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1.0 GENERAL REQUIREMENTS AND POLICIES

1.1 General Requirements

1.1.1 Introduction

Ash Creek Special Service District (Ash Creek SSD) is a county government entity over wastewater established in Utah under the Utah State Code. Ash Creek SSD was organized by the Washington County Commission in 1980 as a general-purpose special service district in Washington County, Utah. Ash Creek SSD is administered by a 6-member Administrative Control Board consisting of the mayor and one city council member from each of the municipalities of Hurricane, LaVerkin and Toquerville.

Ash Creek SSD was originally organized so that its boundaries coincided with the municipal boundaries of Hurricane, LaVerkin, and Toquerville, the residents of which are served by a sewer collection and disposal system which is owned and operated by Ash Creek SSD. Ash Creek SSD has enacted Rules of Operation and Construction Standards, which are subject to amendment from time to time, governing the use of the system.

In 2008, the Washington County Commission expanded Ash Creek SSD by annexing into its boundaries certain unincorporated territory in the east half of Washington County. Ash Creek SSD Rules of Operation were amended to provide a framework of rules and regulations governing sewer facilities in these areas. In 2022 a petition for the annexation of the town of Apple Valley was submitted and approved and the town of Apple Valley was incorporated into Ash Creek SSD.

1.1.2 Title

These regulations shall be known as Development Procedures, Design Standards and Construction Specifications for Ash Creek Special Service District.

1.1.3 Purpose

The purpose of Ash Creek SSD shall be to provide for orderly and efficient collection and treatment of wastewater to all areas within the boundaries of the cities of Hurricane, La Verkin, Toquerville, Apple Valley, and any unincorporated areas of Washington County that may be annexed into Ash Creek SSD.

The purpose of Ash Creek SSD's Development Procedures, Design Standards and Construction Specifications are to establish procedures and provide minimum standards and specifications to control and regulate the development, design, construction, and use of wastewater facilities within Ash Creek SSD.

The provisions of these regulations shall apply to the development, design, and construction of any extension, replacement, relocation, modification, repair, abandonment, connection to and use of the public and private wastewater facilities within Ash Creek SSD.

1.1.4 Intent

The Administration Control Board of Ash Creek SSD has established certain requirements for development approval and construction of wastewater facilities through adoption of these Standards. Each member city has adopted these Development Procedures, Design Standards and Construction Specifications as ordinances and are enforceable as such.

1.1.5 Deviations

Ash Creek SSD does not intend these standards and specifications to replace professional judgment and competent workmanship on the part of the Project Engineer or Contractor.

Proposed designs, materials, or construction methods deviating from these standards and specifications shall be submitted to Ash Creek SSD for review. The submittal shall include additional data, computations, and any other documentation required by Ash Creek SSD. Written approval by Ash Creek SSD authorizing a deviation from these standards and specifications shall be received prior to incorporating the deviation into the project.

Certain environmental or site-specific conditions may require the design and construction of wastewater facilities to exceed the minimum standards and specifications contained in these Standards. It shall be the responsibility of the Project Engineer and Contractor to identify these conditions and modify the design and installation, accordingly, as approved by Ash Creek SSD.

1.1.6 Abbreviations

As used herein, the following abbreviations have the meaning as set forth:

- AASHTO: American Association of State Highway and Transportation Officials.

- ANSI: American National Standards Institute.
- ASTM: American Society for Testing and Materials.
- AWWA: American Water Works Association.
- IPC: International Plumbing Code.

1.1.7 Definitions

As used herein, the following terms have the meaning as set forth:

- “City” or “Municipality” means Hurricane, LaVerkin, Toquerville or Apple Valley.
- “County” means Washington County, Utah.
- “Developer” means any person or entity seeking permission to construct a sewer system for a particular development or parcel of property.
- “Developer or Owner’s Engineer” means the registered professional engineer which is designated and retained by a developer or owner to design the proposed sewer system facilities in accordance with Ash Creek SSD’s rules and regulations.
- “District” means Ash Creek Special Service District, and any officer, employee or other agent duly authorized by Ash Creek SSD to act in its behalf.
- “District Engineer” means any registered professional engineer designated by Ash Creek SSD to provide general engineering services for Ash Creek SSD and shall include any independent professional consultant retained by Ash Creek SSD on an ongoing basis to perform engineering services on behalf of Ash Creek SSD and to advise Ash Creek SSD’s Administrative Control Board and staff on engineering matters.
- “District Rules and Regulations” means the District’s Rules of Operation and these Development Procedures, Design Standards and Construction Specifications for Ash Creek Special Service District, as amended from time to time.
- “Large Underground Wastewater Disposal ” (LUWD) System means an underground wastewater disposal system designed to handle more than 5,000 gallons per day of domestic wastewater, or wastewater that originates in multiple units under separate ownership (except condominiums), or any other underground wastewater disposal system

not covered under the definition of an onsite wastewater system as outlined in the Utah Administrative Code R317-4.

- “Onsite Wastewater Systems” (Septic Systems) means an underground wastewater disposal system that is designed for a capacity of 5,000 gallons per day or less and is not designed to serve multiple dwelling units that are owned by separate owners except condominiums. It usually consists of a building sewer, a septic tank, and an absorption system.
- “Sewer facilities” means all aspects of an existing or proposed sewer system, including sewer lines and all related facilities.
- “Subdivision” means any division of property where a residential, commercial, or industrial unit is to be built. Any subdivision of property approved or recorded before January 22, 2000 is approved for a residential septic tank.
- “Superintendent” means the person designated by the Administrative Control Board of Ash Creek SSD to have the charge, supervision, and administration of Ash Creek SSD’s daily operation. The superintendent may, at his option, designate a person or persons to represent him for inspecting, and reporting on the work as it progresses.
- “Work” means that which is proposed to be constructed or done under a contract or permit, including all activities related to the construction, installation, inspection, and testing of sewer facilities for a project or development.

1.1.8 Referenced Codes and Standards

When reference is made to a Standard Specification (ASTM, IPC, City Standards, County Standards, etc.) the specification referenced shall be understood to mean the latest revision of said specification.

1.1.9 Indemnification of Ash Creek SSD on Developer Sponsored Projects

- A. Ash Creek SSD, its employees, officers, independent contractors, and agents shall be indemnified and held harmless from all claims resulting from the design, construction, inspection, and operation of the new wastewater facilities which arise prior to Final Project Approval and acceptance of the wastewater improvement facilities by Ash Creek SSD.
- B. Developer and Developer’s Contractor shall be responsible for full compliance with the applicable excavation, trenching, confined space requirements, and worker safety

regulations of the U.S. Department of Labor Occupational Safety and Health Administration as administered by the Utah Occupational Safety and Health Division.

1.1.10 Contractor Licensing Requirements

- A. Contractors performing construction on the wastewater system within Ash Creek SSD shall possess all licenses required by local and state rules and regulations.
- B. As a minimum, Contractors shall possess a valid Utah Contractor's License and shall be licensed and insured to perform wastewater system construction in accordance with state law.
- C. For Ash Creek SSD specific projects, where pipe sizes are 12 inches or greater or where depths of pipe are 12 foot or greater, contractors must be preapproved. A list of preapproved contractors will be maintained by Ash Creek SSD and shall be renewed on an annual basis. In order to be listed on the preapproved contractor pool a contractor must submit the following:
 - 1. Requirements for contractor preapproval are as follows:
 - a. A minimum of 5 years' experience.
 - b. A minimum of 3 completed projects documenting pipe depth, pipe diameter, and bypass pumping volume.
 - c. Project reference from the owner's representative for the project provided.
 - d. On-site supervisor with experience on documented projects.

1.2 Policies

1.2.1 Compliance with Rules and Regulations

All requests for wastewater service or approval of wastewater facilities shall be governed by and subject to compliance with Ash Creek SSD's Rules and Regulations, which encompasses Ash Creek SSD's Rules of Operation and Ash Creek SSD's Development Procedures, Design Standards and Construction Specifications, as they now exist or as they may be amended from time to time.

