

CHAPTER 3 DESIGN REQUIREMENTS

SECTION 301 GENERAL

301.1 Minimum Requirements

- A. The design requirements contained in this Chapter include the minimum requirements necessary for the design of wastewater facilities in the SBWRD.
- B. Proposed designs deviating from these regulations will be reviewed by SBWRD on a case by case basis upon the submittal by the Project Engineer of any additional data, computations, exhibits, etc., as required by SBWRD.

301.2 Prohibited Waste Discharges

- A. Wastewater systems shall be designed to exclude wastes prohibited from being discharged to the Public Wastewater System and clear water connections as defined in the *SBWRD Pretreatment Program*, which is on file at SBWRD.

SECTION 302 SUBMITTAL REQUIREMENTS FOR PUBLIC WASTEWATER SYSTEM EXTENSIONS AND MODIFICATIONS

302.1 Description

- A. The design of Public Wastewater System extensions or modifications shall include the submittals and required information described in this Section. The procedures for submitting the information and receiving approval are contained in Section 202.

302.2 Wastewater Master Plan

- A. A wastewater master plan shall be submitted for all proposed projects.
- B. The wastewater master plan shall consist of drawings, calculations, tables, etc. that adequately describe and document the location, routing, and sizing of the proposed wastewater system for the project.
- C. The wastewater master plan shall include the following information.
 1. The location of the development within the SBWRD.
 2. The boundary of the proposed project.
 3. The type of development.
 4. Other properties, outside of the proposed development, that would require wastewater service through the proposed development.
 5. The configuration of the proposed development with roads, lots, proposed buildings, etc. shown.
 6. The number of lots, units, or rooms; commercial area, restaurants and other similar facilities;

industrial area; and all other proposed facilities and areas that will contribute wastewater flows to the wastewater system.

7. The estimated residential equivalents (REs) associated with the various uses within the proposed development.
 8. A conceptual layout of the wastewater system required to provide wastewater service to each lot or facility of the proposed development.
 9. Capacity requirements and size of the wastewater system features.
 10. Location of the proposed connection to the Public Wastewater System.
- D. On smaller projects without multiple phases, the required wastewater master plan information can be included on the overall wastewater system plan required as part of the final wastewater system design.
 - E. Wastewater master plans submitted to SBWRD shall be 24"x36" in size.

302.3 Preliminary Wastewater System Design

- A. The preliminary wastewater system design shall meet the requirements contained in Section 303.
- B. The preliminary wastewater system design shall include the following items.
 1. Site Location Map. The proposed project shown on a vicinity map indicating adjacent streets, projects, etc. The township, range, and section shall be indicated.
 2. Topographic Map. A topographic map of the area to be provided with wastewater service. This information may be included on the wastewater system layout plan.
 3. Wastewater System Layout. Plan of the proposed project indicating the following items with appropriate labeling:
 - a. The proposed location for connection of the proposed wastewater system improvements to the existing SBWRD wastewater collection system. SBWRD manhole numbering shall be included.
 - b. Location of the proposed wastewater system improvements in relation to streets, property lines, lots, other existing and proposed utilities, etc.
 - c. Proposed public wastewater collection lines and manholes, private laterals, and other wastewater system features.
 - d. Lots or proposed facilities that may require ejector pumps for wastewater service, if applicable.
 4. Proposed Low Pressure Sewer System facilities, if applicable, with appropriate design

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- calculations.
5. Proposed wastewater pump stations, force mains and appurtenances, if applicable, with appropriate design calculations.
 6. Estimated maximum number of units to be serviced by the proposed system and the estimated peak and average wastewater flows anticipated to come from the proposed project, as defined in Section 303.1.
- C. Preliminary Design drawings submitted to SBWRD shall be 24"x36" in size.
- 302.4 Final Wastewater System Design**
- A. The final wastewater system design shall meet the requirements contained in Section 303, and review comments from the preliminary design review.
- B. The final wastewater system design drawings shall include the following items:
1. Title Page.
 - a. Project Name.
 - b. Owner/Developer Name.
 - c. Project Engineer Name.
 - d. State of Utah Professional Engineer's Stamp and Signature.
 - e. Location map showing township, range and section and surrounding area of project.
 - f. Construction site identified as "project."
 - g. Sheet Index.
 - h. Construction notes including the following.
 1. Note stating that the construction of the wastewater system improvements shall conform with the *SBWRD Development Procedures, Design Standards and Construction Specifications*.
 2. Benchmark elevation.
 3. Basis of bearing for wastewater system (ties to plat and/or Section Line) or coordinate system.
 - i. Date.
 2. Index Sheet: Plan view of the entire development or phase of development indicating the areas and wastewater lines shown on each plan and profile drawing. This information may be shown on the Overall Wastewater System Plan.
 3. Overall Wastewater System Plan: Plan view of entire development or phase of development indicating the following.
 - a. Scale and North arrow. Scale shall not exceed 1" = 500'.
 - b. Streets, lots or parcels, and proposed buildings indicated and labeled or numbered. The lot or parcel numbering system shall be consistent throughout the project.
 - c. Existing and proposed Public Wastewater System indicating with labeling: manhole location, size, stationing, and numbering (existing manholes referenced with SBWRD manhole number); pipe size; pipe type; and stubs.
4. Plan and Profile Drawings (Plan and Profile shall be shown on the same sheet) - Plan View.
 - a. Scale and North arrow. Scale shall not exceed 1" = 40'.
 - b. Street names.
 - c. Right-of-way lines and widths.
 - d. Parcel or lot lines.
 - e. Lots or buildings numbered. This numbering system shall be consistent throughout the project.
 - f. Existing and final contours.
 - g. Existing and proposed Public Wastewater System indicating: pipe size, length (centerline of manhole to centerline of manhole) and material; deflection angles of wastewater lines at manholes or bearings of lines; curve information if curvilinear alignment; manhole size, type and numbering; existing manholes referenced with SBWRD manhole number; and wastewater stubs with size, slope, length, deflection angle or bearing, and pipe material; wastewater pump stations, force mains, and appurtenances, if applicable; and Low Pressure Sewer System and appurtenances, if applicable.
 - h. Private Lateral Wastewater Lines shown to all parcels or building units indicating: parcel or building unit to be served by lateral; pipe size, slope, length and material; deflection angle or bearing; mid-line bends with lengths between bends; elevation at end of lateral; cleanout locations, if applicable; and sanitary sewer stationing of private lateral at connection to main line.
 - i. Building pad location and elevation for each parcel or building unit to which private laterals are being extended or indication of how depth of main line and laterals was established.
 - j. Existing and proposed easements shown, with type (i.e., temporary, permanent, nonexclusive utilities, sewer, water, access) and recording information indicated.

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- k. Existing and proposed: pavement edges and width; sidewalks, walkways and paths (concrete, pavement, or gravel); curb and gutter; all structures (i.e., buildings, retaining walls, tunnels); fences and retaining walls; trees and shrubs.
 - l. Existing and proposed: water lines (including fire hydrants and service lines); irrigation and drainage ditches; storm drainage structures and pipe; utilities (existing, proposed, buried, and above ground) including power lines, telephone lines, gas lines, etc.
 - m. Erosion control notes.
5. Plan and Profile Drawings - Profile View.
- a. Information shown shall be consistent with the plan view (i.e., direction of flow, manhole stationing, existing land features, utilities, etc.).
 - b. Scale. Scale shall not exceed 1" = 40' horizontal and 1" = 10' vertical.
 - c. Existing and final grades shown at center line of wastewater lines or centerline of road if wastewater line is within the roadway.
 - d. Profile of crossings with existing and proposed utilities including water lines, storm drain lines, power lines, telephone lines, and gas lines. Provide elevations of wastewater lines, water lines or storm drain lines at crossing.
 - e. Profile of crossings with existing and proposed streets including curb, gutter, and sidewalk.
 - f. Profile of parallel ditches within 10' horizontally of wastewater lines, ditches that cross the wastewater line, and ditches parallel to roadways where wastewater laterals must cross ditch.
 - g. Proposed Public Wastewater System indicating: size and flow line (invert) elevation of all existing and proposed wastewater lines at connections to the existing SBWRD collection system; profile of proposed wastewater line flow line and top of pipe shown to scale; road stationing with centerline offsets to proposed manholes and wastewater line stationing based on wastewater line alignment; pipe size and material; distance from centerline of manhole to centerline of manhole; flow line elevations of all lines entering manholes at the inside manhole wall; slope of wastewater line (shown to hundredths of a percent), manhole type and size; manhole stationing and numbering; manhole rim elevations; special bedding, backfill and compaction requirements, if required; special pipe protection measures, if required; minimum cover noted; erosion control notes; and other special notes and instructions as required for construction of the wastewater system.
6. Detailed plans for wastewater pump stations meeting the requirements of Section 303.10, if applicable.
7. Details
- a. Applicable SBWRD Standard Details as contained in Appendix C.
 - b. Manhole base details as required by Section 303.8.
 - c. Any additional Details required for items not covered by the Standard Details.
- C. Final wastewater system design drawings shall be formatted by the Project Engineer to provide individual layers for ease in adapting electronic record drawing file information into the SBWRD wastewater collection Geographic Information System (GIS)
- D. Final wastewater system drawings submitted to SBWRD shall be 24"x36" in size.
- E. Drawings shall be clear, legible, and conform to acceptable drafting practices. Design drawings shall be consistent with the standards in the industry for wastewater system construction drawing.
- F. It is recommended that the design drawings be set up to meet the requirements for Record Drawings as discussed in Section 302.9 with regard to State Plane Coordinates and elevations.
- 302.5 Preliminary and Final Plat and Site Plan**
- A. The submittal and approval process for preliminary and final plats and site plans shall be in accordance with the requirements of Section 204.
 - B. The following information shall be included on the plat or site plan
 - 1. A signature block for SBWRD in the following form:

