



CITY OF REDMOND DESIGN REQUIREMENTS

WATER AND WASTEWATER SYSTEM EXTENSIONS



Adopted by the City of Redmond Public Works Department
Development Services Division January 2012

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Utilities Division of the
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SECTION I - GENERAL

1. **PURPOSE**

The purpose of these design standards is to provide engineers, designers, draftsmen, inspectors and others with a reference to City of Redmond's requirements for the design and installation of improvements to the water and sewer systems. **No extension or modifications to the City's utility system shall be made without approved construction drawings, prepared in accordance with these standards, and approved permit(s).**

The design standards included herein are intended to result in utility systems which will:

- a) Provide the needed source, storage and distribution facilities system to maintain desirable levels of service during periods of maximum use.
- b) Provide the needed sewer facilities to carry all anticipated sewage flows within a basin.
- c) Conform to the City's Water System Plan and General Sewer Plan.
- d) Be of material strong enough to resist all expected loads, both internal and external, in order to preserve the purity and potability of the water supply and protect ground and surface waters from the escape of wastewater.
- e) Be safe and economical to maintain.

Alternate materials and methods will be considered for approval on the basis of these objectives and conformance to all requirements indicated elsewhere in these standards.

2. **REVISIONS TO THESE REQUIREMENTS**

It is anticipated that revisions to these requirements will be made from time to time. The date appearing on the title page is the date of latest revision. Users should be sure that they are using the most recent revision to these requirements. This edition was approved in January, 2012. Contact the Development Services Division at (425)556-2876 to ensure this copy is the most current edition.

3. **REFERENCED STANDARDS**

Reference herein is made to the latest edition of standards, tests, methods, and specifications of research as follows:

- a) American Standards, prepared by the American Water Works Association (AWWA).
- b) American National Standards, prepared by the American National Standards Institute (ANSI).
- c) Standard Specifications, prepared by the American Society for Testing and Materials (ASTM).
- d) Federal Specification, prepared by the Federal Government (FS).
- e) Guide Book for Determination of Required Fire Flow and Grading Schedule for Municipal Fire Protection, prepared by the Insurance Services Office (ISO).
- f) Standard Specifications for Road, Bridge and Municipal Construction, prepared by the Washington State Chapter, American Public Works Association (APWA) as modified by the Water/Wastewater Division.
- g) Rules and Regulations of the State Board of Health Regarding Public Water Systems, prepared by the Water Supply and Waste Section, Health Services Division, State of Washington Department of Health (DOH), latest edition.
- h) City of Redmond Standards, Specifications and Details, prepared by the City of Redmond.
- i) Criteria for Sewage Works Design prepared by the State of Washington Department of Ecology.
- j) Cross Connection Control Manual, prepared by the Cross Connection Control Committee, Pacific Northwest Section American Water Works Association, latest edition.
- k) Uniform Plumbing Code (UPC) prepared by International Association of Plumbing and Mechanical Officials, latest edition.
- l) Record Drawings, reference City of Redmond latest edition of Record Drawing Requirements.

- m) Review Check list, reference City of Redmond Civil Review Checklist for Water and Sanitary Sewer.

4. **REFERENCED UTILITY PLANS**

- a) City of Redmond Water System Plan (Latest Update)
- b) City of Redmond General Sewer Plan (Latest Update)

SECTION II - DRAWING FORMAT AND CONTENT

1. **Material and Size**
All construction drawings for developer extensions of the water and sewer system shall be 22" x 34" mylar originals. Vellum, paper, sepia reproductions, or photographic reproductions are not acceptable. Plans are to be designed on the computer utilizing the following formats: Microstation (*.dgn); AutoCad (*.dwg), and other CAD programs (*.dwg). Hand drawn submittals will not be accepted.
2. **Drawing Content**
Drawings for water and sewer shall contain all information necessary to review the design and to construct the improvements. Show all relevant information from other project drawings, including existing and proposed grading, storm drainage, street and surface improvements, other utilities, landscape drawings, etc., on the water and sewer drawings. Combined water/sewer/storm and road drawings may be used if given prior approval.
3. **Title Block/Drawing Title**
In the drawing title block please include the name, address and phone number of the project developer and project engineer. In addition to the engineer's standard title block on the bottom or right side of drawing, include a drawing title generally centered on the top of the sheet containing the project name, section, township, and range, the number of lots or units in the project, the water system pressure zone and the Metro connection manhole.
4. **Vicinity Map**
Include a vicinity map showing the general location of the project on the first sheet of the water/sewer drawings.
5. **Approval Block**
Include the standard city approval block located in the lower right hand corner on each sheet of the drawing set.
6. **Horizontal Scale**
Unless otherwise approved, the horizontal scale is 1" = 20'. Vertical scale is 1" = 5'.