1.2.2 Access to Public Wastewater Services

- A. The design and construction of extensions or modifications of the Public Wastewater System for all new developments shall provide a Public Wastewater Line adjacent to all

lots or parcels within each developed property for connection of Private Lateral Wastewater Lines.

- B. A Wastewater Line serving a lot or parcel shall not cross another lot or parcel to access the Public Wastewater System with the following limited exception.
 - 1. The public wastewater line to which the Private Lateral Wastewater Line is connecting is located along or near a common lot line with an adjacent lot or parcel and the area of encroachment into the adjacent lot or parcel is within an Ash Creek SSD minimum 15' easement. An easement for the Private Lateral Wastewater Line granted by the property owner of the adjacent property specifically to the property being served by the Private Lateral Wastewater Line shall be executed and recorded, or a private lateral easement specifically granting the easement to the property being served by the Private Lateral Wastewater Line shall be indicated on the Subdivision Plat.

1.2.3 Method of Providing Public Wastewater Services

The proposed method of providing public wastewater service to each project or development shall require review and approval by Ash Creek SSD. This is a general overview. For more detailed information on Ash Creek SSD's Policy regarding wastewater service please see Ash Creek SSD's Rules of Operation.

A. Gravity Flow

Development of residential, commercial, or industrial subdivisions or other multiple lot/unit developments within the incorporated area of Ash Creek SSD shall, unless otherwise approved by Ash Creek SSD, be required to connect said subdivision or development to Ash Creek SSD's sewer system.

Development on single lot parcels in the incorporated and unincorporated area of Ash Creek SSD or subdivisions and multiple lot/unit developments in the unincorporated area of Ash Creek SSD that are within three hundred (300) feet of Ash Creek SSD's wastewater system or other wastewater treatment facility approved or operated by Ash Creek SSD, shall at owners expense be required to connect any dwelling, building or other structure or subdivision directly to Ash Creek SSD's wastewater system or other wastewater treatment facility approved or operated by Ash Creek SSD in accordance with Ash Creek SSD's rules and regulations.

B. Conventional/Alternative Onsite Wastewater Systems (Septic Systems)

Development on single lot parcels or subdivisions and multiple lot/unit developments in the unincorporated area of Ash Creek SSD that are more than three hundred (300) feet from Ash Creek SSD's wastewater system or other wastewater treatment facility approved or operated by Ash Creek SSD, shall at owners expense connect any dwelling, building or other structure or subdivision to an approved conventional onsite wastewater system or alternative onsite wastewater system in accordance with rule 317 of the Utah Administrative Code, the Southwest Utah Public Health Department's Onsite Wastewater Regulations, and Ash Creek SSD's Rules and Regulations, as they now exist or as may be amended from time to time.

In the event that Ash Creek SSD's sewer system, sewer line or other wastewater treatment facility or other system approved or operated by Ash Creek SSD is subsequently extended, constructed or installed to within three hundred (300) feet of the property for which an approved onsite wastewater system or alternative onsite wastewater system has been constructed and installed for any property containing a dwelling, building or other structure or subdivision, said owner or subdivision shall, at his/its sole expense and within sixty (60) days of the date of such extension, construction or installation, disconnect said dwelling, building or other structure or subdivision from said onsite wastewater system or alternative onsite wastewater system, pay the applicable impact fee and connect to Ash Creek SSD's sewer system or other wastewater treatment facility or system approved or operated by Ash Creek SSD.

Any owner or developer of a residential, commercial, or industrial subdivision or other multiple lot/unit development within the incorporated area of Ash Creek SSD who desires to construct and install a sewer system, satellite treatment plant, or other treatment works which is not connected to Ash Creek SSD's sewer system shall provide Ash Creek SSD with the needed information and documentation as required in Ash Creek SSD's Rules of Operation. Ash Creek SSD at its sole discretion, may approve such sewer system, satellite treatment plant or other treatment works.

C. Low-Pressure Sewer System

1. Public Wastewater System design shall avoid Low-Pressure Sewer Systems. Ash Creek SSD permits the construction of Low-Pressure Sewer Systems only under certain limited conditions, where at the sole discretion of Ash Creek SSD, the option of providing wastewater service by gravity flow main lines is not feasible.

2. If the use of a Low-Pressure Sewer System is approved the following requirements shall be met:
 - a. Notes concerning the Low-Pressure Sewer System shall be included on the subdivision plat for the project.
 - b. Notice shall be recorded against each lot served by the Low-Pressure Sewer System which will serve as notification to all future lot owners of the responsibilities associated with the Private Lateral Low-Pressure Wastewater Lines.
 - c. The entire Low-Pressure private sewer lateral shall be the responsibility of the property owner. The property owner shall be responsible to clean, repair, and correct any problem associated with the Low-Pressure lateral from the building to the Public Wastewater System Low-Pressure mainline, including the connection to the Public Wastewater System Low-Pressure mainline.
 - d. The Low-Pressure Sewer System shall meet the requirements of Ash Creek SSD's Development Procedures, Design Standards and Construction Specifications.

D. Pump Stations

1. Public Wastewater System design shall avoid wastewater pump stations. Ash Creek SSD permits the construction of wastewater pump stations only under certain limited conditions where, in the sole discretion of Ash Creek SSD, no physically feasible, financially reasonable, or legally achievable gravity flow collection system or Low-Pressure sewer system can be constructed.
2. Wastewater Pump Stations shall be designed and constructed according to Ash Creek SSD's Development Procedures, Design Standards and Construction Specifications. Equipment and material which minimize operational costs and other replacement and repair expenses to Ash Creek SSD in the future shall be used.
3. In accordance with Ash Creek SSD's Rules of Operation: all responsibility and liability for payment of all costs of operation, maintenance, and repair of any such sewer pump station shall, unless otherwise agreed in writing, remain with the owner or developer for a period of two (2) years from the date that said sewer pump station is completed and accepted by Ash Creek SSD. In order to guarantee payment of said costs of operation, maintenance and repair by the owner or developer for said two (2) year period, the owner or developer shall provide Ash Creek SSD with a letter of credit, or some other acceptable financial guarantee, for the estimated costs of operation, maintenance and repair, as determined by said owner's or developer's engineer.

1.2.4 Private or Common Lateral Wastewater Lines

The method of connecting to Ash Creek SSD's Sewer System by private or common lateral wastewater lines shall comply with Ash Creek SSD's Rules of Operation. This is a general overview. For more detailed information on Ash Creek SSD's Policy regarding private or common laterals please see Ash Creek SSD's Rules of Operation.

- A. Each residence, building or other facility, including units of multiple unit buildings where the units are side by side, shall connect to the Public Wastewater System by way of a separate Private Lateral Wastewater Line.
- B. Ash Creek SSD will permit a Common Lateral Wastewater Line only under the following conditions:
 - 1. Stacked units where the upper unit(s) has no direct access to a separate Private Lateral Wastewater Line. Under this scenario a 6" lateral shall be installed.
 - 2. A building sewer from a front building may be extended to a rear building and the whole considered as one building sewer where:
 - a. One building stands at the rear of another on one lot,
 - b. Connection of the rear building to Ash Creek SSD's system cannot be accomplished through an adjoining alley, courtyard, or driveway, and
 - c. Both buildings are at all times owned by the same person or entity;
 - d. In the event that ownership of either building is changed in any manner, separate sewer facilities shall be constructed by the owner to the rear building or dwelling.
 - 3. A building sewer from a front dwelling may be extended to a rear dwelling and the whole considered as one building sewer where:
 - a. One dwelling stands at the rear of another on one lot,
 - b. Both dwellings are at all times owned by the same person, and
 - c. The conditional use permit is obtained from the local municipality for the purpose of allowing occupancy of the rear dwelling on a temporary basis by an immediate family member because of declining health or advanced age.
 - d. In the event that ownership of either building is changed in any manner, separate sewer facilities shall be constructed by the owner to the rear building or dwelling.
- C. Grease interceptors shall not be placed on common laterals. All facilities or businesses requiring a grease interceptor shall have a separate grease interceptor.