**SNYDERVILLE BASIN WATER
RECLAMATION DISTRICT**

Reviewed for conformance to Snyderville Basin Water
Reclamation District standards on this _____ day
of _____, 20____.

By: _____

- 2. All existing SBWRD easements located on or adjacent to the property being platted or developed. Reference to the easement recording information shall be included.
- 3. All proposed SBWRD easements for Public Wastewater System collection lines.
 - a. Public roadways where Public Wastewater System collection lines will be located shall

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be specifically dedicated for use by SBWRD in the owner's dedication language.

- b. Easements for Public Wastewater System collection lines located outside of streets or roads dedicated as public rights-of-way shall be granted to SBWRD by an SBWRD Grant of Easement form as contained in Appendix A. The location of the easement shall be shown on the plat or site plan and reference to the easement recording information indicated.

- 4. Where applicable, lots that may require ejector pumps for wastewater service identified as EP (wastewater ejector pump) lots and the following plat note included on the plat:

EP: Wastewater Ejector Pump Lots.
Lots _____ may require a privately owned and operated wastewater ejector pump for wastewater service.

- 5. Where applicable, lots that will connect to a Low Pressure Sewer System identified as LP (low pressure) lots and the following plat note

LP: Lots designated as Low Pressure Sewer System Lots. The purchasers of lots identified as Low Pressure Sewer System Lots are hereby notified that wastewater service to these lots will be provided by a Low Pressure Sewer System. The Private Low Pressure Sewer Lateral to these lots consists of a low pressure grinder pump station and low pressure discharge line and appurtenances. The Private Lateral connects to the Snyderville Basin Water Reclamation District's (SBWRD) Public Low Pressure Sewer System. The responsibilities of the Low Pressure Lot owners, the _____ Homeowners Association and SBWRD, as regards the Low Pressures Sewer System, are contained in the "Agreement for Low Pressure Sewer System", Recorded _____, at Entry _____, Book _____, Page _____, in the Summit County, Utah Recorders Office.

included on the plat:

- 6. Where applicable, a note regarding Common Private Lateral Wastewater Lines according to

Section 102.6.

- 7. Where applicable, a note regarding ownership and maintenance responsibilities of individual Private Lateral Wastewater Lines located in common areas designated as public and private easements.
- 8. Where applicable, a note regarding adjustment of manholes in private roads and other paved areas as follows:

At the time of any resurfacing of (Private Road name or paved area), the (Homeowner's Association, Condominium Association, Property Owner, etc.) shall be responsible to adjust wastewater manholes to grade according to Snyderville Basin Water Reclamation District (SBWRD) standards. Prior notification of the adjustments and inspection by SBWRD is required.

- 9. Other notes or information as required by SBWRD.

302.6 Easements

- A. Permanent easements for constructing, operating, maintaining and replacing the Public Wastewater lines, including access within the easement, shall be required for all Public Wastewater lines not located in dedicated public roadways. Permanent easements shall be submitted on the standard SBWRD Grant of Easement Form contained in Appendix A.
- B. A Final Title Report for all properties where easements are being granted shall be submitted with the Grant of Easement Form.
 - 1. The Final Title Report shall demonstrate that the grantor of the easement is the owner of the property where the easement is being granted
 - 2. The Final Title Report shall demonstrate that there are no encumbrances on the property that would prevent SBWRD from exercising its rights as contained in the Grant of Easement Form.
 - 3. The date of issue of the Final Title Report shall be within 30 days of the date the Easement is executed and submitted.
- C. Access easements shall be provided for access to the permanent easement if access to the wastewater lines along the permanent easement alignment is not achievable. Access easements shall be submitted on the standard SBWRD Grant of Easement and Access Easement Form contained in Appendix A.
- D. The legal description of the easements shall be included in the body of the easement forms, not as an attachment to the easement form.
- E. A display shall be attached to all easement forms showing the location of the easements in relation to the

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wastewater line, property lines, section corners, and other pertinent features.

- F. Easements for wastewater lines shall be granted independent of other utilities.
- G. All permanent and access easements shall be a minimum 20' wide.
- H. Additional easement width shall be provided for wastewater lines exceeding 10' in depth, as determined from the finished grade to the top of pipe. An additional 2' of easement width shall be provided for each foot of depth beyond 10'.
- I. The wastewater line shall be centered within the permanent easement.
- J. Permanent Easements shall extend a minimum 10' beyond the center of the last manhole or last section of Public Wastewater line. An additional 1' of easement length shall be provided for each foot of depth beyond 10'.
- K. The permanent easement shall include turnarounds with a diameter of 40' where required for access.
- L. SBWRD will generally record all signed easements with the County Recorder within two weeks of the date the fully executed document is received.

302.7 Special Agreements and Permits

- A. All special agreements or permits required for construction of proposed Public Wastewater System extensions or modifications shall be submitted, reviewed by SBWRD, and executed along with the final design drawings according to Section 202.6.
- B. The developer shall submit documentation assuming responsibility for all costs and work associated with any third party agreements, easements, or permits which SBWRD may be required to enter into for the project.

302.8 Construction Cost Estimate

- A. A construction cost estimate prepared by the Project Engineer and approved by SBWRD shall be used to establish the amount of the Improvement Completion Agreement and Engineering Services Fees.
- B. The construction cost estimate shall include, as separate line items, the following items as applicable
 1. Wastewater main line, each size and type.
 2. Wastewater lateral, each size and type.
 3. Wastewater manholes and structures, each size and type.
 4. Connection to existing manhole.
 5. Acceptance testing (TV inspection, air and vacuum testing, tracer wire continuity testing, etc.)
 6. Street cuts (including pavement and curb replacement).
 7. Manhole platform.
 8. Trench dike
 9. Maintenance access roadway.
 10. Revegetation and/or landscaping.
 11. Trench rock removal (including import material

replacement).

12. Existing manhole adjustment.
 13. Special construction items (i.e., borings, casings, dewatering, wetland restoration, temporary sewer, etc.).
- C. Unit costs shall be consistent with current local construction costs and shall be acceptable to SBWRD.

302.9 Record Drawings

- A. The Developer shall assure that all data for Record Drawings is collected.
- B. The Record Drawing set shall consist of the Approved Construction Drawings, including approved revisions, with all annotations and graphical representations modified to reflect the as-constructed condition of the Public Wastewater System improvements and Private Lateral Wastewater Lines as determined by a field survey conducted by the Project Surveyor.
- C. The Record Drawing set shall include: title page, overall wastewater system plan, plan and profile sheets, and special detail sheets. Landscaping plans, road cross-sections, erosion control plans, miscellaneous detail sheets, etc., that do not affect the construction or operation of the wastewater system shall not be included. Sheets not included in the Record Drawing set shall be lined-out in the drawing sheet index.
- D. Sheet size shall be 24"x36".
- E. Record Drawings shall be legible and scalable and must allow for clear photocopies.
- F. Record Drawings shall include all information required for final wastewater system design drawings according to Section 302.4 and the following additional items:
 1. SBWRD manhole and structure numbers for new manholes and structures based on SBWRD numbering system. These numbers will be provided by SBWRD as part of the first Record Drawing review.
 2. Two swing ties, or measured distances, to the private lateral stub marker for each lot or building and any cleanouts on private lateral stubs installed as part of the project. These ties shall be from the two front property corners, or a "nail-in-curb" projected from the property corner, unless other points of reference are specifically approved by SBWRD. Swing ties that cross onto other Record Drawing sheets shall include a note on each sheet indicating associated feature. Laterals shall not cross from sheet to sheet.
 3. Any field information obtained by the contractor.
 4. The location of the installed wastewater lines within easements. If revised easements are required, a copy of revised easements shall be submitted with the initial Record Drawing

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submittal for review by SBWRD.

