. Couplings for connection of PVC to concrete pipe shall be MaxAdaptor Coupling *(by Gripper Gasket LLC)* for sizes up to and including 12-inch diameter.

~~146.~~148. **Sewer Cleaning.** After manhole channeling and prior to leakage testing, mandrel testing and/or TV inspection, flush and clean all sewers, and remove all foreign material from mainlines and manholes. Failure to clean all dirt, rock and debris from pipelines prior to TV inspection will result in the need to re-clean and re-TV the sewer lines.

~~147.~~149. **Sewer Leakage Testing.** Sanitary sewer pipe and appurtenances shall be tested for leakage. Leakage tests shall include an air test of all sewer mains and laterals prior to paving, and a separate air test of all sewer mains and laterals following excavation and backfilling of any franchise utility trenches or other utility work that crosses sanitary sewer laterals. All testing shall conform to requirements as outlined on City testing forms contained in the PWDS. Unless otherwise approved in writing by the Public Works Director, Public Works staff shall be present for all sewer leakage testing.

~~148.~~150. **Sewer Mandrel Testing.** Contractor shall conduct deflection test of flexible sanitary sewer pipes by pulling an approved mandrel through the completed pipe line following trench compaction. The diameter of the mandrel shall be 95% of the initial pipe diameter. Test shall be conducted after the trench backfilling and compaction is completed and tested. Unless otherwise approved in writing by the Public Works Director, Public Works staff shall be present for all sewer mandrel testing.

~~149.~~151. **Sewer TV Inspection.** Upon completion of all sewer construction, testing and repair, the Contractor shall conduct a color TV acceptance inspection of all mainlines in accordance with OSSC (ODOT/APWA) 445.74 to determine compliance with grade requirements of OSSC (ODOT/APWA) 445.40.b *(no deviation greater than 1/32-inch per inch of pipe diameter [1/2-inch max for pipes >16-inch diameter], & no reverse sloping pipe inverts)* and to verify pipelines are adequately cleaned. The TV inspection shall be conducted by an approved technical service, using a track or wheel propelled self-leveling auto-focus pan-head camera which is equipped to make audio-visual recordings of the TV inspections on USB storage device. Unless otherwise required by the agency with jurisdiction, a standard 1-inch diameter ball shall be suspended in front of the camera during the inspection *(with the ball in contact with the pipe invert)* to determine the depth of any standing water. Sufficient water to reveal low areas or reverse grades shall be discharged into the pipe immediately prior to initiation of the TV inspection. The USB storage device and written report *(or download link and pdf report)* shall be delivered to the City Engineer.

~~150.~~152. Prior to or concurrent with connection to a sanitary sewer lateral, it shall be

demonstrated to the City that the sewer lateral is not obstructed. This shall be accomplished by "snaking" the service lateral downstream of the connection point to the mainline, or similar method acceptable to the City. City personnel or authorized agent shall be present during the "snaking" or other demonstration method.

~~151.~~153. Sewer service from upstream and affected properties shall be maintained during construction unless prior written City approval is granted. Bypass pumping or other methods used to maintain sewer flows shall be the Contractor's design, subject to approval by the City. The bypass system shall be capable of conveying flows when the sewers are flowing full. Normal unrestricted flows shall be restored at the end of each work day. Bypass systems left in place or operated outside normal working hours shall be monitored continuously by the Contractor personnel unless alternate arrangements proposed by the Contractor are acceptable to the City *(ie. high level & pump fail alarm callouts, etc.)*. The Contractor shall provide for City review all submittal information required to demonstrate *(to the satisfaction of the City)* compliance with these requirements. Contractor shall be responsible for all costs related to cleanup, damages and fines resulting from any sewerage spill or overflow associated with any methods used to convey sewage flows during construction.

~~152.~~154. Thrust restraint shall be provided on all pressure pipelines meeting the same standards and requirements as for water mainlines.

~~2~~ Storm Drain

~~153.~~155. Storm drain pipe materials shall conform to the construction drawings and City requirements, based on cover depth. Contractor shall use uniform pipe material on each pipe run between structures unless otherwise directed or approved. Jointed HDPE pipe shall not be used for slopes exceeding ten percent (10%).

156. Storm drainage laterals for single family residential properties shall be a minimum of 4-inches in diameter *(6-inch minimum for all multi-family, industrial or commercial type laterals)*, and shall include toning wire and warning tape per standard details.

~~154.~~157. Catch basins and junction boxes shall be set square with buildings or with the edge of the parking lot or street wherein they lie. Storm drain inlet structures and paving shall be adjusted so water flows into the structure without ponding water.