- D. Ejector pumps and Low-Pressure pumps shall not be placed on common laterals for multi-unit buildings.
- E. The entire private sewer lateral shall be the responsibility of the property owner. The property owner shall be responsible to clean, repair, and correct any problem associated with the sewer lateral from the building to the Public Wastewater System line, including the connection to the Public Wastewater System Lines.
- F. The entire common sewer lateral shall be the responsibility of the homeowners, condominium and or building association. Responsibility of the common lateral shall include cleaning, repairing, and correcting any problem associated with the common sewer lateral from the building to the Public Wastewater System line, including the connection to the Public Wastewater System Lines.

1.2.5 Off-Road Public Wastewater Lines

- A. All wastewater lines that are part of the Public Wastewater System, including gravity flow lines, low-pressure sewer system lines, and pump station force mains, shall be located in maintained public or private streets, roads, or rights-of-way.
- B. If local conditions prevent compliance with this policy, Ash Creek SSD may allow Off-Road Public Wastewater Lines if the following requirements are met.
 - 1. The Off-Road lines shall meet the requirements of Ash Creek SSD Standards.
 - a. A 25-foot easement is granted by the property owner.
 - b. A 6 inch deep, all-weather, 14-foot road centered over sewer line and manholes is constructed.
 - c. Swing panel gates through fence lines must be provided for access.
 - 2. Revegetation and erosion protection of the off-road corridor shall be provided. The Developer shall be solely responsible for revegetation and erosion protection of Off-Road Public Wastewater Line corridors during the warranty period. Revegetation plans shall specifically exclude trees, bushes or other vegetation that would impede travel along the corridor by Ash Creek SSD personnel and equipment.

2.0 DEVELOPMENT PROCEDURES

2.1 General Overview

Approval to design and construct new wastewater facilities intended to become part of the Public Wastewater System shall be obtained from Ash Creek SSD. It is the responsibility of the developer, developer's engineer, homeowner, builder, building owner or facility owner to coordinate all requests and submittals for approval. Contact with Ash Creek SSD early in the development process for all projects is encouraged.

The procedures contained in this section include the minimum requirements necessary for developing wastewater facilities in the Ash Creek SSD service area. Additional meetings, submittals, reviews, etc. may be necessary during the development process as determined by Ash Creek SSD.

2.2 Developer and/or Owner Responsibilities

As a general matter, any developer or owner who desires to construct and install any building or structure requiring sewer facilities shall, at his/her expense, be responsible to:

- A. Submit to Ash Creek SSD all plans, designs, and specifications for any proposed sewer system or facilities.
- B. Obtain, in the name of Ash Creek SSD and/or dedicate to Ash Creek SSD, all sewer right-of-way easements or deeds necessary for construction, installation, and maintenance of sewer facilities.
- C. Obtain approval from Ash Creek SSD and any other governmental entity having control or jurisdiction over any matter related to construction, installation, and maintenance of sewer facilities.
- D. Pay all impact fees, plan review fees, inspection fees, monthly fees, and all other fees required by Ash Creek SSD's Rules and Regulations.
- E. Construct and install approved sewer facilities in accordance with Ash Creek SSD's Rules and Regulations.

- F. Where required, enter into an agreement for private maintenance, repair, and replacement of sewer facilities.
 - 1. Examples where a private sewer agreement may be required are RV parks, private parcels, and developments with private roads or streets not dedicated to the City.
 - 2. Example “Private Sewer Agreement” available from Ash Creek SSD upon request.
- G. Where required, dedicate and convey completed sewer facilities to Ash Creek SSD at no cost to Ash Creek SSD.
- H. An owner of any property where a sewer main line is installed on private property shall dedicate an adequate easement or sign a private sewer agreement.

2.3 Public Wastewater System Extensions and Modifications

The general procedure for obtaining approval of a proposed wastewater system extension or modification is as follows:

2.3.1 Service Provider Letter

- A. The Developer may be required to obtain a “Will Serve” letter from Ash Creek SSD during the planning process to demonstrate that Public Wastewater Service is available to a Project.
- B. Developer shall submit a copy of a proposed preliminary plat, site plan, or proposed master plan for large, multi-phase developments showing the property or area for which sewer service is desired and shall request a “Will Serve” letter from Ash Creek SSD.
 - 1. Submittals shall be in the form of PDF electronic files. A full-size paper copy may also be required at the discretion of Ash Creek SSD.
- C. Ash Creek SSD shall issue or deny issuance of a “Will Serve” letter, depending on the location of the property or area to be served, and the sewer main line capacity and treatment capacity as determined by the Board.

2.3.2 Design

- A. Developer and the Project Engineer shall prepare and submit preliminary design drawings and specifications in accordance with Ash Creek SSD's Rules and Regulations.
 - 1. Submittals shall be in the form of PDF electronic files. A full-size paper copy may also be required at the discretion of Ash Creek SSD.
- B. The Developer shall provide all necessary deeds or right-of-way easements.
- C. Developer's Engineer shall submit to Ash Creek SSD engineered drawings along with plan review fees or other required fees. Plan review fees shall be \$25.00 per lot or ERU. In areas not within Hurricane, LaVerkin, Toquerville, or Apple Valley there is an additional \$400.00 per lot or ERU fee.
- D. Ash Creek SSD shall review all preliminary design drawings, plans and specifications, provide "red-lined" drawings and give feedback for any issues that need to be addressed.
- E. Developer and the Project Engineer shall prepare final design drawings by making corrections and addressing issues contained in the preliminary design review. An additional plan review by Ash Creek SSD may be necessary.
- F. Ash Creek SSD, if all corrections are made, issues addressed, and plan review fees paid shall give approval for said plans and specifications by signing the plans and specifications. Self-adhesive or add on labels, certifications, details, etc. are not acceptable on final plans.
- G. The Developer or Project Engineer shall make copies of the Approved Construction Drawings, with copies being distributed at the preconstruction meeting. A PDF electronic file of the Approved Construction Drawings should also be provided to Ash Creek SSD.
- H. Proposed modifications to the Approved Construction Drawings, plat or final site plan shall be submitted to Ash Creek SSD for review and approval prior to incorporation into the project.

2.3.3 Construction and Inspection

- A. Ash Creek SSD shall give written approval, either by separate letter or by signing the plans and specifications, for developer to proceed with construction and installation of sewer lines and facilities.
- B. After all submittals are approved, a Preconstruction Meeting shall be held.

- C. The Contractor shall construct the project according to the Approved Construction Drawings.
- D. Developer shall give Ash Creek SSD two working days' (48 hours) notice before commencement of construction or installation of sewer lines and facilities.
- E. Verbal acknowledgment of notification from Ash Creek SSD will be required before excavation.
- F. An Ash Creek SSD Inspector will conduct periodic inspections, preliminary inspection, and final inspection of the project.

2.3.4 Final Project Approval

- A. The Developer shall request Final Project Approval of the completed wastewater system improvements.
- B. The following items require completion, submittal, and/or approval by Ash Creek SSD prior to requesting Final Project Approval.
 - 1. Completion and approval of all final inspection "punch list" items.
 - 2. Submittal and approval of passing acceptance test results.
 - 3. Submittal and approval of Record Drawings.
 - 4. Submittal and approval of Operation and Maintenance Manuals, if applicable.
 - 5. Submittal and approval of all executed easements and special agreements required for the project.
 - 6. Payment of all fees.
 - 7. Final Project Approval of the downstream Public Wastewater System by Ash Creek SSD.
- C. Upon completion of construction and installation of sewer lines and facilities in accordance with Ash Creek SSD's Rules and Regulations, Ash Creek SSD's Superintendent shall issue "Notice of Final Inspection" or other letter accepting the sewer lines and facilities as completed.
- D. Developer shall transfer and convey the sewer lines and facilities to Ash Creek SSD at no cost to Ash Creek SSD.