7. **Datum**
City of Redmond elevations are based on the NAVD 88 datum. List a minimum of two (2) City of Redmond benchmarks on the first sheet of the water/sewer drawings that the survey is tied to. Sewer inverts may not be used as benchmarks.
8. **North Arrow/Bar Scale**
Include a north arrow and bar scale in the upper left hand corner of the drawing with north oriented to the top or left of each drawing.
9. **Drawing Layout**
Lay out drawings to afford the maximum understanding possible. Drawings may not be approved if layout is considered confusing. It is advisable to discuss plan layout prior to preparation of a large project with the Development Services Division. Provide matchlines and cross references at all appropriate locations.
10. **Profiles**
Profiles are required for both water and sanitary sewer unless waived by the Development Services Division. Locate profiles on plan sheets oriented directly above or below the plan view when possible. Profiles may be shown on separate sheets when given prior approval.
11. **Profile Information**
Accurately plot finished grade above the utility and accurately depict or calculate utility crossings showing the clearance. Show physical characteristics of the utilities true to scale including waterline deflection, pipe diameter, pipe slope, manhole depths, etc.
12. **Plan View Information**
Indicate and identify all existing and proposed buildings, structures, utilities (water, sewer, power, phone, gas, and cable TV), street improvements and paving, stream crossings, mailboxes, and other known physical features within the project area which will affect the design and construction of the water and sewer improvements. If an existing utility line is greater than 12" in diameter, show the utility with its actual width on the drawing. (See Drawing Content, Item 2 above.)
13. **Professional Engineer / Licensed Fire Sprinkler Designer Stamp**
Construction drawings for all piping and appurtenances that will become the property of the City of Redmond are to be prepared, signed and stamped by a civil engineer with current registration in the State of Washington prior to submittal and review by the City. Private fire sprinkler system designs are to be signed and stamped by a Fire Sprinkler Designer with current State of Washington license.
14. **Legend**
Include a legend of symbols used to show clarity.

15. **Property Data**
Include all property lines, with dimensions and bearings, ownership lines, street right-of-way lines, lot numbers, block numbers, plat names, and street names.

16. **Stationing / Coordinates**
Include both centerline stationing and offsets and state plane coordinates using NAD 83-91 survey control for all mains and appurtenances.

17. **Phased Project Drawings**
Phased projects require drawings which depict all construction necessary to complete each phase independently.

18. **Multi-Family Projects**
Include building numbers and number of units per building on multi-family projects construction drawings.

19. **Manhole Requirements**
 - a. **Profile Call Outs**
Manhole callouts in the profile are to include manhole number, stationing, type, size, and compass locations of penetrations, and are to be shown complete for each manhole shown on the plans. Inlet pipe crowns shall be 1/10th higher than outlet pipe crowns.

Example: MH #2, Type I-48
Station 13 + 42 - 5' LT
I.E. 348.75 - 8" N in
I.E. 348.95 - 6" S in
I.E. 359.75 - 8" E in Drop Connection
I.E. 348.75 - 8" E in
I.E. 348.65 - 8" W out

 - b. **Plan Callouts**
Manhole callouts in the plan view are to include manhole number, stationing, type, and size.

 - c. **Manhole Numbering**
Upon first submittal of the construction drawings for review, the City of Redmond Water/Wastewater Division staff will assign numbering convention for wastewater manholes. The Developer's Engineer is required to incorporate these numbers onto the construction drawings. These numbers must be legible and not interfere with wastewater appurtenances.

SECTION III - ADMINISTRATIVE REQUIREMENTS

For additional details pertaining to forms, fees, or administrative requirements for developer utility system extensions contact the Development Services Division at 425-556-2876.

Reimbursement Agreements (Late Comers)

Portions of a system extension, either potable water or sanitary sewer, may benefit other properties and meet the criteria to be eligible for a reimbursement agreement. In order to be eligible for reimbursement, the City must have received a completed reimbursement agreement application prior to approval of construction drawings and the agreement must be fully executed by the City prior to commencement of construction of the facility. Any approved reimbursement fees associated with a parcel must be paid prior to sale of water or side sewer permits and or prior to plat/short plat recording. Reference Redmond Municipal Code 13.12.

SECTION IV - WATER MAIN DESIGN REQUIREMENTS

1. GENERAL

The system will be designed to have sufficient capacity to minimize pressure variations, provide minimum residual pressure of 40 psi at each meter during periods of maximum use, and provide sufficient volumes of water at adequate pressure to satisfy the expected maximum instantaneous demand plus fire flow. . If 40 psi cannot be maintained at the highest meter then close review of available flows and pressures will be made.