5. Written certification by the Project Surveyor or Project Engineer that a field survey of existing as-constructed wastewater system information has been performed and has been incorporated into the Record Drawings.
- G. A copy of the Record Drawings shall be submitted to the District Engineer for review prior to scheduling a final inspection.
- H. The final Record Drawing submittal shall consist of signed revised easements, if required, one set of plotted mylar drawings and a digital file of all sheets in the Record Drawing set submitted on a clearly labeled digital disc.
- I. The digital files shall be submitted in a format that is compatible with SBWRD GIS software (ESRI's ArcGIS) such as AutoCad or other similar programs.
- J. The digital files shall be converted from the project's ground survey coordinates to the State Plane Coordinate System (Utah North, NAD83, U.S. survey foot) by applying the appropriate rotation and elevation scale factors. All elevations shall be referenced to a survey quality benchmark and the North American Vertical Datum of 1988 (NAVD 88).
- K. Any incorrect or modified information shown on the Record Drawings found during the warranty period shall be corrected by the Developer and Project Engineer and the corrected sheets resubmitted.

302.10 Operation and Maintenance Manuals

- A. An Operation and Maintenance Manual, prepared by the Project Engineer and approved by SBWRD, shall be required for wastewater pump stations.
- B. Submittal Requirements.
 1. One copy of a preliminary draft of the Operation and Maintenance Manual shall be submitted at the 50% stage of construction for review and approval by SBWRD. No release of Improvement Completion Agreement monies beyond 40% will be approved until this submittal occurs.
 2. One copy of the final draft of the Operation and Maintenance Manual shall be submitted at the 90% stage of construction for review and approval by SBWRD. Comments from previous reviews shall be addressed. No release of Improvement Completion Agreement monies beyond 80% will be approved until this submittal occurs.
 3. Four copies of the final approved Operation and Maintenance Manual shall be submitted prior to Final Project Approval of the pump station.
- C. Content.
 1. General description of the facility and how it operates.
 2. Detailed description of all components and how they function in relation to other components.

3. Operating procedures for the overall facility and for its specific components under all operating conditions.
4. Maintenance procedures and schedules.
5. Technical guidance for troubleshooting.
6. Manufacturer's recommended spare parts list and special tools list.
7. Record drawings of the pump station and force mains showing as-constructed condition and meeting the requirements of Section 302.9.
8. Certified pump curves for the installed system.
9. Drawings, schematic diagrams, wiring diagrams, etc. as required to adequately describe the as-constructed facility and its components.
10. Catalog cut sheets, equipment test certifications, and other information for all components of the station. Catalog cut sheets shall be marked to indicate the specific equipment models, serial numbers, etc. included in the station.
11. Other information as required by SBWRD.

SECTION 303 DESIGN CRITERIA FOR PUBLIC WASTEWATER SYSTEM EXTENSIONS AND MODIFICATIONS

303.1 Basis Of Design

- A. Design Period.
 1. The wastewater system shall be designed to serve the estimated ultimate tributary area at buildout.
 2. The wastewater system design shall be based on the best information available, including the SBWRD *Capacity Model*, current development regulations, and approved planning reports when available.
- B. Design Capacity: Main lines shall be designed to carry not less than the design peak flow from the tributary area as follows:
 1. Design Peak Flow.
 - a. 8" through 15" gravity lines: 4.0 times the design average flow.
 - b. Larger than 15" gravity lines: 2.5 times the design average flow.
 - c. Low Pressure Sewer System: According to system manufacturer's recommendations. All gravity lines downstream of the Low Pressure Sewer System shall be designed for the greater of the peak pumping rate of the Low Pressure Sewer System and the peaking factors described above.
 2. Design Average Flow: 320 gallons per Residential Equivalent per day.
 - a. The number of Residential Equivalents assigned to single family residential subdivision lots, condominiums and other

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similar units shall be based on the projected number of bedrooms or living sections that will be built on the lot or unit as submitted by the Developer and approved by SBWRD (One bedroom or living unit is equivalent to 1/3 RE). If this information is not available, the number of Residential Equivalents will be based on similar type developments in the area of the proposed development.

- b. The number of Residential Equivalents assigned to lots in commercial and industrial subdivisions or other similar type developments shall be based on projected water usage for the type of development proposed as submitted by the Developer and approved by SBWRD.

303.2 Location

- A. The location of all wastewater lines that are part of the Public Wastewater System shall comply with the requirements of Section 102.2.
- B. If construction of a new wastewater line in an existing road is detrimental to the existing road, is cost prohibitive as determined by SBWRD, or an alternative is in the best interest of SBWRD, the new line may be located along the edge of the road.
 1. Manholes or other access and maintenance features on the line shall be located a maximum 10' from the back of curb or edge of asphalt.
 2. A Manhole Platform meeting the requirements of the standard detail in Appendix C shall be provided.
 3. Grading around the manholes shall provide for road side drainage and drainage away from the manhole.
 4. Roadway shoulder with steep cut or fill slopes.
 - a. Special grading shall be required for manholes located on steep slopes within roadway shoulder areas.
 - b. An acceptable design for grading under this circumstance shall be submitted to SBWRD for approval.
 - c. A minimum distance of 3' from the edge of the manhole to any slope retention shall be required.

303.3 Protection of Water Supplies

- A. Wastewater system appurtenances shall be kept remote from public water supply wells, other water supply sources and structures, and water distribution systems. The following requirements shall be observed at all times.
- B. The wastewater system shall be designed in accordance with the rules and requirements of *State of Utah Rule for Public Drinking Water Systems* as

contained in *R309-550, UAC, Facility Design and Operation: Transmission and Distribution Pipelines* and *R309-600, UAC, Drinking Water Source Protection for Groundwater Sources*.

- C. The Project Engineer shall be responsible to review Drinking Water Source Protection Plans and Management Programs for the project area and incorporate the requirements into the wastewater system design.
- D. The Project Engineer shall show existing wells or springs on the construction drawings and indicate horizontal distances from the well head to the wastewater system.
- E. Horizontal and vertical pipe separation between culinary water lines and wastewater system main lines and private lateral lines shall comply with the following requirements.
 1. Horizontal separation: Wastewater main lines and private laterals shall be installed a minimum 10' horizontally from any existing or proposed water main or service, measured edge of pipe to edge of pipe.
 2. Vertical separation at crossings: Where wastewater main lines or private laterals must cross culinary water lines, wastewater lines shall be at least 18" below the bottom of the water line, measured edge of pipe to edge of pipe.
 3. If local conditions prevent a ten foot horizontal separation, the wastewater line may be laid closer than 10' to a water main provided:
 - a. The reduced separation is approved by SBWRD and the water system authority. The Project Engineer may be required to submit justification for the conditions preventing separation to be maintained.
 - b. The top of the wastewater line shall be at least 18" below the bottom of the water line, measured edge of pipe to edge of pipe.
 - c. Wastewater main line pipe material shall be ductile iron with mechanical or restrained joints or HDPE with butt-fusion welded joints. Private lateral pipe material shall be ductile iron with mechanical or restrained joints, PVC with solvent-weld joints or HDPE with butt-fusion welded joints. Water line materials shall comply with *State of Utah Rule for Public Drinking Water Systems*. Other pipe materials are subject to specific approval by the District and the water authority.
 - d. The wastewater line is laid according to one of the following criteria;
 - i. in a separate trench, or
 - ii. The water main is laid on an undisturbed earth shelf on one side of the wastewater line trench with the maximum possible separation possible,