2.3.5 Warranty Period

- A. The warranty period for Developer Sponsored Projects shall extend to the latter of one year from the date of Final Project Approval or the date when all warranty “punch list” items are completed and approved by Ash Creek SSD.
- B. During the warranty period, the Developer shall remain responsible for problems due to defects in materials and workmanship (this also includes elimination of infiltration and inflow) and correcting incomplete or incorrect information on the Record Drawings.
- C. Toward the end of the warranty period, Ash Creek SSD will perform a project warranty inspection which will include a video inspection of the installed wastewater system by Ash Creek SSD personnel. A warranty inspection letter with a "punch list" of deficient items will be issued and sent to the Developer, the Project Engineer, and the Contractor.
- D. Upon satisfactory completion of the warranty inspection "punch list" items by the Developer, as verified by Ash Creek SSD Inspector, and at the expiration of the warranty period, the warranty period shall be complete.
- E. Should the warranty inspections reveal necessary repairs or replacement of wastewater system components the new system will be subject to an additional one-year warranty for said repairs.

2.4 Requirements of Other Public Agencies

The requirements for the design, construction, and installation of sewer facilities, as specified herein, shall be in addition to and shall be deemed supplemental to the requirements of any other rules and regulations of any other governmental entity or public agency having jurisdiction or control over any aspect related to the approval, construction, installation, and maintenance of such sewer facilities. Any person or entity who undertakes the preparation of plans and specifications for the construction and installation of a sewer system shall be charged with the knowledge of such rules and regulations and shall be required to comply with the same.

3.0 PLAN DESIGN AND REVIEW

3.1 General

The developer, at his/her expense, shall be responsible to design all sewer facilities in accordance with all Ash Creek SSD Rules and Regulations and Ash Creek SSD's Capital Facilities Plan. The Developer shall submit all plans and specifications for review and approval by Ash Creek SSD.

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 2.0 Development Procedures.

3.2 Construction Drawings

Complete and detailed construction plans, drawings of improvements, and all necessary reports shall be submitted to Ash Creek SSD for review and acceptance. All Drawings or prints shall be clear and legible and conform to standard engineering and professional drafting practices. All Drawings or prints shall be in compliance with individual City requirements and include any additional information as required by the Joint Utility Committee (JUC).

A. Format:

Wastewater system plans and specifications submitted to Ash Creek SSD shall be in the following format:

1. Size: the standard drawing size shall be twenty-four by thirty-six inches or digital PDF file.
2. North arrow included.
3. Scale: Standard engineering scales shall be used. Uncommon scales generated by CAD systems shall not be used. Whenever possible, profile scale shall be 1" = 10', 20' or 40' horizontal and 1" = 5' vertical.
4. Stationing and elevations for profiles: Profiles should be drawn directly below plan view when possible. Benchmarks and elevations must be referenced to latest revision of USGS datum or other datum as may be approved.

B. Information to be included:

1. Site Location Map. The proposed project shown on a vicinity map indicating adjacent streets, projects, etc.
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 or extensions to the existing Ash Creek SSD wastewater collection system.
 - 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.
 - e. Proposed Low-Pressure Sewer System facilities with appropriate design calculations, if applicable.
 - f. Proposed wastewater pump stations, force mains and appurtenances with appropriate design calculations, if applicable.
4. Plan and Profile View Sheets shall include all proposed and existing utility lines, existing ground surface and proposed street grade, existing and proposed sewer lines, laterals, and street cross section with all utilities listed, with the flowline plotted in the profile, and slope indicated between each vertical point of intersection.
5. Existing and proposed easements shown with type (i.e., temporary, permanent, nonexclusive utilities, sewer, water, access) and recording information indicated.

6. Ash Creek SSD General Sewer Notes.

- a. See Appendix C for a list of General Sewer Notes that must be included on each plan set.

7. Ash Creek SSD Detail Sheets

- a. Applicable Ash Creek SSD Detail Sheets as contained in Appendix D must be included.

C. Wastewater Utility Location

1. Wastewater lines should be located at least five (5) feet North or West of the road centerline with a minimum of five (5) feet of distance to the toe of curb and gutter from the sidewall of the manhole barrel.

D. Wastewater Utility System

Plan and Profile View sheets should include the following. Ash Creek SSD may require additional information as it deems necessary.

1. Manholes

- a. Include location, depth, diameter, rim elevation, and invert elevations.
- b. All manholes should be numbered, and stationing included.
- c. Polymer manholes should be labeled.

2. Pipes

- a. Flowline plotted including depth, size, slope, length, stubs, and clearance at all pipe crossings.
- b. Pipe material.

3. Laterals and Cleanouts

- a. Private lateral wastewater lines to all lots or building units shown.
- b. Include location, size, slope, and material.

3.3 Plan Review Submittal

A. The following shall be submitted as part of the Residential Development first plan review:

1. Sewer Plans
2. Street Plans
3. Storm Drain Plans
4. Grading Plans
5. Erosion Control Plans
4. Easements, Documents and Plats
5. For phased projects, map of overall plan for sewer and water, including size and type of lines.
6. Appropriate Survey Notes

B. The following shall be submitted as part of the Commercial/Industrial Development first plan review:

1. Items listed in Section A above if applicable.
2. Site plan/plot plan with water, sewer, and fire systems shown.
3. Building floor plan/plumbing plan.
4. Completed Ash Creek SSD industrial form with pretreatment data. See Appendix A for form.
5. Submittal of data indicating typical waste discharge contents.
6. Calculation of number of units.
7. Grease trap/industrial waste clarifier sizing calculations.
8. Square footage of the building by use type.
9. Water usage of a similar type of installation.
10. For restaurants and bars: number of seats, daily meals and/or peak hour meals.

3.4 Easements

The developer shall be responsible to obtain all right-of-way easements or deeds necessary for the construction, installation, and maintenance of sewer facilities. In connection therewith, Developer shall submit for review and approval a proposed subdivision plat, or, if said right-of-way easement is not a part of a subdivision, a proposed Right-of-Way Easement Agreement and map, which contains the following:

A. Required information:

1. a physical address for the property in which the easement is written
2. north arrow (orientation to upper half of plat)
3. scale
4. track numbers
5. lot numbers
6. lot lines
7. ownership lines
8. sections corner
9. street R/W and street names
10. section, township & range and base & meridian Data
11. call out of easement
12. parcel numbers
13. dimensions
14. title block
15. drawing number
16. Ash Creek SSD signature block

B. Additional Information When Bearings are Used:

1. basis of bearings
2. T. P.O.B. (True Point of Beginning)
3. bearing and distances
4. curve data
5. designated point
6. existing easement data

C. Additional Right-of-Way Easement Requirements:

1. All sewer right-of-way easements shall be obtained in the name of Ash Creek SSD, as Grantee, or shall be assigned to Ash Creek SSD.
2. All right-of-way easements shall contain legal description of the desired right of way which is prepared by a licensed surveyor.
3. Unless otherwise approved by Ash Creek SSD, all main sewer lines and related facilities must be located in public roadways, or, if approved by separate written agreement, in utility corridors which are dedicated to the use and benefit of the public.

4. Unless otherwise approved by Ash Creek SSD, construction right-of-way easements shall be 50 feet in width, and permanent right-of-way easements shall be 25 feet in width.
5. Unless otherwise approved by Ash Creek SSD, all sewer pipelines shall be installed along the centerline of the easement. For good cause shown, the pipeline may be installed no less than 5 feet from either easement boundary.
6. All easement property must be graded so that every manhole will be accessible to maintenance equipment. On a case-by-case basis, an all-weather road may be required by Ash Creek SSD.
7. All necessary sewer right-of-way easements shall be obtained and recorded at the office of the Washington County Recorder prior to construction and installation of sewer facilities.
8. No other public utility shall be permitted in the sewer right-of-way easement, except that storm drain facilities may be installed in the same easement if the minimum permanent easement width is 30 feet, and the storm drain facilities are installed in the outer-most 5 feet.

D. Right-of-Way Easements Within Subdivision Plat:

1. Where sewer right-of-way easements are included in public roadways, the plat shall contain general dedicatory language dedicating said roadway to the municipality in which it is located for the use and benefit of the public as a public roadway and to Ash Creek SSD for construction, installation, maintenance, replacement and repair of sewer lines and related facilities.
2. Except as approved by Ash Creek SSD, all sewer main lines shall be constructed in public or private streets as shown on the plat. Upon request of the developer and for good cause shown, a main sewer line may be permitted between lots, provided that a sewer corridor of at least 25 feet in width shall be provided by deed and shown on the plat as open space which is dedicated and conveyed to Ash Creek SSD.
3. Except as approved by Ash Creek SSD, laterals shall not cross property lines. Upon request of the developer and for good cause shown, a lateral may be permitted to cross an adjacent property line provided that a 15' right-of-way easement is recorded.