~~155.~~158. Unless otherwise approved by the City Engineer, all storm drain connections shall be by manufactured tee or wye fittings.

~~156.~~159. Unless otherwise shown on the drawings, all storm pipe inlets & outfalls shall be beveled flush to match the slope wherein they lie.

~~157.~~160. Sweep *(deflect)* storm drain pipe into catch basins and manholes as required. Maximum joint deflection shall not exceed 5 degrees or manufacturers recommendations, whichever is less.

~~158.~~161. CB Grouting to be Smooth. All joints, penetrations & any exposed lifting holes shall be grouted smooth, so as not to retain debris. Base/sump shall be smooth to facilitate cleaning.

~~159.~~162. Unless otherwise specified or directed, install storm drain pipe in accordance with manufacturer's installation guidelines.

~~160.~~163. Gravity Storm Couplings. Couplings for connection of PVC to concrete or other non-compatible pipe shall be MaxAdaptor Coupling *(by Gripper Gasket LLC)* for sizes up to and including 12-inch diameter.

~~161.~~164. **Storm Cleaning.** After manhole channeling and prior to mandrel testing or final acceptance, flush and clean all sewers, and remove all foreign material from the mainlines, manholes and catch basins.

~~162.~~165. **Storm Mandrel Testing.** Contractor shall conduct deflection test of flexible storm sewer pipes by pulling an approved mandrel through the completed pipe line following trench compaction. The diameter of the mandrel shall be 95% of the initial pipe diameter. Test shall be conducted not more than 30 days after the trench backfilling and compaction has been completed.

~~163.~~166. Prior to acceptance, the City will typically lamp storm lines upstream & downstream of structures to verify that the pipes are clean and there is no grout or concrete in the mainlines, and that there are no observable bellies in the line. When necessary, sufficient water to reveal low areas shall be discharged into the pipe by the Contractor prior to any such inspection by the City.

STREET LIGHTS

~~164.~~167. Street lights shall be installed after all other earthwork and public utility installations are completed and after rough grading of the property is accomplished to prevent damage to the poles.

~~165.~~168. Public street light poles, conduit and junction boxes shall conform with the requirements of the City and the power company providing service. Junction boxes shall be H-20 rated and set to finish grade. Direct bury street light poles shall be set to a depth as specified by the manufacturer, but not less than 5 feet.

~~166.~~169. Street light poles shall be installed within one degree (1°) of plumb.

~~167.~~170. All public street lights shall be energized and fully operational prior to requesting final inspection by the City.

FRANCHISE & PRIVATE UTILITIES

~~168.~~171. Unless otherwise shown on the drawings and approved in writing by all jurisdictions

having authority, new and relocated franchise utilities *(power, cable TV, telephone & gas)* shall be installed underground in conjunction with the development.

~~169.~~172. Franchise utility plans shall be submitted to Public Works Director and the City Engineer for review prior to installation. All franchise utility street crossings shall be installed at right angles to the street centerline, and all crossings of water, sewer or storm mainlines or service lines/laterals shall be as close to perpendicular as feasible.

~~170.~~173. Where franchise utilities are installed along new public or private streets, franchise utilities shall either be extended across the entire frontage of the property or to the end of the street improvements *(whichever is further)* or conduit shall be provided for extension of franchise utilities in the future without additional excavation along the new street frontage.

~~171.~~174. Developer and/or Contractor shall coordinate with gas, power, telephone, and cable TV company for installation/location of utilities and/or conduits in common trenches, as well as location of vaults, pedestals, etc., as required to serve all existing homes and new lots within the development. The Contractor shall be responsible for providing franchise utility companies adequate written notice of availability of the open trench *(typically 10 days minimum)*, and reasonable access to the open trench for installation of franchise utilities as required to serve each lot within the development or along offsite improvements *(even though how or whether the homes will connect to such franchise utility service lines will be up to the homebuilder or homeowner)*.

~~172.~~175. Unless otherwise approved in writing by the City, all above-grade facilities shall be located in PUEs *(where PUEs exist or will be granted by the development)*, and otherwise shall be placed in a location outside the proposed sidewalk location. Contractor shall grade street frontage PUEs so that all franchise utility pedestals and vaults can be set to finished grade as measured from the back of the public sidewalk *(whether the sidewalk is installed with street construction or deferred to a later time)*.