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- but in no case less than 24" horizontal separation between the water and wastewater line, or
- iii. The wastewater line trench is compacted to 95% of the Modified Proctor Density or greater, with the maximum separation possible, but in no case less than 24" horizontal separation between the water and wastewater line.
4. If local conditions prevent a minimum vertical separation of 18" to be maintained between the wastewater line and water line at crossings, reduced separation may be allowed with the following requirements:
 - a. The reduced separation and routing are approved by SBWRD and the water system authority. The Project Engineer may be required to submit justification for the conditions preventing separation to be maintained.
 - b. The vertical separation shall be maximized but in no case shall the pipes be in contact.
 - c. Wastewater main line pipe material shall be ductile iron with mechanical or restrained joints or HDPE with butt-fusion welded joints. Private lateral pipe material shall be ductile iron with mechanical or restrained joints, PVC with solvent-weld joints or HDPE with butt-fusion welded joints. Water line materials shall comply with *State of Utah Rule for Public Drinking Water Systems*. Other pipe materials are subject to specific approval by the District and the water authority. Special design requirements may be required.
 - d. Minimum depth requirements for the wastewater line as contained in Section 303 shall be met.
 5. If local conditions prevent the water line from crossing over the wastewater line, the wastewater line may be routed over the water line with the following requirements:
 - a. The routing is approved by SBWRD and the water system authority. The Project Engineer may be required to submit justification for the conditions preventing separation to be maintained.
 - b. A minimum 18" vertical separation shall be maintained between the lines, measured edge of pipe to edge of pipe.
 - c. Wastewater main line pipe material shall be ductile iron with mechanical joints or restrained joints or HDPE with butt-fusion welded joints. Private lateral pipe material shall be PVC with solvent-weld joints or HDPE with butt-fusion welded joints. Water line materials shall comply with *State of Utah Rule for Public Drinking Water Systems*. Other pipe materials are subject to specific approval by the District and the water authority.
- d. The crossing shall be arranged so that the wastewater line joints are equidistant and as far as possible from the water line joints.
 - e. Special bedding, consisting of cement treated backfill or untreated base course material compacted to 95% of the Modified Proctor Density, shall be required to be placed between the water line and the wastewater line.
 - f. Minimum depth requirements for the wastewater line as contained in Section 303 shall be met.
- F. The separation of wastewater lines from all secondary water system lines and irrigation lines 6" diameter and greater shall comply with the rules and requirements in Paragraph E.

303.4 Separation From Other Utilities

- A. Wastewater main lines and private lateral lines shall be located below all existing and proposed utilities with a minimum separation of 18" for main lines and 12" for private lateral lines, measured edge of pipe to edge of pipe or utility line.
- B. If local conditions prevent the wastewater lines from being located below other utilities, the wastewater line may be routed over the other utilities with the following requirements:
 1. The routing is approved by SBWRD and the utility authority. The Project Engineer may be required to submit justification for the conditions preventing this requirement from being met.
 2. A minimum vertical separation of 18" for main lines and 12" for private lateral lines from edge of pipe to edge of pipe or utility line shall be maintained.
 3. Special bedding, consisting of cement treated backfill or untreated base course material compacted to 95% of the Modified Proctor Density, shall be required to be placed between the existing pipe or utility line and the wastewater line.
 4. Minimum depth requirements for the wastewater line as contained in Section 303 shall be met.
- C. If local conditions prevent a minimum vertical separation of 18" for main lines and 12" for private lateral lines between the wastewater line and other utilities, reduced separation may be allowed with the following requirements:
 1. The reduced separation and routing is approved by SBWRD and the utility system authority. The Project Engineer may be required to submit justification for the conditions preventing separation to be maintained.

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2. The vertical separation shall be maximized but in no case shall the pipes be in contact
3. Wastewater main line and private lateral line may be required to be constructed of ductile iron pipe with mechanical joints or restrained joints, or HDPE with butt-fusion welded joints, as determined by SBWRD. Special design requirements may also be required.
4. Special bedding, consisting of cement treated backfill or untreated base course material compacted to 95% of the Modified Proctor Density, shall be required to be placed between the existing pipe or utility line and the wastewater line.
5. Minimum depth requirements for the wastewater line as contained in Section 303 shall be met.

303.5 Site Improvements Within Public Wastewater Line Easements

- A. Permanent structures shall not be located within Public Wastewater Line easements.
- B. Trees and other major landscaping features shall not be located within Public Wastewater Line easements.
- C. Lighting poles, retaining walls and large landscape rocks shall not be located within Public Wastewater Line easements.
- D. Irrigation systems within Public Wastewater Line easements shall be designed to minimize interference with the wastewater line alignment. Major feeder, valves, and controllers shall not be located within the easement.
- E. Driveways or streets with snowmelt or heating systems imbedded in the pavement shall not be located within Public Wastewater Line easements.
- F. Walks and trails shall be designed to minimize interference with the wastewater line alignment. When walks, private driveways or trails are utilized as access roadways, the pavement or trail section shall be designed to support wastewater maintenance equipment (heavy axle) without damaging the surface.

303.6 Gravity Flow Main Lines

- A. Line Size: 8" minimum diameter.
- B. Line Depth.
 1. The depth of gravity flow main lines should be sufficient to provide gravity service to the lower building level(s) of each lot. This is determined from the roadway elevation at the center of the lot plus an allowance for 2 percent slope on laterals from the center of the anticipated building pad to the proposed wastewater main.
 2. If the depth of a gravity line is required to exceed 16' to provide gravity service to lots or as a result of other site constraints, alternative design measures which will eliminate the lines with excessive depth may be required, including:
 - a. Reconfiguration of the lots and roads in the

- proposed development.
- b. Realignment of the proposed wastewater lines.
- c. Ejector or grinder pumps for those lots requiring the excessive depth.
- d. Low Pressure Sewer System.
- e. Off-road wastewater lines.
3. The minimum depth of gravity flow main lines from the top of the pipe to the finished grade elevation shall be as follows:
 - a. 5' below elevation 7,000.
 - b. 6' above elevation 7,000.
 - c. The design minimum depth shall provide required cover over gravity and pressure laterals, as applicable.
- C. Minimum Slope.
 1. Pipe slopes shall be calculated using the horizontal distance from inside manhole wall to inside manhole wall and the flow line elevations at the inside manhole wall.
 2. Gravity flow main lines shall be designed and constructed with slopes sufficient to achieve flow velocities of not less than 2.0 feet per second for the anticipated design peak flow, based on Manning's formula.
 3. A Manning's "n" value of 0.013 shall be used for all pipe materials.
 4. If site constraints such as topography or depth of existing wastewater lines results in pipe slopes less than those required to achieve a velocity of 2.0 feet per second, alternative design measures which eliminate the flat lines may be required including:
 - a. Realignment of the proposed wastewater lines.
 - b. Individual ejector or grinder pumps for those lots requiring the flat lines
 - c. Low Pressure Sewer System.
 - d. Off-road wastewater lines.
 5. Exceptions to the requirement to achieve a velocity of not less than 2.0 feet per second for the anticipated design peak flow shall be specifically approved by SBWRD on a case by case basis.
 6. In all cases the minimum slope of any line segment shall not be less than the following.

<u>Sewer Size</u>	<u>Minimum Slope in Feet per 100 Feet (%)</u>
8"	0.40
10"	0.28
12"	0.22
14"	0.17
15"	0.15
16"	0.14
18"	0.12
21"	0.10

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24" 0.08

7. Any line segment that has any portion of the line with a slope less than minimum shall be re-installed.
- D. Maximum slopes.
1. The slope of the wastewater line should generally be less than 67 percent (1½:1).
 2. Special design consideration, including pipe anchoring and pipe material, shall be given to wastewater lines with slopes greater than 33.3%.
- E. Pipe Anchors.
1. Wastewater lines on slopes 3:1 (33.3 percent) or steeper shall be anchored to prevent displacement.
 2. At the discretion of SBWRD, an exception to this requirement may be made if the pipe material is butt fusion welded HDPE, or restrained joint or mechanical joint ductile iron.
 3. Pipes with bell and spigot joints shall be anchored immediately down gradient of bells with pipe anchors as follows:
 - a. Not over 26' center-to-center on slopes 3:1 to 2:1 (33.3 percent to 50 percent.)
 - b. Not over 13' center-to-center on slopes steeper than 2:1 (50 percent).
 4. The location and spacing of anchors on butt fusion welded HDPE, or restrained joint or mechanical joint ductile iron shall be as directed by SBWRD.
- F. Alignment.
1. Gravity flow main lines shall be designed on straight horizontal and vertical alignments between manholes. Curvilinear alignments meeting the requirements of Section 303.7, may be allowed on a case by case basis as approved by SBWRD.
 2. Wastewater lines shall be located at a sufficient distance from curb and gutter and other structures to eliminate disturbance during possible future repair of the sewer line.
- G. Tracer Wire.
1. Tracer wire shall be installed directly on top of the pipe, along the entire length of all gravity flow main lines.
 2. The tracer wire shall be attached to the pipe at maximum 5' intervals with duct tape or zip ties.
 3. The tracer wire shall be continuous from manhole to manhole and shall terminate inside the manhole according to Standard Detail MH-01.
 4. A successful continuity test on the installed tracer wire will be required at the end of construction prior to final project approval.
- H. Marking Tape.
1. Marking tape shall be installed vertically above the pipe, along the entire length of gravity flow

main lines.

2. The tape shall be located at a depth of 2' to 3' above the top of the pipe.
3. The warning tape depth shall be consistent along the entire length of the line.
4. Where other utilities are crossed, a second strip of marking tape may be required between the utility and the wastewater line.