4. In subdivisions or developments where sewer lines are to be constructed in private streets or upon other private property, the developer/owner and Ash Creek SSD shall enter into a written agreement satisfactory to Ash Creek SSD which, among other things:
 - a. Grants to Ash Creek SSD a right-of-way easement conforming to the requirements of these rules,
 - b. Requires construction and installation of sewer lines and related facilities in accordance with Ash Creek SSDs Rules and Regulations by the developer/owner,
 - c. Upon request of the developer and for good cause shown, a main sewer line may be permitted between lots, provided that a sewer corridor of at least 25 feet in width shall be provided by deed and shown on the plat as open space which is dedicated and conveyed to Ash Creek SSD
 - d. Provides for the ownership, maintenance, replacement and repair of sewer lines and related facilities within the development by the developer/owner, homeowner's association, or lot owners within the development, and
 - e. Requires a notation on the subdivision plat giving notice to prospective purchasers and lot owners that ownership, maintenance, replacement, and repair of said lines and related facilities will be the responsibility and liability of the developer/owner, homeowner's association, or lot owners within the development.
- E. Right-of-Way Easement Agreements:
- A sewer right-of-way easement shall be obtained by separate Right-of-Way Easement Agreement which conforms to the requirements of these rules where:
1. Sewer facilities are to be constructed and maintained on property, which is not included in a subdivision plat, or
 2. The developer desires to construct and install sewer facilities prior to the time a subdivision plat is recorded at the office of the Washington County Recorder.

3.5 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 Ash Creek SSD, and executed along with the final design drawings.
- B. The developer shall submit documentation assuming responsibility for all costs and work associated with any third-party agreements, easements, or permits which Ash Creek SSD may be required to enter into for the project.

3.6 Construction Cost Estimate

The following construction cost estimates shall apply for Ash Creek SSD projects.

- A. A construction cost estimate prepared by the Project Engineer and approved by Ash Creek SSD shall be used to establish the amount of the project and Engineering Service Fees.
- B. The construction cost estimate shall include, as separate line items, the following items as applicable:
 - 1. Wastewater main line 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. Trench dike
 - 8. Maintenance access roadway.
 - 9. Revegetation and/or landscaping.
 - 10. Trench rock removal (including import material replacement).
 - 11. Existing manhole adjustment.
 - 12. Special construction items (i.e., bypass pumping, borings, casings, dewatering, wetland restoration, temporary sewer, etc.).
- C. Unit costs shall be consistent with current local construction costs and shall be acceptable to Ash Creek SSD.

3.7 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., which 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 and digital copies.
- F. Record Drawings shall include all information required for final wastewater system design drawings and the following additional items:
 - 1. Existing manholes removed as part of the project shall be shown on the record drawings with appropriate notes and how the manhole was abandoned or noted as removed.
 - 2. Distance from the near side property line to the sewer lateral marker.
 - 3. Any changes to sewer main line slopes and depths.
 - 4. Any field information obtained by the contractor.
 - 5. 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 submittal for review by Ash Creek SSD.

6. 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 Ash Creek SSD in PDF electronic form for review prior to scheduling a final inspection.
- H. The final Record Drawing submittal shall consist of the following:
1. Signed revised easements, if required.
 2. One set of plotted mylar drawings.
 3. A PDF digital file of all sheets in the Record Drawing set.
- I. 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.

3.8 Operation and Maintenance Manuals

- A. An Operation and Maintenance Manual, prepared by the Project Engineer and approved by Ash Creek SSD, shall be required for wastewater pump stations.
- B. Hard copies and a PDF digital file of the final approved Operation and Maintenance Manual shall be submitted prior to Final Project Approval of the wastewater 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 wastewater pump station and force mains showing as-constructed conditions.
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 Ash Creek SSD.

3.9 Certificate of Review

No construction of sewer improvements shall be permitted until all sewer plans and specifications have been reviewed by Ash Creek SSD and all improvements conform to these Design Standards and Construction Specifications.

4.0 DESIGN REQUIREMENTS

4.1 General

This section defines the minimum design requirements necessary for the design of wastewater facilities within Ash Creek Special Service District. It is not the intent of these design requirements to restrict professional judgment, but, rather, to serve as a guide and to establish consistency in design. Wastewater facilities and improvements proposed for inclusion into Ash Creek SSD's service area shall be designed in accordance with the criteria set forth herein, unless otherwise approved in writing by Ash Creek SSD. The design shall take into consideration physical conditions known to exist at the time and place of each installation and the probable operating requirements.

Proposed designs deviating from these requirements will be reviewed by Ash Creek SSD on a case-by-case basis upon submittal by the Project Engineer of any additional data, computations, exhibits, etc., as required by Ash Creek SSD.

4.2 Design Criteria for Public Wastewater System Extensions and Modifications

4.2.1 Basis of Design

A. Design Period

1. All sanitary sewers and appurtenances shall be designed to carry the design flows from all contiguous or adjacent areas which may, within a reasonable period in the future be tributary thereto.
2. The wastewater system design shall be based on the best information available.

B. Design Capacity

1. Peak Flow:

Sanitary sewers must be designed to carry the peak discharge and to transport suspended material so that deposits in the sewer are precluded. Hydraulic jumps shall be avoided whenever possible. Where velocities greater than fifteen (15) feet per second are attained, special provision shall be made to protect against displacement by erosion and shock.

2. Average Flow:

- a. New sewer systems shall be designed based on an average daily per capita flow of not less than 100 gallons per day. This figure is assumed to provide for normal infiltration, but an additional allowance should be made where groundwater conditions are unfavorable. To provide for peak loads sanitary sewers should be designed to carry, when full, not less than the following:

Laterals and Sub Mains	400 gal. per capita/day
Mains, trunks, and outfall	250 gal. per capita/day

3. Future Land Use:

- a. The following sewage flow parameters shall be used as a general guideline for minimum estimated flows generated from future land use.

Future Residential Areas	1250 gal. per/acre/day
Commercial Areas	1000 gal. per/acre/day
Infiltration-inflow allowance	500 gal. per/acre/day

4.2.2 Location of Facilities

A. General Guide

The following information is provided as a general guide for laying out the wastewater main lines. This information is to be used as a guide and may be changed by Ash Creek SSD as required to meet existing utilities or to meet the cities of Hurricane, LaVerkin, Toquerville, Apple Valley and unincorporated County construction standards.

B. New Wastewater Lines

1. Wastewater lines should be located five (5) feet North or West of the road centerline with a minimum of five (5) feet of distance to the toe of curb and gutter from the sidewall of the manhole barrel.
2. New lines should be stubbed out to the property boundary to allow for future development.
3. No sewer main line should be constructed thru a water detention basin.

4.2.3 Separation from Other Utilities

Horizontal and vertical pipe separation between culinary water lines, utilities, and wastewater main lines and private lateral lines shall comply with the following requirements.

A. Horizontal Separation

1. Wastewater main lines and private laterals shall be installed a minimum of 10' horizontally from any existing or proposed water main or service, measured edge of pipe to edge of pipe.
2. The separation of wastewater lines and private laterals from all secondary water system lines and irrigation lines shall be a minimum of 10' horizontally, measured edge of pipe to edge of pipe.
3. The separation of wastewater lines and private laterals shall be installed a minimum of 10' horizontally from all other utilities measured edge of pipe to edge of pipe or utility line.

B. Vertical Separation

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.

C. Approvals for Reduced Separation

If local conditions prevent the minimum 18" separation of wastewater lines from other utilities, reduced separation may be allowed with the following requirements:

1. The Contractor shall provide construction as required per the State Health Department Water/Sewer Special Construction Requirements.
2. Sewer mains and laterals shall be sleeved where an 18" clearance is not met or when sewer is above the water line. Sleeve shall be 20' long centered at the water line.

D. Separation at Crossings

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 measured edge of pipe to edge of pipe or utility line.