In general, water system extensions are to be designed to incorporate the recommendations of the current City of Redmond Water System Plan.

2. CAPACITY AND SIZING REQUIREMENTS

a. Design capacities and main sizing shall be determined by considering the following factors:

- 1) The proposed development and adjacent areas.
- 2) Current and projected populations within the areas to be served.
- 3) Current and projected land use within the areas to be served.
- 4) Commercial, multiple-family, industrial, or institutional users to be served.
- 5) Changes in any of the above factors which are likely to occur within a foreseeable time period.

b. In the absence of project specific data use the following demand criteria.

- 1) Average day demand for a single-family dwelling is 210 gal/day and a multi-family dwelling is 160 gal/day.
- 2) Required minimum instantaneous demand for a single-family dwelling is 20 gpm.
- 3) Average day demand for typical retail commercial user is 2,000 gal/acre/day.
- 4) Demand for unique commercial/industrial/institutional installations will be calculated on an individual basis.

- 5) Fire flow of 1,500 gpm at 20 psi residual pressure in residential areas and 3,500 gpm at 20 psi residual pressure in multi-family, commercial and industrial areas.
- 6) The maximum velocity in a pipe will be 10 fps. (For example, if more than one fire hydrant is required within the water line extension then a 12" diameter or larger pipe must be used.)

These criteria may be used to estimate the minimum and average day demand with the required fire flow. (Submission of design calculations will not ordinarily be required, but designers should be prepared to substantiate pipe sizes, layout, population estimates, land uses, or other design assumptions when requested.)

c. Main Sizes

- 1) 2" - not to be used as part of the distribution system.
- 2) 3" - not to be used as part of the distribution system.
- 3) 4" - not to be used as part of the distribution system except at the end of cul-de-sac mains after the last fire hydrant.
- 4) 6" - not to be used as part of the distribution system except as fire hydrant runs.
- 5) 8" - minimum size for permanently dead-ended mains supplying fire hydrants, for local distribution mains in residential areas, and for minor transmission mains.
- 6) 10" - not to be used as part of the distribution system.
- 7) 12" or Larger - as required for transmission (feeder) mains. 12" diameter is the minimum acceptable size in commercial and industrial zones.

3. WATER MAIN LOCATIONS

a. General

The preferred location for a water main is within the rights-of-way of public streets. Water mains may be installed within a 20-foot wide public water main easement across privately owned property when necessary and only if approved. When located in easement areas, water mains will be located within the drive lanes of access corridors. Water mains in non-paved areas are generally not allowed but may be permitted on a case by case basis. Properties that are redeveloping or undergoing additional development, for which existing water mains do not meet current location standards, must abandon the existing mains and construct new mains in accordance with current standards.

b. Public Streets

Water mains within public street rights-of-way are preferably located on the north and east sides of the centerlines thereof, and to the greatest extent possible 10 feet from centerline when the street is 34 feet in width or greater and 7 feet from the curb face if narrower. Exceptions to this requirement may be made in order to minimize the cutting and replacing of pavement, to avoid conflicts with replacing of pavement, to avoid conflicts with other underground facilities, to permit sanitary sewers to be installed on the "low side" of streets, or for other approved reasons.

c. Private Streets

Water mains within private street tracts or parking areas will be located 5 feet from the private street or parking drive centerline.

d. Variations

As nearly as practical, mains are to be installed on a particular street with the distance from the property line and/or centerline varied as little as possible.

e. Horizontal Clearance - Utilities

The minimum horizontal clearance between water mains and storm drains, gas mains, fire sprinkler mains, and other underground utility facilities, except sanitary sewer, will be 10 feet. Horizontal clearances of less than 10 feet may be approved but in no case can they be less than 5 feet. (Reference the Washington State Department of Ecology Design Criteria.)