303.7 Curved Gravity Flow Main Lines

- A. Gravity flow main lines may be designed and constructed on curvilinear horizontal and vertical alignments on a case by case basis as approved by SBWRD. If the use of curvilinear lines is approved the following criteria shall apply.
- B. The requirements of Section 303.6 shall apply.
- C. Pipe material shall be HDPE meeting the requirements of Section 402.3.
- D. The number of horizontal and vertical curves in a line segment shall be minimized.
- E. Minimum slope: 5% unless the following special construction procedures are used in which case 3% minimum.
1. Installed pipe must be surveyed by a qualified surveyor every 10' to demonstrate that a 3% slope is maintained.
 2. Any line segment that has any portion of the surveyed line with a slope less than 2.5% shall be re-installed.
 3. Survey notes shall be submitted to SBWRD to demonstrate compliance with these requirements.
 4. The party responsible for performing the survey and submitting survey notes shall be determined during the Pre-construction Meeting.
- F. Minimum radius of horizontal and vertical curves: 100' unless specifically approved by the District Engineer in which case special construction procedures similar to those contained in paragraph E shall be used. Radiuses less than 50' shall not be allowed
- G. The construction methods and procedures that will be used to assure that the lines are constructed to the design horizontal and vertical alignment shall be submitted and approved by SBWRD.
- H. Additional construction and as-constructed surveying will be required to provide accurate location information for the as-constructed line. This information shall be indicated on the Record Drawings.
- I. Tracer Wire.
1. Tracer wire shall be installed directly on top of the pipe, along the entire length of all curved gravity flow main lines.
 2. The tracer wire shall be attached to the pipe at maximum 5' intervals with duct tape or zip ties.
 3. The tracer wire shall be continuous from manhole to manhole and shall terminate inside

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the manhole according to Standard Detail MH-01.

4. A successful continuity test on the installed tracer wire will be required at the end of construction prior to final project approval.

J. Marking Tape.

1. Marking tape shall be installed vertically above the pipe, along the entire length of all curved gravity flow main lines.
2. The tape shall be located at a depth of 2' to 3' above the top of the pipe.
3. The warning tape depth shall be consistent along the entire length of the line.
4. Where other utilities are crossed, a second strip of marking tape may be required between the utility and the wastewater line.

303.8 Manholes

A. Diameter:

1. Manholes shall have a minimum inside diameter of 4'.
2. Manholes with the following conditions shall have an inside diameter of 5'.
 - a. Manholes constructed with an inside drop structure.
 - b. Manholes with a depth greater than 16'.
 - c. Manholes connecting to lines 18" and greater.
 - d. Low Pressure Sewer System flushing connections and combination air valve manholes.
3. An evaluation to determine if a larger diameter manhole is required to accommodate connecting lines and provide an adequate shelf in the base of the manhole for maintenance shall be conducted for the following situations.
 - a. Manholes with 4 or more main lines or private lateral wastewater lines connecting to the manhole.
 - b. Manholes with the angle between any adjacent connecting lines less than 100 degrees.
 - c. Other configurations as required by SBWRD.
 - d. A detail of the manhole base shall be provided on the construction drawings for these manholes. The detail shall be drawn to scale and shall include the deflection angle and flow line elevation of all connecting lines.

B. Location.

1. Manholes shall be installed at both ends of each main line segment; at all changes in pipe size; at all changes in alignment or grade (unless a curved gravity flow main line); and at intervals not to exceed 400' for lines 15" in diameter or smaller, or 500' for lines 18" in diameter and

larger.

2. Manholes shall be placed within a 5-foot offset from the street center line whenever possible. If circumstances warrant and as specifically approved by SBWRD, manholes may be located outside the 5-foot offset. However, in these special cases the manhole shall be located within the pavement with a minimum distance of 2.5' required between edge of pavement, concrete curb or gutter, and edge of manhole rim.
3. Manholes shall not be located in waterways, gutters or drainage swales.
4. Manholes shall not be placed within 10' of storm drains, catch basins, or in low points where catch basins are located.
5. Watertight, seal-down covers shall be provided in areas subject to flooding below the 100 year floodplain.
6. Cleanouts shall not be used as an alternative to manholes on public sewer lines.
7. With the exception of sampling manholes installed according to pretreatment requirements, manholes shall not be placed on private lateral lines.
8. Manholes shall not be located within sports playing field areas or where exercise activities may occur.

C. Drop through Manholes.

1. The minimum elevation difference between the flow line of incoming and outgoing lines in manholes (minimum drop) as calculated at the inside manhole wall shall meet the more restrictive of the following criteria.
2. Slope of connecting lines:
 - a. Minimum slope to 5%.
 1. 4-foot diameter manhole: 0.2'.
 2. 5-foot diameter manhole: 0.25'.
 - b. 5% and above: Drop required to match slope of connecting lines. Provide smooth transition through manhole.
3. Angle between incoming and outgoing line less than 110 degrees: 0.5'.
4. Pipe Size Transitions: Meet requirements of Section 303.8.D.
5. The flow line (invert) elevations at the inside manhole wall of all connecting lines shall be shown on the construction drawings.
6. A detail of the manhole base, including a section along the length of the flow line, shall be required for manholes with a connecting line with a slope 20% and greater, or when requested by SBWRD.

D. Pipe Size Transitions.

1. To approximately maintain the flow energy gradient in manholes where pipe diameters change, the elevation of the 0.8 depth of the incoming pipe shall be placed at the same

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- elevation as the 0.8 depth of the outgoing pipe, with additional allowance for the drop through manholes discussed in paragraph C above.
2. Where a wastewater main line intersects with a manhole located on a major collector or trunk line, the crown of the incoming wastewater line shall match the crown of the collector or trunk line.
- E. Drop Manhole Connections.
1. Drop manhole connections shall be avoided in the design of the wastewater collection system and will require approval on a case by case basis by SBWRD.
 2. Drop manhole connections shall be required whenever the elevation difference between the flow lines of the incoming pipe and the outgoing pipe, as calculated at the inside manhole wall, exceeds 18".
 3. Drop connections shall be constructed with an internal drop.
 4. Drop manholes shall be a minimum 5' diameter.
 5. If a drop manhole is to be constructed at an existing 4-foot diameter manhole, the existing manhole shall be replaced with a 5-foot diameter manhole and the drop constructed.
- F. Shallow Manholes:
1. Shallow manholes shall be required for manhole depths less than 6.3', but not allowed for manholes with depths greater than 6.7' as measured from the top of rim to the invert.
 2. Shallow manholes shall be indicated on the construction drawings.
- G. Sufficient information shall be shown on the construction drawings to allow for efficient design review, manufacture, construction and inspection of the manhole components and installed manhole.
- 303.9 Low Pressure Sewer Systems**
- A. Proposed Low Pressure Sewer Systems and manufacturers shall be approved by SBWRD.
- B. Intermixing of different manufacturer's Low Pressure Sewer Systems or low pressure pumps within the same Low Pressure System shall not be permitted.
- C. The layout of the Low Pressure Sewer Systems shall minimize the length, number of branches, and number of connections on the Low Pressure Sewer System. A combination of smaller Low Pressure Sewer Systems discharging to gravity flow lines is preferable to a large and complex Low Pressure Sewer System.
- D. The design of the Low Pressure Sewer System shall be based on the system manufacturer's recommendations for line sizing and maximum total system head with the following minimum requirements.
- E. Line Size: shall be sized to provide a minimum velocity of 2.0 feet per second while minimizing head losses through the system during system operation.
- F. Maximum Total System Head: shall not exceed the system manufacturer's recommended allowable head for the pump system being proposed at any point on the Low Pressure Sewer System. Total system head consists of static (elevation) head plus accumulated friction losses through the system.
- G. Detailed calculations for each branch of the Low Pressure Sewer System, including the following minimum information, shall be required.
1. Number of units connected to the Low Pressure Sewer System.
 2. Design maximum flow.
 3. Pipe size.
 4. Design velocity at design maximum flow.
 5. Friction losses.
 6. Static(elevation) head.
 7. Total head.
- H. Minimum Line Depth: shall be located below all other utilities with a minimum 18" vertical separation, measured edge of pipe to edge of pipe, from other utilities and shall have a minimum depth of 7' from the top of the pipe to the finished grade elevation.
- I. Vertical Alignment: shall minimize the number of high points, low points and significant changes in grade on the system.
- J. Horizontal Alignment.
1. Placed at a horizontal offset of 5' from the street center line.
 2. Located at a sufficient distance from curb and gutter and other structures to eliminate disturbance during possible future repair of the line.
 3. Not placed within 5' of catch basins, vaults or other similar structures.
- K. Connection of the Low Pressure Sewer System main line to the gravity wastewater collection system shall occur at a manhole and shall meet the following requirements.
1. The invert of the Low Pressure Sewer System main line shall enter the manhole 0.5' above the invert elevation of the gravity outlet line unless the depth of the Low Pressure Sewer System main line would exceed 9', in which case a drop within the manhole will be allowed.
 2. The manhole base shall have a formed channel from the Low Pressure Sewer System main line to the gravity outlet line to minimize disturbance of the wastewater entering the manhole.
 3. To minimize hydrogen sulfide attack on the manhole structure, the interior of the manhole to which the Low Pressure Sewer System main line is connected shall have Manhole Interior Coating meeting the requirements of Section 404.17 applied to all interior concrete surfaces and manhole section joints.
 4. The receiving manhole shall be designed and located with consideration for proximity to