1. If local conditions prevent the wastewater lines from being located below other utilities, the wastewater line may be located over the other utilities with the following requirements:
 - a. The routing is approved by Ash Creek SSD and the utility system authority. The Project Engineer may be required to submit justification for the conditions preventing this requirement from being met.
 - b. A minimum vertical separation of 18" for main lines measured from edge of pipe to edge of pipe or utility line shall be maintained.
 - c. Special construction shall be required whenever sewer lines cross over a water line.
2. If local conditions prevent a minimum vertical separation of 18" for main lines and for private lateral lines between the wastewater line and other utilities at crossings, reduced separation may be allowed with the following requirements:
 - a. The reduced separation and routing are approved by Ash Creek SSD and the utility 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. There shall be a minimum separation of 4", but in no case shall the pipes be in contact.

4.3 Gravity Flow Main Lines

A. Line Size

No public sanitary sewer shall be less than 8" in diameter.

B. Line Depth

1. In general, sanitary sewers shall be designed of sufficient depth to permit floor drains from basements to be connected, unless in subdivisions or areas in which basement-less houses are to be constructed. In which instance the developer shall sign a statement to this fact on all plans presented for approval and noted on the subdivision plat which is recorded at the county office.
2. Minimum cover over sewer pipe should be sufficient to service adjacent property by gravity, and cover shall not be less than 9 feet to finish grade of street. Shallower depths will be approved on a case-by-case basis by Ash Creek SSD. Where depths

shallower than 5 ½ feet are unavoidable, a pump station or low-pressure system may be required.

3. In addition, sewer mains must be sufficiently deep in subdivisions to allow water lines to be set with 3' minimum cover without interference from sewer laterals.

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 of manhole wall.
2. All sewers shall be designed and constructed with hydraulic slopes sufficient to give average daily cleaning velocities of not less than 2.0 feet per second, based on Manning's formula.
3. A Manning's "n" value of 0.013 shall be used for all pipe materials.
4. Exceptions to the requirement to achieve a velocity of not less than 2.0 feet per second shall be specifically approved by Ash Creek SSD on a case-by-case basis.
5. In all cases the minimum slope of any line segment shall not be less than the following:

Sewer Size (inches)	Minimum Slope in feet per 100 feet (%)
4"	2.00
6"	1.00
8"	0.50
10"	0.40
12"	0.35
15"	0.30
18"	0.25
21"	0.20
24"	0.15

6. Pipes larger than 24" shall be per the Design Engineers recommendation but not have a slope less than 0.10 ft/100 ft.

7. Any line segment that has any portion of the line with a slope less than the minimum shall be reinstalled.

D. Maximum Slopes

1. The maximum slope of all lines entering manholes is 35 percent or any time peak pipeline velocity is 10 feet per second.
2. In cases where the required slope from manhole to manhole exceeds 10 feet per second:
 - a. The slope of the wastewater line should generally be less than 35 percent. Custom manholes will be required to meet steep pipe slopes.
 - b. Special design consideration, including pipe anchoring and pipe material, shall be given to wastewater lines with slopes greater than 30 percent.
 - c. Any pipe slope over 20 percent must be evaluated for peak flow velocities.

E. Alignment

1. Sewers shall be designed for uniform slope and alignment between manholes and located parallel to and at least 10 feet distant from any waterline or any other utility.
2. When one sewer joins a larger one, the invert of the smaller sewer should be sufficiently high to maintain the same energy gradient. The tops of the pipes shall be at the same elevation. (or crown of pipes match)
3. All sewers shall be designed to prevent damage from superimposed loads as well as trench loading conditions.

4.4 Manholes

A. Location

1. Manholes shall be installed at the end of each line.
2. At all changes in grade, pipe size, or alignment.
3. At all intersections.
4. At intervals not greater than 400 feet apart.
5. A minimum of five (5) feet of distance to the toe of curb and gutter.

6. With the exception of sampling manholes installed according to pretreatment requirements, manholes shall not be placed on private lateral lines.
7. All service lateral connections, 6" and larger and all sewer collection lines shall be made with the installation of a manhole.
8. Manholes shall not be buried except where approved by Ash Creek SSD. Manholes shall be raised above ground level where necessary to maintain them in farmed areas and in waterways.

B. Diameter

1. Manholes shall have a minimum inside diameter of 5'.
2. Manholes shall be 6' in diameter where pipes are 24 inches or larger, as determined by Ash Creek SSD.

C. Manhole Fall Through (slope)

1. Flow lines of incoming and outgoing lines in manholes shall have a drop of 0.2'.

D. Pipe Size Transitions

1. Unless otherwise approved by Ash Creek SSD, junction manholes shall have the crowns (soffits) of the intersecting pipes at the same elevation where their projections intersect the manhole centerline.

E. Drop Manhole Connections

1. Drop manhole connections are not permitted.

F. Depth

1. In general, manholes shall have a 9' depth as measured from the top of rim to the invert.
2. Manholes with a depth less than 9' shall be approved by Ash Creek SSD.

G. Special Requirements

1. Pipe diameters 12" and greater are considered regional lines and require manholes installed on these lines to be polymer, integrated polymer lined or equivalent. A note shall be included on construction drawings indicating manholes are polymer.
2. Manholes installed in fields, well protection zones or in areas of known ground water shall have a monolithic base, double mastic at the joints, and 12-inch mastic wrap around exterior joints or equivalent. A note shall be included on construction drawings indicating such. See Appendix D for detail drawing.

H. Detail Sheet

1. All manholes shall conform to the detailed dimensions, construction details, and materials as shown on the drawing titled "Sewer Manhole" provided in Appendix D Detail Drawings.

4.5 Low Pressure Sewer Systems

- A. Proposed Low-Pressure Sewer Systems and manufacturers shall be approved by Ash Creek SSD. Approved manufacturers include:
 1. E/One D-Series as manufactured by Environment One Corporation.
 2. Omni Grind or Omni Grind Plus as manufactured by Barnes.
 3. Equivalent as approved by Ash Creek SSD.
- B. Intermixing of different manufacturer's Low-Pressure System pumps within the same Low-Pressure System shall not be permitted.
- C. The layout of the Low-Pressure Sewer System 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.

1. Line Size:

Line shall be sized to provide a minimum velocity of 2.0 feet per second while minimizing head losses through the system during system operation.

2. Maximum Total System Head:

Maximum 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.

E. Detailed calculations for each branch of the Low-Pressure Sewer System, including the following minimum information, shall be required and provided to Ash Creek SSD for review.

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
8. Anticipated number of simultaneous pump operations
9. For systems with more than 1 home a verified system model shall be provided.
10. Location and number of pipe flushing connections.

F. Minimum Line Depth:

1. Depth shall be located below all other utilities with a minimum of 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.

G. Vertical Alignment:

1. Shall minimize the number of high and low points on the system.
2. The connection of the Low-Pressure System to the gravity system shall be the highest elevation of the Low-Pressure System.

H. Horizontal Alignment:

1. Wastewater lines will generally be located five (5) feet North or West of the road centerline with a minimum of five (5) feet of distance to the toe of curb and gutter.

I. 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 0.2' above the invert elevation of the gravity outlet line.
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. The manhole shall be a polymer, integrated polymer lined or equivalent.
4. 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 Low-Pressure Sewer System.
5. The receiving manhole shall have a vented cover and manhole odor control unit installed. Odor control unit shall be a Manhole Odor Eliminator (MOE) as manufactured by Inventive Resources Inc. or an equivalent activated carbon filter media system as approved by Ash Creek SSD.

J. Appurtenances

1. Combination air valves, junction manholes 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 Ash Creek SSD and should meet the following general guidelines.
 - a. Combination air valves should be installed at intermediate system high points, at significant changes in grade where air pockets can form, and at intervals of 1,200 feet or less in long horizontal runs that lack a clearly defined high point.
 - b. See Appendix D for Air Vac Valve Detail Drawing.

2. Flushing connections shall be installed at the terminal end of each main line and at other locations, as determined by Ash Creek SSD, which will facilitate operation and maintenance of the system.
3. All low-pressure sewer pipe shall be installed with tracer wire and marking tape. See Section 5.10 Miscellaneous Material.