- f. **Horizontal Clearance - Sewer**
Whenever possible, water mains are to be installed a minimum horizontal distance of 10 feet from sanitary sewer mains. Where this specified separation cannot be met, the design requirements and regulations adopted by the Washington State Department of Ecology, regarding water main/sanitary sewer horizontal separation, shall be followed.
- g. **Vertical Clearance - Utilities**
The minimum vertical clearance between walls of water main pipelines and other pipelines/cables/conduits of other utility facilities, except sanitary sewers, is 12 inches. If this separation cannot be achieved, special construction techniques to protect each utility will be required. Install other pipelines/cables/conduits below water mains. Exceptions to this requirement will be made on a case by case basis.
- h. **Vertical Clearance - Sewer**
Locate water mains over sanitary sewers, providing a minimum of 18 inches of vertical clearance between the walls of these pipelines. Where this specified clearance cannot be met the design requirements and regulations adopted by the Washington State Department of Ecology, regarding water main/sanitary sewer vertical clearance shall be followed.
- i. **Vertical Clearance – Electrical Wires**
Where overhanging electrical wires cross a water utility easement, a minimum above ground clearance of the longest vertical clearance of the following shall be maintained:
1. The height of the highest point of equipment that may be operating under the overhanging electrical wire plus the minimum vertical clearance specified in Table 212-2, “Minimum Vertical Clearance of Rigid Live Parts Above Ground,” of the latest edition of WAC 296-44-21230, “Vertical clearance of wires, conductors, cables, and live parts of equipment above ground, rails or water.”
 2. Puget Sound Energy Vertical clearance requirements.
- Notice: Add wire sag to the above clearance.
- j. **Crossing Angles - Utilities**
Water mains are to cross other pipelines/cables/conduits as close to right angles (90 degrees) as possible.

- k. **Depth of Cover**
The standard cover over 8-inch diameter and smaller water mains is 36 inches, and 48 inches for 12-inch diameter and larger pipe. 60-inches is the maximum cover allowed over water mains where conflicts with other utilities require the water main to be deeper.
- l. **Easement Widths**
Public water main easements are to be 20-feet in width. Easement widths of less than 20-feet may be approved if the full 20-feet are not obtainable, but in no case will easements less than 15 feet in width be acceptable.
- m. **Looping**
Loop the distribution system wherever possible.

4. **VALVE REQUIREMENTS**

- a. **Valve Type**
Valves 2” through 12” shall normally be resilient seat/wedge gate valves. Valves larger than 12” shall normally be butterfly valves. All valves shall meet the requirements of the City of Redmond, Water/Wastewater Division, Standard Specifications and Details.
- b. **Valve Size**
In general, the valve size shall be the same as the main in which it is installed. When approved, special valves such as plug or ball valves, may be a size smaller than the main depending upon the special conditions involved.
- c. **Valve Locations**
Distribution system valves are to be located as an assembly on branches of a tee or cross. The spacing of valves shall be such that the length of any one (1) shut-down in commercial, industrial and multi-family areas does not exceed 800 feet, and in other areas 1,200 feet. The spacing of valves is to be such that no more than two (2) fire hydrants are removed from service with any separate main shutdown.
- d. **Air Valves**
Combination air release and vacuum valves shall be installed on all high points of new water mains. Locate the box which contains the valve and the standpipe outside the traveled way, preferably behind the curb and sidewalk at property line intersections but within the public right-of-way or water line easement. Install air valve assemblies in accordance with the City of Redmond Standard Specifications and Details.

- e. **Blow Offs**
Terminate all dead-end mains with a blow-off assembly or fire hydrant. All low points of a main shall have a blow-off assembly or fire hydrant. Locate blow-off assemblies outside the traveled way, behind the curb and sidewalk, but within public right-of-way or water line easement. Blow-off assemblies on pipe 12” diameter and larger pipe shall be 4” size or a fire hydrant.

5. **BACKFLOW PREVENTORS**

- a. Locations and size of backflow preventors must be shown on the construction drawings. Backflow preventors are to be installed in accordance with the latest editions of the American Water Works Association (AWWA) Cross Connection Control Manual and the Uniform Plumbing Code (UPC). If the backflow preventor is to be installed within a vault located on the exterior of the building, a detailed design must be included with the construction drawings delineating the vault layout, piping configuration, gravity drain and appurtenances. Contact the Cross Connection Control Program at 425-556-2847. (Reference Redmond Municipal Code 13.10).

6. **FIRE FLOW/HYDRAULIC ANALYSIS**

- a. The desirable level of service for fire flow is 1,500 gpm for standard single-family residential areas of the City and 3,500 gpm in other areas such as commercial, industrial and multi-family housing. A hydraulic analysis to determine fire flow to a specific property may be requested by contacting Utility Engineering Division at 425-556-2884.

7. **FIRE HYDRANT REQUIREMENTS**

- a. The location of fire hydrants will be determined on a project by project basis. In general, the following criteria shall be used, but the specific determination of the Fire Marshal shall govern:
 - 1) Maximum hydrant spacing in single-family residential plats is 600 feet with the hydrants preferably located at intersections and not more than 350 feet to the center of any building lot (including flag lots). Where structures on a dead end access are over 300 feet from a hydrant, an additional hydrant may be required to be placed within 300 feet and placed in relation to the overall development and existing hydrant layout.
 - 2) Maximum hydrant spacing in commercial, industrial and multi-family residential developments is 300 feet with a fire hydrant no closer than 30 feet to any structure and with no more than 150 feet

traveled distance to any portion of the exterior wall of any structure.