~~173.~~176. Installation of private utilities *(including either franchise utilities or private water, sewer or storm services)* in a common trench or within 5 feet parallel with public water, sanitary sewer or storm drain mainlines is prohibited. Any parallel utilities shall be installed with a minimum of 5 feet horizontal separation *(ie. clear separation)* from parallel public water, sanitary sewer or storm drains.

~~174.~~177. Power, telephone and TV trenching and conduits shall be installed per utility company requirements with pull wire. Contractor shall verify with utility company for size, location and type of conduit prior to construction, and shall ensure that trenches are adequately prepared for installation per utility company requirements. All changes in direction of utility conduit runs shall have long radius steel bends.

~~175.~~178. Contractor shall notify and coordinate with franchise utilities for relocation of power poles, vaults, etc. to avoid conflict with City utility structures, fire hydrants, meters, sewer or storm laterals, etc.

STREET TREES, LANDSCAPING & IRRIGATION:

~~176.~~179. Street tree species and spacing shall be approved by the City prior to planting, based on City code provisions *(whether or not street trees are shown on the drawings)*.

~~177.~~180. All street trees shall be provided with root barrier tree wells per City details.

~~178.~~181. Street trees and landscaping shall not conflict with sight distance standards.

~~179.~~182. Landscape plantings shall maintain a minimum of three (3) feet clear from all fire hydrants. Maintenance of this clearance is an ongoing obligation of the property owner.

~~180.~~183. All irrigation systems shall be provided with backflow protection conforming to state and City standards. Backflow testing results shall be submitted to Public Works Director prior to requesting final inspection by the City.

TESTING AND INSPECTION:

~~181.~~184. The Contractor shall be responsible to ensure that all required or necessary inspections are completed by authorized inspectors prior to proceeding with subsequent work which covers or that is dependent on the work to be inspected. Failure to obtain necessary inspection(s) and approval(s) shall result in the Contractor being fully responsible for all problems and/or corrective measures arising from uninspected work.

~~182.~~185. Unless otherwise specified, the attached "Minimum Required Testing and Frequency" table outlines the minimum testing schedule for the project. This testing schedule is not complete, and does not relieve the Contractor of the responsibility of obtaining all necessary inspections or observations for all work performed, regardless of who is responsible for payment. Cost for retesting shall be borne by the Contractor. Copies of all test reports shall be submitted to the designated City representative.

Standard Easement Forms, Etc.

Appendix D

Note: Forms in this appendix are sample model documents only, included for convenience of reference by developers, and may not include all forms. These sample documents are for reference only, and may not have the proper margins and spacing required by the County Clerk for recording.

The documents are subject to modification by the City to address project specific conditions *(as required by the Public Works Director, the City Engineer or the City Attorney)*.

Easement Procedure Summary (*use similar procedure for ROW dedications, etc.*).

- For easements from a developer or property owner to the City, the easement legal description and to-scale exhibit map for the proposed easement shall be submitted to the City for review and approval *(unless the easement is created by the final plat, in which case the City easement form will simply reference the easement as noted on the plat)*. Exhibit maps not drawn and plotted to scale, or not containing the information required under PWDS 1.11.b *(or required to accurately and unambiguously identify the easement boundary and/or the subject property)*, will be returned for revision.
    - ~~☑~~○ Per ORS 93.600, use of a tax lot number ONLY~~only~~ as a legal description for property is not legally adequate for use in a recorded document.
- In conjunction with submittal of the legal descriptions and exhibit maps, the developer shall provide the City with the following information *(if not included as part of the legal description or exhibit map)*:
    - Legal name of owner-of-record of property on which the easement is located.
    - For easements located on land not owned by the developer, the amount or type of consideration provided by the developer for the easement.
- Once approved, the City will attach the legal description and exhibit map to the appropriate City easement form *(modified by the City as applicable based on specific project conditions)*, and it will be returned to the developer for execution and recording at the County.
- A photocopy of recorded easements documents must be returned *(hard copy or email)* to the City after recording *(ie. to the City Planner, Public Works Director & City Engineer)*.
- All recording costs shall be borne by the Developer.

Note regarding City easements created on/by a plat.

- Easements required in conjunction with a plat may be *(at the developer's option)* either (1) created on/by the final plat, or (2) created separately by recorded instrument and referenced on the final plat.
- ORS 92.050.9 prohibits City's from requiring information or notes on a plat which *"is or may be subject to administrative change or variance by the City"* unless authorized by the county surveyor. Under this requirement, terms and conditions of easements to the City typically cannot be included on plats. Therefore, the City requires that a separate easement document be recorded for any easement(s) to the City which is created by a plat, in order to formalize the terms and conditions of said easement(s).
- The developer should be aware that any utility easements to the City which are created on/by the plat *(other than street frontage PUEs)* will also require a separate easement document be recorded *(to formalize the terms of the City easement)*, with the easement to be recorded in conjunction with the final plat. In either case *(ie. whether created on/by a plat or created by separate instrument)*, a recorded easement document *(in a form acceptable to the City)* must be recorded for any easements to the City.