4.6 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 an open trench 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, and 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. 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 Ash Creek SSD.
- G. Casing pipe shall meet requirements of Section 4.7 and Section 5.9.
- H. Ash Creek SSD may require submittal of additional structural calculations with construction drawings.
- I. The design of the boring shall allow for some variance in the installed boring line and grade.
- J. 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.

4.7 Casings

- A. Wastewater lines shall be installed inside casings when additional protection of the line is necessary as determined by the Project Engineer or Ash Creek SSD.
- B. Ash Creek SSD 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 Ash Creek SSD.
- 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.

4.8 Service Laterals

A. Description

- 1. Ownership, construction, maintenance, and operation of Private Lateral Wastewater Lines from the building to the Public Wastewater System line, including the connection to the Public Wastewater System Lines, shall be the responsibility of the property owner.
- 2. The property owner shall be responsible for cleaning, repairing, and correcting any other problem associated with sewer laterals to include services that are in roadways.
- 3. Under no circumstances shall roof drains, foundation drains, storm drains, or sub-drains be connected to the sanitary sewer system.

4. Only one residence, structure, building, or office shall be served by each Private Lateral connected to the public main line.

B. Location

1. Private laterals shall be installed 25 feet off from the low side property line.
2. All laterals shall extend 15 feet in back of the curb and/or 10 feet from back of the property line, shall extend behind all other utilities, shall be stubbed 3 feet above surface grade and protected with a t-post. See Appendix D Sewer Service Connection Detail.
3. All laterals shall be constructed a minimum distance of 10 feet from existing water services and other utilities.

C. Gravity Flow Lateral Lines

1. Line Size shall be a minimum of 4" in diameter. Larger diameters will require the installation of a sewer manhole.
2. Minimum Slope: In no case shall any private lateral be constructed at less than 2 percent slope.
3. Alignment:
 - a. Private laterals shall be designed on straight horizontal and vertical alignments and not less than a 90-degree angle to the main line, unless approved by Ash Creek SSD.
 - b. No more than one 45-degree angle in 3 feet and no more than two 45-degree angles without a cleanout.

D. Cleanouts

1. Cleanouts shall be installed on all gravity flow Private Lateral Wastewater Lines according to the following requirements:
 - a. A minimum of one cleanout shall be required on each gravity flow private lateral line.
 - b. Cleanouts shall be constructed at or near property line and within 5' from the building foundation when houses are built.

- c. Cleanouts shall be installed or placed in such a manner so that the lateral can be located by lateral maps or sewer monument cover (metal detector).
- d. Cleanouts shall be placed before any turns in the line and at intervals of not more than 100' measured from the entrance to the cleanout, along the lateral, to the next cleanout or the wastewater main line.
- e. A cleanout shall be provided at the property line.
- f. Cleanouts shall have the same diameter as the private lateral to which it connects.
- g. See Appendix D "Sewer Cleanout W/Lid" and "Sewer Service Connection" Detail Drawing Sheets.

E. Pressure Private Lateral Lines/Sewage Ejectors:

- 1. In some extreme circumstances, the ability to service an individual lot by gravity may be uneconomical based on shallow depths of the mainline sewer. The definition of these circumstances shall be determined by Ash Creek SSD. Should Ash Creek SSD determine these conditions exist for a lot, and upon Ash Creek SSD approval, a pressure private lateral or an individual sewage ejector may be used.
- 2. The ejector shall be constructed to U.P.C. International Plumbing Code standards on private property by the property owner or developer. Maintenance of the pressure private lateral or ejector shall be the responsibility of the property owner.

4.9 Pretreatment Requirements

- A. The property owner is responsible for installation, maintenance, and upkeep of any pretreatment requirements.
- B. A sanitary sewer survey will be required to determine if a business will be permitted to discharge. See Appendix A for Pretreatment Survey form.
 - 1. Businesses that fall under specific pretreatment categories will be required to retain, treat, store, and dispose of waste independently.
- C. A grease interceptor, oil separator or sand interceptor, located outside the facility or building, shall be provided as part of the Private Sewer Lateral line of any commercial, industrial, and institutional facility or building that has the potential of introducing substances that would be detrimental to the Ash Creek SSD Collection or Treatment System as determined by Ash Creek SSD.

- D. All wastewater from FOGS-bearing (fats, oils, and grease) fixtures must be routed to the interceptor. All wastewater from floor drains, trench drains, mop sinks and hand washing stations must be routed to the interceptor. Sanitary waste shall be excluded from the interceptor but tied in at the sampling manhole.
- E. The working capacities of interceptors connected to Ash Creek SSDs wastewater system shall be at least 1000 gallons and 3 bay.
- F. Sampling Manhole:
 - 1. A sampling manhole is required downstream of all Grease and Sand/Oil Interceptors.
 - 2. The facility sanitary sewer shall also discharge to the sampling manhole.
- G. Impact fees will need to be paid to Ash Creek SSD based on business type and square footage.
- H. See Appendix D “Grease and Sand Interceptor” Detail Drawing.

4.10 Onsite Wastewater Systems

- A. Onsite Wastewater Systems or “Septic Systems” must comply with Utah Administrative Code R317-4, Southwest Utah Public Health Department’s Onsite Wastewater Regulations, and Ash Creek SSD Rules and Regulations. See Section 1.2.3.B of these Standards and Ash Creek Special Service District Rules of Operation Part IV.
 - 1. Conventional onsite wastewater systems shall:
 - a. Comply in all respects with the septic system densities of the Hansen Allen Luce Study
 - b. Be shown by an engineering report to have no negative effect on groundwater quality, or
 - c. Be exempt from the Hansen Allen Luce Study.
- B. For any Large Underground Wastewater Disposal (LUWD) System where Ash Creek SSD will be designated Body Politic, the following requirements shall be meet:
 - 1. Must comply with Utah Administrative Code R317-5, Southwest Utah Public Health Department’s Onsite Wastewater Regulations, and Ash Creek SSD Rules

and Regulations. See Section 1.2.3.B of these Standards and Ash Creek Special Service District Rules of Operation Part IV.

2. A System Design Report shall be submitted by the Project Engineer to Ash Creek SSD for review and approval. The report shall contain design criteria along with other information necessary to describe the proposed project and demonstrate project feasibility. The Report shall include a completed copy of the Southwest Utah Public Health Department's "Onsite Wastewater System Subdivision Feasibility Application". It is the responsibility of the Project Engineer to ensure the report meets all requirements of Utah Administrative Code R317-5.
3. Construction drawings for the Development including sewer and the LUWD System shall be submitted for review, redline comments and approval by Ash Creek SSD.
4. After all redline comments have been addressed and Ash Creek SSD has approved the construction drawings, Ash Creek will submit construction drawings and the System Design Report to the Utah Department of Water Quality (DWQ) for comments and approval.
5. No construction shall begin until comments from DWQ have been addressed and plans have been approved.
6. The Developer or project owner shall execute a Body Politic Agreement with Ash Creek SSD prior to completion of the LUWD System construction.

4.11 Wastewater Pump Stations

- A. See Section 7.0 Wastewater Pump Stations.

4.12 Force Mains

- A. See Section 7.3.2.H Force Mains.

5.0 MATERIAL REQUIREMENTS

5.1 General

A. Minimum Requirements

1. The material requirements contained in this Section include the minimum requirements necessary for construction of wastewater facilities in the Ash Creek SSD area.
2. Contractor shall submit material cut sheets and specifications for proposed materials to demonstrate compliance with Ash Creek SSD Standards.
3. Materials proposed for incorporation into the work that do not conform to these specifications shall require written approval by Ash Creek SSD prior to delivery to the job site.
4. Any material or equipment not conforming to the Approved Construction Drawings and/or these Ash Creek SSD Standards or has not received prior written approval by Ash Creek SSD shall be removed from the project site at the expense of the owner/contractor.

B. Use of Materials

1. All materials and equipment furnished for permanent installation in the work shall be new, unused, and undamaged when installed or otherwise incorporated in the work.
2. No material or equipment shall be used by the contractor for any purpose other than that intended or specified.