- 3) Maximum hydrant spacing in surface parking lots or along rights-of-way is 600 feet. This spacing will be reduced if hydrants are also for protection of structures.
- b. The City of Redmond Fire Department and the Public Works Department jointly approve fire hydrant locations. Fire hydrants shall have a minimum setback from curb face as shown on the City of Redmond Standard Details.
- c. The minimum waterline size from the main to the hydrant is 6-inches in diameter if the length of the line is less than or equal to 50 feet, otherwise the minimum line size is 8-inches in diameter.

8. **SERVICE CONNECTIONS**

a. **General**

Water service connections including service saddle, service line, meter setter, meter box and appurtenances are to be installed as part of the construction of new water main extensions and must be installed at the locations shown on the approved construction drawings. Locate meter boxes within a landscape area. It is not permitted to place a meter box in a hard surface area, such as asphalt or concrete. Water meters will be installed by the City upon application and payment of fees required by other city codes and resolutions.

b. **Standard Sizes**

The sizes of water meters which may be used are $\frac{5}{8}$ " x $\frac{3}{4}$ ", 1", 1-1/2" and 2". The use of larger size meters requires specific approval.

c. **Multiple Meter Assemblies**

For adjacent residential lots/parcels install multiple service connections in as many situations as possible. The proposed meter layouts shall be shown on the approved construction drawings.

d. **Meter Location - Residential**

In general, locate meters in front of the lot/parcel to be served. All materials comprising the service connection shall be located within the public street right-of-way or public water line easement, whichever is applicable, with the front edge of the meter box being adjacent to the back of curb or sidewalk. Meter boxes should be located to allow ease in the periodic reading of the meter and should be placed as close to the property line as possible. Meter boxes shall not be placed within a driveway.

- e. **Meter Location - Commercial/Multi-Family**
In commercial and multi-family developments locate meters behind the back of curb or sidewalk of a vehicle travel aisle and not behind parking spaces or other obstructions. Meters should be located to allow ease in the periodic reading of the meter.

9. **CONNECTIONS TO EXISTING WATER MAINS**

In general, connections of proposed water mains to existing water mains shall be made by cut-in type procedures. Connections to the existing system by tapping the existing water main while under pressure and still in service will be considered. The connection is subject to Development Services approval. Cut-in tees are typically required to provide for suitable valving at the assembly.

10. **MISCELLANEOUS**

- a. **Pipe Callouts**
Show pipe size in the plan and profile views. Pipe length need not be shown, but sufficient dimensional information to locate all appurtenances needs to be shown (for construction and for later maintenance).
- b. **Valve at Connection**
Install a new valve at the end of an existing main which is to be extended in order to facilitate disinfection and testing of the new main.
- c. **Valve Callouts**
Delineate the type and size of valves to be used.
- d. **Meter Callouts**
Show the location, service line size, size and type of meter for all meters. This includes domestic, irrigation and fire sprinkler meters.
- e. **Fitting Callouts**
All fittings including tees, crosses, bends, sleeves, etc., are to be shown in plan and profile. Identify the joint connections of each fitting in plan view with the appropriate dimensional information. Generally all valve to fitting connections shall be flanged and fitting to pipe connections shall be mechanical joint.
- f. **Restrained Joints**
Restrained jointing systems are required in areas of unsuitable soils or complex thrust conditions.
- g. **Vertical Bends**
Vertical bends are not allowed in the water system unless approved.

- h. **Poly Wrap**
Poly wrap may be required for pipes in areas where soil corrosion is considered to be a problem. Poly wrap will be required for all fittings placed in control density fill (CDF).
- i. **Individual PRVs**
If the area has a high static pressure (over 80 psi), the plans must indicate the need for individual pressure reducing valves.
- j. **Trees**
Trees shall not be located within eight (8) feet horizontally of the pipe.
- k. **Unstable Soils**
Remove unsuitable/unstable soils, such as peat, and other organic material from under pipes.
- l. **A.C. Pipe Crossings**
Existing A.C. pipe may be required to be removed and replaced with ductile iron when crossed under or over by other utilities or where grading or other construction activities may subject the pipe to damage or loss of support. Dispose of the removed A.C. pipe in accordance with the Puget Sound Clean Air Agency (PSCAA) requirement. A permit from PSCAA to perform the disposal is required prior to construction drawing approval.
- m. **Rockerries/Retaining Walls**
Rockerries or retaining walls shall not cross or be in close proximity to water mains. Where no alternatives exist, crossings under a rockery or retaining wall require special construction techniques, including but not limited to, installation of steel casings.