PWDS Appendix G

Construction Drawing Review, Public Works Permit, Construction Requirements & Procedures

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b. Suspension of Permit

1) At any time after the issuance of a construction permit required by these standards, the Public Works Director may suspend the permit ~~same~~ upon a finding that any of the following grounds exist:

a) False, misleading, or erroneous data or information submitted by the applicant in connection with securing the permit.

b) Materials or workmanship do not meet specification for the construction or installation of the permitted improvement; or construction or installation ~~which~~ varies from the approved plan or design of the improvements without written authorization by the City.

c) Violation of any of the provisions of the City development ordinances governing the work being done under the permit.

~~c)~~d) Failure by the Contractor and his personnel to at all times be civil and courteous around private citizens and property owners, as well to the City staff and inspectors. Foul or abusive language, obscene gestures, use of obscenities, or rudeness directed to private citizens *(or to the City staff or inspectors)* will not be tolerated.

2) Upon verbally notifying the Contractor of suspension of a construction permit as provided above~~in Subsection (a) of this section~~, the Director shall cause to be issued a written "stop work order," one copy of which shall be sent by regular mail to the permittee at the address shown on the permit application, one copy of which shall be sent by regular mail to the permittee's engineer overseeing the work, if known, and one copy of which shall be personally delivered to the person in charge of any work in progress.

3) It shall be unlawful for any person to cause, suffer, or permit any work to be done for which a permit is required by these standards when a "stop work order" has been issued as provided ~~in Subsection (b) of~~ by this section. The City will not accept any work performed after verbal notification ~~delivery~~ of the "stop work order" to the person in charge of work in progress at the project site, or after subsequent delivery of the written stop work order.

4) An applicant whose permit has been suspended may appeal such action to the City Manager through the City's established appeal process. Notwithstanding the provisions for appeal to the City Manager, the filing of an appeal shall not stay the effect of a "stop work order" issued under ~~Subsection (b) of~~ this section.

~~4)~~5) In reinstating the permit *(upon adequate assurances that subsequent work and/or conduct will be in accordance with City standards)*, the Public Works Director and/or the City Engineer may impose additional requirements or conditions deemed necessary for the project to conform to current City

standards.

G.14 NOTICE OF COMPLETION OF WORK, FINAL INSPECTIONS

a. Within 3 business days of completion of the work for which a permit was required under these standards, all in accordance with the approved construction drawings and City standards, the person or organization to whom the permit to do such work was issued shall submit written notice to the Public Works Director *(Type A permits)* or the City Engineer *(Type B permits)* stating that the work has been completed and give such other information as may be required by the City, and request a preliminary final inspection of the work.

b. As a minimum, the following must be submitted to the Public Works Director or the City Engineer as applicable prior to the preliminary final inspection.

1) All exterior property pins and street monumentation set *(partitions & subdivisions)*.

2) All set property pins exposed and all property corners marked with lath *(partitions & subdivisions)*.

3) All easement limits *(except PUEs parallel with r/w)* marked with labeled lath.

4) Paper copy of as-built drawings submitted to City Engineer a minimum of 48 hours prior to final inspection, including distance ties to all utility stub ends.

5) Written copies of all required utility test reports *(compaction, mandrel, pressure, vacuum, etc)*, as well as video tapes of any required pipeline TV inspections.

6) Completion report from design engineer including written copies of all utility test reports *(compaction, mandrel, pressure, vacuum, etc)*, as well as inspection reports of any required TV inspections. Submitted compaction tests shall include certification of engineered fills, baserock and AC pavement tests for streets and trench patching, as well as soil compaction results for all lots with fills.

7) Certification that the areas within the building envelopes of all lots conform to compaction requirements of the applicable Oregon Building Code.

c. Any corrective work items identified during the preliminary final inspection *(ie. punchlist items)* shall be completed prior to the City's conditional acceptance of any of the public streets or utilities. Failure by the City to include items on the preliminary punchlist shall not, in any way, relieve the contractor from any obligation to perform the work in strict compliance with the approved plans and City standards. Additional items discovered during subsequent inspections must be corrected prior to provisional acceptance of the improvements by the City.