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- existing and future residences, businesses and other facilities which may be affected by potential wastewater odors generated in the Low Pressure Sewer System main line that may be released at the manhole.
5. A manhole odor control unit shall be installed on the receiving manhole.
- L. Appurtenances
1. Combination air valves and flushing connections shall be included in the design of the Low Pressure Sewer System. The location of these valves on the system shall be approved by SBWRD and should meet the following general guidelines.
 2. Combination air valves should be installed at system high points, at significant changes in grade where air pockets can form and at intervals of 2,000' to 2,500' in long horizontal runs that lack a clearly defined high point.
 3. Manholes containing air valves shall have a standard frame with special vented cover and manhole odor control unit installed.
 4. To minimize hydrogen sulfide attack on the manhole structure, the interior of manholes containing air valves shall have Manhole Interior Coating meeting the requirements of Section 404.17 applied to all interior concrete surfaces and manhole section joints.
 5. Flushing connections shall be installed at the terminal end of each main line, wherever two or more main lines come together and feed into another main line and at other locations, as determined by SBWRD, that will facilitate operation and maintenance of the system.
 6. Flushing connection manholes shall have a frost proof manhole frame and cover with a water-tight seal-down cover.
 7. The location of manholes containing these appurtenances should generally follow the requirements for manhole locations under Section 303.8.
- M. Tracer Wire.
1. Tracer wire shall be installed directly on top of the pipe, along the entire length of all low pressure sewer system main lines.
 2. The tracer wire shall be attached to the pipe at maximum 5' intervals with duct tape or zip ties.
 3. The tracer wire shall be continuous from manhole to manhole and shall terminate inside the manhole according to Standard Detail MH-01.
 4. A successful continuity test on the installed tracer wire will be required at the end of construction prior to final project approval.
- N. Marking Tape.
1. Marking tape shall be installed vertically above the pipe, along the entire length of all Low Pressure Sewer System Main Lines.
 2. The marking tape shall be located at a depth of 2' to 3' above the top of the pipe.
 3. The marking tape depth shall be consistent along the entire length of the line
 4. Where other utilities are crossed, a second strip of marking tape may be required between the utility and the wastewater line.
- 303.10 Wastewater Pump Stations**
- A. The SBWRD Wastewater Pump Station policy in Section 102.4 shall be followed.
 - B. Wastewater pump stations shall meet the Utah Department of Environmental Quality, Division of Water Quality pump station design requirements as outlined in R317-3-3, Utah Administrative Code, Sewage Pumping Stations.
 - C. In addition to the above requirements, wastewater pump stations shall meet the following requirements.
 1. Type of Pump Station.
 - a. Pump stations shall generally be of the submersible pump type.
 - b. A minimum of two pumps, each capable of pumping the total design flow, shall be provided.
 - c. The pump station controls shall provide for automatic alternating of the lead pump.
 2. Design Flows.
 - a. Pump station structures, equipment and piping shall be designed to handle the ultimate tributary flow at buildout.
 - b. Provisions for smaller interim flows shall be provided for in the design of the pump station.
 3. Property Ownership: The property on which the pump station is located shall be deeded to SBWRD.
 4. Accessibility:
 - a. A paved, all-weather access road shall be provided to the pump station.
 - b. The access road may be granted by way of an easement.
 - c. The Developer may be required to provide ongoing snow removal from the access road as part of the LEA.
 5. Security: The pump station equipment and controls shall be adequately protected with appropriate buildings and fencing to prohibit unauthorized entry by the public.
 6. Weather: The pump station equipment, buildings, vaults, piping, valves, controls, access roads, etc. shall be designed for the weather conditions experienced in the area including sub-zero temperatures, large accumulations of snow, blowing and drifting snow, etc.
 7. Pump Station Building: The emergency generator, pump and equipment controls,

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- electrical panels, communication equipment, odor control equipment, etc. shall be housed in a heated and vented weatherproof building. It shall be the responsibility of the Developer to obtain approval of the building and site improvements from the local planning and building departments.
8. Equipment Removal: Portable hoists or other equipment shall be provided to facilitate the removal of pumps and other equipment.
 9. Flow Measurement: Continuous measuring and recording of wastewater flow shall be provided at each pump station.
 10. Alarm, Control and Monitoring System.
 - a. A remote alarm, control and monitoring system which allows for remote control and monitoring of the pump station operation and noticing of alarm conditions shall be provided at each pump station.
 - b. The system shall be compatible with SBWRD pump station SCADA system.
 11. Odor Control Facilities: Facilities to control odors generated at the pump station shall be provided.
 12. Pump stations shall be equipped with in-line grinding devices, or equivalent, as approved by SBWRD, to prevent clogging of pumps.
 13. Emergency Operations:
 - a. An in-place, engine driven, emergency generator with an automatic transfer switch shall be provided at each pump station.
 - b. A piping connection for a portable pump with appropriate valving and an at-grade connection shall be provided at the pump station to allow pumping of wastewater around the pump station.
 - c. The generator shall be fueled by natural gas, if the natural gas supply is available near the pump station, or diesel.
 14. Spare Parts and Service.
 - a. Equipment and spare parts for all pump station components shall be available from local manufactures and suppliers.
 - b. Local service representatives shall be available for assistance with repair of pump station components.
- D. Detailed calculations for the wastewater pump station and appurtenances shall be submitted for review and approval.
- E. An Operation and Maintenance Manual shall be submitted according to the requirements of Section 302.10, Operation and Maintenance Manuals.
- F. Start-up services and training on the completed pump station shall be completed according to the requirements of Section 510.
- G. Acceptance testing of the completed pump station shall be completed according to the requirements of

Section 515.8.

303.11 Force Mains

- A. Number of Lines.
 1. Generally a single force main from the wastewater pump station to the receiving manhole will be adequate. However, if the buildout of the pump station service area will occur over several years, dual force mains may be required to assure adequate velocities in the lines during the early years.
 2. The projected timing of the service area buildout shall be considered during design.
- B. Line Size: shall be sized to provide a minimum velocity of 2.0 feet per second while minimizing head losses through the system during system operation.
- C. Design Friction Losses.
 1. Friction losses through force mains shall be based on the Hazen Williams formula or other hydraulic analysis to determine friction loss.
 2. When the Hazen Williams formula is used, the design shall be based on a value of C equal to 120.
- D. Design Pressure: force mains and fittings, including reaction blocking, shall be designed to withstand normal pressure and pressure surges (water hammer).
- E. Detailed calculations for the force main shall be submitted with the pump station calculations.
- F. Air Valves.
 1. Combination air valves shall be included in the design of the force main. The location of these valves on the system shall be approved by SBWRD.
 2. Combination air valves should be installed at system high points, at significant changes in grade where air pockets can form and at intervals of 2,000' to 2,500' in long horizontal runs that lack a clearly defined high point.
 3. Combination air valves shall be sized for the specific location and system configuration.
 4. Manholes containing air valves shall have a standard frame with special vented cover and manhole odor control unit installed.
 5. To minimize hydrogen sulfide attack on the manhole structure, the interior of manholes containing air valves shall have Manhole Interior Coating meeting the requirements of Section 404.17 applied to all interior concrete surfaces and manhole section joints.
 6. The location of manholes containing the air valves should generally follow the requirements for manhole locations under Section 303.8. Manholes.
- G. Minimum Line Depth: shall be located below all other utilities with a minimum 18" vertical separation, measured edge of pipe to edge of pipe, from other utilities and shall have a minimum depth of 7' from the