Rockerries or retaining walls parallel (or adjacent) to water mains are to be constructed as follows:
 - 1) Locate the foundation of the rockeries or retaining walls outside of the utility easement.
 - 2) The foundation of the rockeries or retaining walls shall not intersect with a soil failure plane identified by a 1:1 slope extended from the bottom edge of the utility or water main trench up to the ground surface.
- n. In situations where multiple fittings are to be used, fittings are not to be bolted together. Space fittings a minimum of five (5) feet apart. If a pipe joint must be installed between fittings, restrain the joint.
- o. A push-on pipe joint is not permitted within five (5) feet of a fitting.

- p. In general, any water main or appurtenances that are removed during construction cannot be reused on any part of the water system.

SECTION V - SEWER MAIN DESIGN REQUIREMENTS

1. **GENERAL**

Design of sanitary sewers must, at a minimum, comply with the "Criteria for Sewage Works Design" as published by the State of Washington Department of Ecology. Any exceptions to the design requirements requires separate approval.

In general, sewer system extensions are to be designed to incorporate the recommendations of the latest General Sewer Plan for the City of Redmond.

2. **CAPACITY AND SIZING**

a. Design capacities and main sizing will be determined for specific proposed developments by considering the following factors:

- 1) The proposed development and adjacent areas.
- 2) Current and projected population within the areas to be served.
- 3) Current and projected land use within the areas to be served.
- 4) Commercial, multiple-family, or institutional users to be served.
- 5) Changes in any of the above factors which are likely to occur within a foreseeable time period.

b. In the absence of project specific data, assume the following:

- 1) Single Family Residence Unit Flow 210 Gal/Day
- 2) Multi-Family Residence Unit Flow 160 Gal/Day
- 3) Retail Commercial Areas 2000 Gal/Acre
- 4) Industrial 2000 Gal/Acre
- 5) I/I 1100 Gal/Acre
- 6) Peak Factor -- in accordance with General Sewer Plan

- c. These assumptions may be used to design new extensions and evaluate existing systems. Submission of design calculations will not ordinarily be required except where portions of the system will need to be extended to serve additional areas or at the discretion of the Public Works Department.
- d. The minimum size for an extension of a city sewer main is 8” diameter. Main sizes greater than 8” will be used only when design flows will fill an 8” pipe at the design slope or when a larger pipe has been used upstream.

3. **SEWER MAIN LOCATIONS**

- a. **General**
Locate sewer mains within public rights-of-way. Sewer mains may be installed within a public sewer main easement across privately owned property when necessary and as approved on a case by case basis. When placed in easements, locate the sewer mains within the lanes of access corridors. Sewers in unpaved areas are generally not allowed but may be permitted on a case by case basis. Properties that are redeveloping or undergoing additional development, for which existing sewer mains do not meet current location standards, are to abandon the existing mains and construct new mains in accordance with current standards.
- b. **Streets**
Sewer mains within public streets, private streets, access tracts or parking areas are to be located such that manholes are five (5) feet south and west of centerline or on centerline. In curved street sections, additional manholes may be required.
- c. **Horizontal/Vertical Clearance**
The minimum horizontal and vertical spacing of sewer mains from other utilities is the same as specified for water mains in Section IV of these requirements.
- d. **Minimum Cover**
The preferred cover over sewer mains is seven (7) feet in order to assure gravity service and provide normal vertical separation between water and sewer mains. The minimum cover over ductile iron sewer mains is three (3) feet in both paved and unpaved areas; minimum cover over other sewer mains is five (5) feet in both paved and unpaved areas.

e. **Easement Widths**
Public sewer main easements shall be 20 feet in width. Easement widths of less than 20 feet may be considered if the full 20 feet is not obtainable. However, no easement shall be less than 15 feet in width.

f. **Access Roads**
All manholes shall be accessible to the City maintenance vehicles. If not located in a vehicle access way, then access by an improved roadway surface must be provided. Materials of construction may include asphalt concrete, cement concrete, structurally stabilized vegetated surface, crushed surfacing, etc., as determined by the Water/Wastewater Division Engineer. Access roads are to be designed with 25 foot inside radius on curves, with slopes less than 15% and with paved widths as determined by the Water/Wastewater Division Engineer.

g. **Manholes**
Manhole Spacing
Manholes are to be installed at a maximum of 350-foot spacing. Manholes are to be installed at the end of all dead end mains and junctions.

Knockouts
Provide knockouts and channeling in manholes where future extensions are anticipated. These are to be shown on the plans.

Drop Manholes
Drop manholes will only be approved on a case by case basis. Generally, drop manholes will not be approved if the drop is less than five (5) feet in connecting to existing manhole structures and will not be approved in new construction unless used in conjunction with a deep trunk extension. Drops shall be constructed of ductile iron and ductile iron will be used to the next upstream manhole. Drop manholes are to be outside drops. Inside drops are not allowed.

Maximum Depth
The maximum depth of a manhole without special detailed design is 25 feet.

Ladder
Locate the ladder and eccentric cone directly over the outlet pipe.

5. **SIDE SEWERS**

a. **Size and Slope**

Side sewer stubs shall be 6" in diameter and extended to the property or easement line. The minimum side sewer slope is 2%. When the slope is greater than 2% show the invert elevation at the property line.

b. **Finish Floor Elevations**

Show the minimum finish floor elevations on all lots where gravity service is in question. The minimum finished floor must be 5.0 feet above the side sewer invert at the property line and may be greater depending on the distance to the structure.

c. **Tee Locations**

Side sewer tees extend from public mainlines. Connection at a manhole is not preferred and will not be accepted without prior approval.

d. **Branch Configurations**

6" side sewers connect to 8" or larger mainlines with a tee. Wye connections may only be used on 6" to 6" connections or 4" to 6" connections.

e. **Double Services**

Double services for single family residences are to be wye'd within the lots being served. The maximum allowable differential between the floor elevations of the residences is two (2) feet. A joint use side sewer agreement must be provided.

f. **Service to Properties**

Side sewer stubs shall be provided for all platted lots. Stubs to unplatted land will be provided as required by the Water/Wastewater Division Engineer. Multiple side sewers shall not be used in lieu of extending a sewer main. Side sewers shall generally be perpendicular to the street centerline.

g. **Side Sewer Location**

Locate side sewers on the platted lot to be serviced and run directly from the building to the sewer main. Side sewers on adjacent lots shall not be installed in a common trench.

h. **Side Sewer Length**

Side sewers shall be a maximum of 150 feet in length unless otherwise approved.

- i. **Cleanouts**
Provide a cleanout at every bend and at every 100-foot increment.
- j. **Backwater Valves**
Install backwater valves on all side sewers where the finish floor elevation of the building is lower than the invert elevation of the upstream manhole.

6. **CONNECTIONS TO EXISTING SEWERS**

Connections to existing sewers for main extensions shall be made by connecting to an existing manhole or constructing a new manhole over an existing pipeline. Drawings showing connections to existing manholes shall call for core-drilling and rechanneling. For drawings which show a new manhole installed over an existing sewer, include a detail of construction for building over the pipe.

7. **MISCELLANEOUS**

- a. **Pipe Callouts**
Show pipe size and manhole to manhole length in the plan view. Show pipe size, manhole to manhole length, pipe material, slope in %, and pipe class or strength (if not standard) in the profile. Pipe material shall not change between manholes. Pipe slopes are to be designed to tenths of a percentage. Establish slopes then calculate inverts. Do not set inverts then calculate slopes.

- b. **Slope on Dead End Run**
Provide a minimum slope of 1% on the last manhole to manhole section of a dead-end run in order to promote flushing velocities. Exceptions to these requirements may be approved by the Water/Wastewater Division Engineer.

- c. **Minimum Slopes**
Minimum slopes on main lines are:

8"	=	0.0050 ft./ft.
10"	=	0.0032 ft./ft.
12"	=	0.0025 ft./ft.

- d. **Steep Slopes**
Pipe designs on slopes of 20% or greater, must use of ductile iron pipe and pipe anchors which are detailed and located by the design engineer.

- e. **Deep Sewers**
For deep sewers submit pipe strength design data or calculations when requested. Use ductile iron pipe when the pipe invert is greater than 15 feet below finished grade.

- f. **Unstable Soils**
Remove unstable/unsuitable soils, such as peat and other organic material, from under pipes.

- g. **Trees**
Trees shall not be located within eight (8) feet horizontally from the pipe.

- h. **Building Footings**
Locate public sewers at least ten (10) feet from structures. Building footings are to be designed, or sewers located, such that the footing will not bear on the pipe. In general locate footings outside the zone defined by a one to one slope extended up from a point two (2) feet horizontal from the pipe invert.

- i. **Rockeries/Retaining Walls**
Rockeries or retaining walls are not to cross or be in close proximity to water mains. Where no alternatives exist, crossings under a rockery or retaining wall will require special construction techniques, including but not limited to, installation of steel casings.

Rockeries or retaining walls parallel (or adjacent) to sewer mains will be constructed as follows:
 - 1) Locate the foundation of the rockeries or retaining walls outside of the utility easement.
 - 2) The foundation of the rockeries or retaining walls shall not intersect with a soil failure plane identified by a 1:1 slope extended from the bottom edge of the utility or water main trench up to the ground surface.