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- top of the pipe to the finished grade elevation. Certain environmental or site-specific conditions may require the line to be installed at a greater depth in order to prevent freezing, as determined by SBWRD.
- H. Vertical Alignment: shall minimize the number of high points, low points and significant changes in grade on the system.
- I. Horizontal Alignment.
1. Located at a sufficient distance from curb and gutter and other structures to eliminate disturbance during possible future repair of the line.
 2. Not placed within 5' of catch basins, vaults or other similar structures.
- J. Connection of the force main to the gravity wastewater collection system shall occur at a manhole and shall meet the following requirements.
1. The invert of the force main line shall enter the manhole 0.5' above the invert elevation of the gravity line. A drop greater than 0.5' will not be allowed.
 2. The force main shall enter the manhole as near to 180 degrees from the gravity outlet line as possible.
 3. The manhole base shall have a formed channel from the force main to the gravity outlet line to minimize disturbance of the wastewater entering the manhole.
 4. To minimize hydrogen sulfide attack on the manhole structure, the interior of the manhole to which the force main is connected shall have Manhole Interior Coating meeting the requirements of Section 404.17 applied to all interior concrete surfaces and manhole section joints.
 5. The receiving manhole shall be designed and located with consideration for proximity to existing and future residences, businesses and other facilities which may be affected by potential wastewater odors generated in the pump station and force main that may be released at the manhole.
 6. Receiving manholes shall have a standard frame with special vented cover and manhole odor control unit installed.
- K. Tracer Wire.
1. Tracer wire shall be installed directly on top of the pipe, along the entire length of all force mains.
 2. The tracer wire shall be attached to the pipe at maximum 5' intervals with duct tape or zip ties.
 3. The tracer wire shall be continuous from manhole to manhole and shall terminate inside the manhole according to Standard Detail MH-01.
 4. A successful continuity test on the installed tracer wire will be required at the end of construction prior to final project approval.
- L. Marking Tape.
1. Marking tape shall be installed vertically above the pipe, along the entire length of the force main.
 2. The marking tape shall be located at a depth of 2' to 3' above the top of the pipe.
 3. The marking tape depth shall be consistent along the entire length of the force main.
 4. Where other utilities are crossed, a second strip of marking tape may be required between the utility and the wastewater line.

303.12 Borings

- A. Borings under roadways or other similar facilities; consisting of a bored or jacked casing pipe, a carrier pipe and appurtenances; may be approved on a case-by-case basis when a cut and fill installation method is not allowed by the owner of the roadway or facility.
- B. Borings shall be designed in accordance with applicable City, County, State, or Federal standards and requirements.
- C. Approval for the boring shall be obtained from the owner of the roadway.
- D. Borings under Interstate Highways shall, as a minimum, extend from right-of-way line to right-of-way line.
- E. Casing pipe and carrier pipe material, size, length, and flow line elevations shall be shown on construction drawings.
- F. Casing pipe shall meet requirements of Section 409.
- G. Minimum casing diameter shall typically be 24" to allow for possible upsizing of the carrier pipe in the future, however smaller sized casings may be allowable on a case by case basis as approved by SBWRD.
- H. SBWRD may require submittal of additional structural calculations with construction drawings.
- I. The carrier pipe shall generally be the same pipe material as the connecting wastewater lines.
- J. The carrier pipe shall be supported by manufactured casing spacers designed specifically for this application. Redwood skids are not acceptable.
- K. Casing end seals shall be installed at either end of the casing pipe to prevent migration of water and soil along the carrier pipe.
- L. The design of the boring shall allow for some variance in the installed boring line and grade.
- M. Construction drawings shall require the bored portion of the wastewater line to be completed before construction of the adjacent portions of line to allow for discrepancies in alignment and grade which may occur during the boring operation.

303.13 Casings

- A. Wastewater lines shall be installed inside casings when

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additional protection of the line is necessary as determined by the Project Engineer or SBWRD.

- B. SBWRD may require submittal of additional structural and pipe loading calculations with construction drawings to determine the need for additional protection.
- C. Casing pipe and carrier pipe material, size, length, and flow line elevations shall be shown on construction drawings.
- D. Minimum casing diameter shall typically be 24" to allow for possible upsizing of the carrier pipe in the future, however smaller sized casings may be allowable on a case by case basis as approved by SBWRD.
- E. The carrier pipe shall generally be the same pipe material as the connecting wastewater lines.
- F. The carrier pipe shall be supported by manufactured casing spacers designed specifically for this application. Redwood skids are not acceptable.
- G. Casing end seals shall be installed at either end of the casing pipe to prevent migration of water and soil along the carrier pipe.

303.14 Groundwater Migration

- A. The Project Engineer shall consider methods to prevent the continuous migration of groundwater along the trench line including the installation of trench dikes. The methods used shall be approved by SBWRD.
- B. Trench Dikes shall be installed on wastewater lines down gradient from all ditch and stream crossings, periodically along all wastewater lines installed in areas subject to ground water and at other locations as determined by the Project Engineer and approved by SBWRD.

SECTION 304 SUBMITTAL REQUIREMENTS AND DESIGN CRITERIA FOR PRIVATE LATERAL WASTEWATER LINES

304.1 Description

- A. The design of Private Lateral Wastewater Lines shall include the submittals and required information described in Section 203. Section 304 covers the minimum criteria that shall be used for the design of Private Lateral Wastewater Lines.
- B. Ownership, construction, maintenance and operation of Private Lateral Wastewater Lines from the building to the Public Waster System line, including the connection to the Public Wastewater System line, shall be the responsibility of the property owner.
- C. However, to protect the Public Wastewater System to which they connect, Private Lateral Wastewater Lines shall meet or exceed the minimum requirements

contained in these specifications.

304.2 Basis Of Design

- A. Private Lateral Wastewater Lines shall conform to applicable parts of the International Plumbing Code. Where the requirements of these SBWRD Standards are more restrictive than the International Plumbing Code, SBWRD Standards shall govern.
- B. Each residence, building or other facility shall connect to the Public Wastewater System by way of a separate Private Lateral Wastewater Line unless the requirements for Common Private Lateral Wastewater Lines in Section 102.5 are met and the Common Lateral Wastewater Line is specifically approved by SBWRD.
- C. Private Lateral Wastewater Lines shall be sized according to requirements of the International Plumbing Code for building sewers.
- D. A Private Lateral Wastewater Line stub shall be provided as part of the construction of the Public Wastewater System extension or modification to each lot or building that is part of the development project.
- E. If the extension of the Public Wastewater System passes adjacent to other lots or parcels outside of the proposed development with existing buildings or structures that are not connected to the Public Wastewater System, a Private Lateral Wastewater Line stub shall also be provided to those lots or parcels, as determined by SBWRD.
- F. Private Lateral Wastewater Lines shall not connect directly to Public Wastewater System lines larger than 15" in diameter.
- G. In all cases, a manhole shall be used to connect wastewater lines 8" and larger to Public Wastewater System lines.
- H. Private Lateral Wastewater Lines shall be gravity flow meeting the requirements of Section 304.6, unless one of the following criteria are met.
 - 1. The topography of the development would require a gravity flow Public Wastewater line which is located in a paved road to have an excessive depth as defined in Section 303.6.
 - 2. The lot or building being served is part of an approved Low Pressure Sewer System.
 - 3. The lot or building being served has received prior approval from SBWRD as an ejector lot as evidenced by a note on the subdivision plat, and a gravity flow lateral option is still not available.
 - 4. The existing Public Wastewater line to which the Private lateral will connect is not at a sufficient depth to allow for a gravity flow Private Lateral line.
- I. If a gravity flow Private Lateral line meeting the requirements of these SBWRD standards is achievable for a portion of the building being served, the Private Lateral line from the building to the connection to the Public Wastewater line shall be

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gravity flow, and any pumping required for lower levels of the building shall occur within the structure.

304.3 Location

- A. Private laterals should not be located under driveways, retaining walls or other areas that may restrict access to the private lateral for maintenance and repair, may cause damage to the private lateral, or may increase the possibility of the lateral freezing.
- B. In areas where this cannot be avoided, additional depth, additional cleanouts, material changes, or other precautions as conditions warrant, may be necessary, as proposed by the building owner or his contractor, and acknowledged by SBWRD.

304.4 Protection of Water Supplies

- A. Private laterals shall meet the requirements of Section 303.3.

304.5 Separation From Other Utilities

- A. Private laterals shall meet the requirements of Section 303.4.

304.6 Gravity Flow Private Lateral Lines

- A. Line Size: 4" minimum diameter. 6" maximum diameter unless specifically approved by SBWRD.
- B. Minimum Depth:
 - 1. 48" from the top of the pipe to the finished grade elevation.
 - 2. Additional depth is recommended for Private Lateral lines located at elevations above 7,000 feet.
 - 3. Additional depth is recommended for Private Lateral lines located under driveways or other areas where the clearing of snow and vehicular traffic may force the frost level deeper.
 - 4. Gravity flow stubs serving ejector pump lots will require a minimum 6' bury depth at the pump to gravity connection to achieve the required 5' bury depth on the pressure lateral.
 - 5. Certain environmental or site-specific conditions, including elevation, surface features over the line (pavement vs. landscaping), etc. may require the private lateral to be installed at a greater depth to prevent freezing.
- C. Minimum Slope: 1/4" per foot (2 percent).
- D. Maximum Slope: 1 foot per foot (100 percent).
- E. Alignment.
 - 1. Private laterals shall be designed on straight horizontal and vertical alignments between bends. Some minor roping or deflection of the private lateral pipe may be allowed.
 - 2. Vertical bends pose problems in obtaining adequate support during backfill and compaction and should therefore be avoided where possible.
 - 3. Curvilinear alignments meeting the requirements

of Section 304.7, may be allowed on a case by case basis as approved by SBWRD.