- j. In general, any sewer main, manhole, or appurtenances removed during construction shall not be reused on any part of the sewer system.

SECTION VI - SPECIAL APPURTENANCES

1. GENERAL

From time to time, special appurtenances will be required for various development projects including, but not limited to, sump pumps, pressure reducing stations, backflow preventors, booster pump stations, sewage pump stations, grinder pumps, oil-water separators, and grease interceptors. Calculations and designs for these appurtenances will be reviewed and approved on a case by case basis.

a. Sump Pumps

Sump pumps are not allowed within the City system unless approved due to unusual conditions. If approved, special easements and agreements apply and must be in place prior to construction drawing approval.

b. Pressure Reducing Stations

Location and size of pressure reducing stations are determined by the Water/Wastewater Division. A pressure reducing station design includes detailed plans and sections drawn at a horizontal and vertical scale of 1" = 10', delineating the vault layout, piping configuration, gravity drain and appurtenances. Notes referencing standard details without a detailed drawing are not acceptable. Refer to the City of Redmond Standard Details and Specifications for pertinent design information.

c. Pump Stations

Booster pump station and sewage pump station applications will be determined by the Water/Wastewater Division. Design criteria will be dictated by the particular application and will require coordination with the Water/Wastewater Division.

d. Grinder Pumps

Grinder pump applications are restricted to single-family residences and single commercial buildings which are physically unable to connect to the sanitary sewer system by gravity. For single-family residential applications, each grinder pump must have its own individual force main. The pressure discharge line must connect to a gravity side sewer from the sewer main. A maximum of four (4) pressure lines are allowed to manifold into one (1) gravity side sewer connection.

e. Oil-Water Separators

Oil-water separators treat oily wastewater before the water is discharged to the sanitary sewer. Oil-water separators are required for underground parking structures, gas stations, and for all facilities where there is

potential for the discharge of oily contaminated water. In addition, no grease, oil, sand, liquid waste containing grease or flammable material or other harmful ingredients in excessive amount may be discharged into a public sewer without the installation of a pretreatment process. Designs shall follow criteria established by the City and King County Metro.

f. **Grease Interceptors**

Grease interceptors are required for all commercial buildings with kitchen, cafeteria, or food service facilities. In addition, no grease, oil, sand, liquid waste containing grease or flammable material or other harmful ingredients in excessive amounts may be discharged into any public sewer without the installation of a grease interceptor. The sizing of the interceptor shall be in accordance with the latest edition of the UPC recognized by the City. The Building Division is responsible for approving the design and inspecting the installation of grease interceptors. For permitting questions, sizing criteria, or other information contact: 425-444-2431.

g. **Septic Tanks**

If your site is currently serviced by a septic system, and you need information on location, etc., contact the King County Health Department at 206-296-4920. If you have questions regarding installation of sanitary sewer for replacement of you septic system, please contact the City of Redmond Development Services Center at 425-556-2876.

SECTION VII - EASEMENTS

1. GENERAL

- a. All easements needed for water and sewer main extensions are to be provided by the Developer in the name of the City. Show required easements on the construction drawings. Submit easement legal description(s) or plat markup for review at the time construction drawings are submitted for review. Easements must be executed prior to construction drawing approval, except when they are included with the final plat or short plat recording documents.
- b. Easement widths are a minimum of 20 feet, 10 feet on all sides of pipelines or appurtenances.
- c. Easements are to be prepared on the City of Redmond standard forms.
- d. An alternative to separately recording a standard easement form is to record an easement on the face of a plat or short plat. If this is the method used, a standard City of Redmond dedication statement must be included in the documents.
- e. Buildings, structures, garages, carports, dumpster enclosures, decks, trees, rockeries, retaining walls, etc., can are not permitted in easement areas.
- f. New easements, in accordance with current standards, are to be granted for properties which are redeveloping or undergoing tenant improvements.
- g. Before a project is accepted by the City, revised easements with the legal description of the as-built locations of the water and sewer extensions are to be provided, reviewed, and approved by the City.

SECTION VIII - WATER/SEWER SERVICE AREAS

The City of Redmond water and sewer service areas for both the Redmond Service Area and the Novelty Hill Service Area can be found in the latest Water System Plan or latest General Sewer Plan.

Note: General parcel information for King County properties located in both incorporated and unincorporated areas can be obtained via the County's website. The Department of Development and Environmental Services (DDES) Parcel Locator displays this information in the form of maps, tables, and text allowing visitors to search for a property using a parcel number, a street address, or a street intersection.