- F. Pipe Bends: 11 1/4 degree, 22 1/2 degree, and 45 degree pipe bends may be used to change direction of the pipe. 90 degree bends shall not be used. Individual pipe bends shall be a minimum 18" apart.
- G. Pipe Anchors.
 - 1. Private laterals on slopes 3:1 (33.3 percent) or steeper shall be anchored to prevent displacement.
 - 2. At the discretion of SBWRD, an exception to this requirement may be made if the pipe material is butt fusion welded HDPE, or restrained joint or mechanical joint ductile iron.
 - 3. Pipes with bell and spigot joints shall be anchored immediately down gradient of bells with pipe anchors as follows:
 - a. Not over 26' center-to-center on slopes 3:1 to 2:1 (33.3 percent to 50 percent.)
 - b. Not over 13' center-to-center on slopes steeper than 2:1 (50 percent).
 - c. The anchors shall begin and end at the bends where the steeper section occurs.
 - 4. Sections of Private laterals that consist of a single length of pipe between bends and exceeds a 3:1 slope shall not be required to install a pipe anchor if the adjoining sections do not exceed a 3:1 slope.
 - 5. The location and spacing of anchors on butt fusion welded HDPE, or restrained joint or mechanical joint ductile iron shall be as proposed by the building owner or his contractor and approved by SBWRD.

304.7 Curved Gravity Flow Private Lateral Lines

- A. Gravity flow private lateral lines may be designed and constructed on curvilinear horizontal and vertical alignments on a case by case basis as approved by SBWRD.
- B. If the use of curvilinear lines is approved, the following criteria shall apply.
 - 1. The requirements of Section 304.6 shall apply.
 - 2. Pipe material shall be HDPE.
 - 3. The minimum slope of all portions of the line shall be 3.0 percent.
 - 4. The number of horizontal and vertical curves shall be minimized.
 - 5. Minimum radius of horizontal and vertical curves: 50'.

304.8 Cleanouts

- A. Cleanouts shall be installed on all gravity flow Private Lateral Wastewater Lines according to the following requirements.
- B. Number and Location:
 - 1. A minimum of one cleanout shall be required on each gravity flow private lateral line.

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2. The cleanout shall be located within 5' of the building being served.
 3. Additional cleanouts on the private lateral shall be located at the following locations.
 - a. Not more than 100' apart measured from the upstream entrance of the cleanout.
 - b. Not more than 40' apart measured from the upstream entrance of the cleanout, where more than one change of direction occurs in a run of piping. Changes in direction greater than 45 degrees shall not be allowed.
 4. Where specifically approved by SBWRD, bi-directional cleanouts may be installed at intervals not to exceed 200' as measured from the upstream or downstream entrance of the cleanout on straight runs of piping.
- C. Size: same diameter as the private lateral to which it connects.

304.9 Pressure Private Lateral Lines

- A. Design and installation information such as type and size of pumping system; type and size of pressure pipe; valving; and all other information required for the permanent installation of the system, should be submitted to SBWRD for reference purposes.
- B. Line Size: shall be sized to provide a minimum velocity of 2.0 feet per second at the ejector pump design pumping rate.
- C. Maximum Total System Head: shall not exceed the ejector pump manufactures recommended allowable head for the pump system being proposed. Total system head consists of static (elevation) head plus friction losses through the system.
- D. Minimum Depth:
 1. 5' from the top of pipe to finished grade for elevations below 7,000.
 2. 7' from the top of pipe to finished grade for elevations above 7,000.
 3. 7' from the top of pipe to finished grade for Pressure Private Lateral Lines located under driveways or other areas where the clearing of snow and vehicular traffic may force the frost level deeper.
 4. Additional depth is recommended for Pressure Private Lateral lines installed in conditions such as higher elevations, surface features over the line (pavement vs. landscaping), etc., that may lead to freezing of the line at shallower depths.
- E. Vertical Alignment: shall minimize the number of high points, low points and significant changes in grade.
- F. Connection to Gravity Flow Public Wastewater Lines.
 1. The section of private lateral from the street right-of-way or easement line to the Public Wastewater line shall be gravity flow.
 2. A pressure to gravity transition with cleanout per the standard detail in Appendix C shall be installed at the end of the gravity line to allow access.

- G. Connection to Low Pressure Sewer System Main Lines.
 1. The pressure Private Lateral wastewater line shall include a curb stop valve, curb box, and check valve assembly located at the right-of-way line or easement line. Curb boxes located in pavement shall be traffic rated.
 2. Private lateral stubs constructed as part of a Low Pressure Sewer system shall connect to the Low Pressure Sewer System main lines with an in-line fusion welded tee or an electrofusion tapping tee.
 3. New connections to existing Low Pressure Sewer System main lines shall be by way of an electro-fusion pressure tap fitting specifically designed for this application.

304.10 Private Lateral Stubs Constructed With Main Lines

- A. Private lateral stubs constructed in conjunction with new wastewater main lines shall extend from the Public Wastewater line to a minimum 5' beyond the right-of-way or property line.
- B. Private lateral stubs deeper than 15' shall extend to 10' beyond the right-of-way or property line.
- C. Laterals in trenches blasted or saw cut into rock shall have the trench over cut 5' beyond the installed end of the lateral stub.
- D. The end of the Private Lateral stubs shall be capped with a glued-on or fusion welded cap.
- E. Gravity private lateral stubs shall include cleanouts if required by Section 304.8.
- F. Private lateral stubs constructed as part of a Low Pressure Sewer system shall include a curb stop valve, curb box and check valve assembly located at the right-of-way line or easement line with concrete support block under valve box. Curb boxes located in pavement or future driveway areas shall be traffic rated.
- G. Private lateral stubs constructed as part of a Low Pressure Sewer system shall have a minimum depth of 7' from top of pipe to finished grade. Certain environmental or site-specific conditions, including elevation, surface features over the line (pavement vs. landscaping), etc. may require the private lateral stub to be installed at a greater depth to prevent freezing.

304.11 Marking Tape

- A. Marking tape shall be installed vertically above the pipe, along the entire length of all laterals and lateral stubs.
- B. The marking tape shall be located at a depth of 2' to 3' above the top of the pipe.
- C. The marking tape depth shall be consistent along the entire length of the lateral and throughout the project.

304.12 Grease Interceptors, Oil Separators, Sand Interceptors and Sampling Manholes

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- A. A grease interceptor, oil separator or sand interceptor, located outside the facility or building, shall be provided as part of the Private Lateral Wastewater line of any commercial, industrial, and institutional facility or building that has the potential of introducing substances that would be detrimental to the Public Wastewater System, as determined by SBWRD according to the SBWRD Pretreatment Program.
- B. A separate sampling manhole shall be provided with grease interceptors serving restaurants and industrial facilities or as otherwise determined by SBWRD.
- C. Sampling manholes are not required with sand/oil interceptors connected to parking structures or garage drains.
- D. Only grease or oil laden waste shall discharge to the interceptor. Sanitary waste shall be excluded from the interceptor.
- E. Building sewers transporting sanitary waste shall connect to the Private Lateral Wastewater line at or downstream of the sampling manhole.
- F. The structures should be located considering maintenance access and the potential for odors.
- G. Venting of the structure through a vent stack shall not be allowed.
- H. The capacity of the grease interceptor shall be according to the requirements of the International Plumbing Code or as directed by SBWRD. The minimum capacity of grease interceptors serving restaurants shall be 1,000 gallons. The minimum capacity for parking structures shall be 500 gallons.

304.13 Private Lateral Casings

- A. Private Lateral Wastewater lines shall be installed inside casings when additional protection of the line is necessary as determined by SBWRD.
- B. To allow for some variation in how the carrier pipe is positioned in the casing pipe, the casing pipe shall be installed at a minimum 3% slope.
- C. Casing end seals shall be installed at either end of the casing pipe to prevent migration of water and soil along the carrier pipe.

304.14 Private Lateral Borings

- A. Private Lateral Wastewater lines shall not be installed using the boring method unless specifically approved by SBWRD.

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