5.2 Gravity Pipe

A. Acrylonitrile Butadiene Styrene (ABS) Pipe:

1. Ash Creek SSD does not permit the use of ABS Pipe.

B. High Density Polyethylene (HDPE) Pipe

1. HDPE pipe is permitted under the following conditions:

- a. Installation is at a water well protection zone.
 - b. Installation meets state and local standards.
2. Materials: Virgin resins, Cell Classification meeting or exceeding PE 345464C as defined in ASTM D 3350, resins shall be listed by the Plastic Pipe Institute in its pipe-grade registry TR-4.
3. Pipe and Fittings:
 - a. ASTM Material Designation Code: PE 3608/3408 or PE 4710 high density, extra high molecular weight.
 - b. SDR 17 in accordance with ASTM F 714.
 - c. Outside diameter to be ductile iron pipe size (DIPS) or iron pipe size (IPS).
 - d. Marked in accordance with ASTM F 714.
 - e. Pipe shall be manufactured with an integral color-coded stripe of HDPE, color green.
4. Fittings for Private Lateral Lines:
 - a. No molded HDPE fittings will be allowed.
 - b. 45-degree bends shall be fusion welded seamless long radius HDPE sweep bends, or fusion welded 3 segment fabricated HDPE fittings.
 - c. Wyes for cleanouts shall be fabricated fusion welded fitting.
 - d. The SDR of the fitting shall match the SDR of the adjoining pipe.
5. Joints:
 - a. Zero leak-rate heat-fusion joint conforming to ASTM D 3261.
 - b. HDPE gravity lines 8" and larger shall have the internal bead resulting from the heat-fusion process removed and extracted from the pipe during the cooling stage of the fusion process.
 - c. The bead removal process shall be in accordance with the bead removal equipment manufacturer's specifications.
 - d. The extracted fusion bead shall be subjected to visual inspection and verification per Section 6 Construction Requirements.

C. Polyvinyl Chloride (PVC) Pipe

1. Material: PVC plastic having a cell classification of 12364 or 12454 as defined in ASTM D1784
2. Pipe:
 - a. 4" thru 15" diameter: ASTM D 3034, SDR-35.
 - b. 18" thru 48": ASTM F 679 (Large diameter solid wall), SDR-35.
 - c. Minimum pipe stiffness shall be 46 psi when tested in accordance with ASTM D 2412.
 - d. For depths and loads exceeding the minimum 46 psi then 115 psi pipe stiffness shall be used in accordance with ASTM D 3034, SDR-26.
3. Fittings:
 - a. Gasketed sewer fittings conforming to ASTM F1336.
 - b. Solvent weld PVC fittings meeting ASTM D3034 may be used on 4" and 6" private laterals. Gasketed fittings shall not be used for solvent welding.
4. Joints:
 - a. Integral bell gasketed joints conforming to ASTM D3212. Rubber gaskets shall be factory installed and conform to ASTM F 477.
 - b. Joints on 4" and 6" diameter pipe may be solvent weld joints conforming to ASTM D 2855. A purple primer conforming to ASTM D 656 and solvent cement not purple in color and conforming to ASTM 2564 shall be used.
 - c. Pipe lengths shall not be greater than 20 feet.
 - d. PVC pipe meeting requirements of ASTM D 1785, Schedule 40 or Schedule 80, with equivalent gasketed or solvent weld fittings, may be used for 4" and 6" Private Lateral Wastewater Lines.

D. Polyvinyl Chloride (PVC) AWWA C900 Pipe

1. Material: PVC plastic having a cell classification of 12454 as defined in ASTM D1784
2. Pipe:
 - a. Meets the requirements of the ANSI/AWWA C900 standard specification of polyvinyl chloride water distribution pipe.
 - b. DR-18 or less

3. Joints:
 - a. Restrained gasketed joints required.
 - b. The integral bell joint system meets the requirements of ASTM D3139 and utilizes an elastomeric seal meeting the specification defined in ASTM F477.

5.3 Pressure Pipe

A. High Density Polyethylene (HDPE) Pipe

1. HDPE pipe is permitted under the following conditions:
 - a. Installation is at a water well protection zone.
 - b. Installation meets state and local standards.
2. Materials: Virgin resins, Cell Classification meeting or exceeding PE 345434C as defined in ASTM D 3350, resins shall be listed by the Plastic Pipe Institute in its pipe-grade registry TR-4.
3. Pipe and Fittings:
 - a. ASTM Material Designation Code: PE 3608/3408 or PE 4710 high density, extra high molecular weight.
 - b. 4" thru 12" diameters. SDR and Pressure Class shall be based on specific requirements of installation with minimum SDR 11 and Pressure Class 160 in accordance with ASTM F 714.
 - c. Outside diameter to be ductile iron pipe size (DIPS) or iron pipe size (IPS).
 - d. Marked in accordance with ASTM F 714.
 - e. Pipe shall be manufactured with an integral color-coded stripe of HDPE, color green.
4. Joints: Zero leak-rate heat-fusion joint conforming to ASTM D 3261.
5. Thrust Blocking: Appropriate thrust blocking, designed specifically for the pressures and soil conditions encountered, shall be installed at all fittings.

B. Polyvinyl Chloride (PVC) Pipe

1. Material: PVC plastic having a cell classification of 12454 as defined in ASTM D1784.
2. Pipe and Fitting.
 - a. 4" thru 12" diameters: AWWA C900. DR and Pressure Class shall be based

on specific requirements of installation with a DR of 18 or less and Pressure Class 150.

3. Joints.
 - a. 4" thru 12" diameters. Integral-bell gasketed joints conforming to ASTM D31339. Rubber gaskets shall be factory installed and conform to ASTM F 477.
4. Fittings: ANSI A21.10. Fittings shall be consistent with the specified pipe.
5. Thrust Blocking: Appropriate thrust blocking, designed specifically for the pressures and soil conditions encountered, shall be installed at all fittings.

5.4 Manholes

A. General

1. Manholes shall be watertight and shall be constructed with precast reinforced cementitious concrete or polymer concrete bases, wall and cone sections, thermo-plastic riser form, and castings.
2. Steps shall be removed in all manholes.
3. Cast-in-place concrete bases will generally not be allowed, and if allowed only for connection of new main lines to existing main lines where the use of a precast concrete base is not practical, as specifically approved by Ash Creek SSD.

B. Precast Concrete Bases

1. Shall conform to ASTM C 478 and standard detail "Sewer Manhole" in Appendix D. Shall consist of a monolithically cast precast base section with invert and shall be supplied with a flexible pipe connector for each pipe entering the manhole.
2. Invert
 - a. An invert shall be provided for each pipe, including private laterals, entering the manhole.
 - b. Inverts shall be full depth. The cross-sectional shape of the invert shall be uniform for the entire length and shall match the lower halves of the inflow and outflow pipe up to the spring line of the pipe and shall be vertical from the spring line to the top of the pipe.

- c. In certain situations, extra depth of the channel may be required to contain the wastewater flow in the channel.
 - d. If a change in pipe diameter occurs at the manhole, crowns of pipes shall match and a smooth transition from one size to the other shall be provided.
 - e. The invert shall have a uniform grade from inflow to outflow pipe flow lines with no areas of flat or reverse grade.
 - f. Changes in flow direction shall be smooth and uniform. Short radiuses or abrupt changes in direction will not be allowed.
 - g. The junction where the pipe abuts the invert shall be manufactured specifically for the type of pipe connecting to the manhole such that the flowline of the pipe matches the flowline of the invert.
 - h. The junction shall be constructed so that the distance from the inside of the manhole wall to the end of the pipe when installed is 5" for HDPE pipe and 3" for all other pipe material.
 - i. Minimum clear distance between two wall penetrations shall be 6 inches. Minimum clear distance between wall penetration and joint shall be 3 inches.
 - j. A 0.2-foot drop through manhole as required by Section 4 Design Requirements.
3. Private Lateral Wastewater Line connections to Precast Base:
- a. Private Lateral Wastewater Line connections to manholes are only allowed for 6" diameter and larger lines as specifically approved by Ash Creek SSD. 4" lateral connections to the public wastewater system shall be according to Section 4.8.
 - b. If allowed, Private Lateral Wastewater Line connections to pre-cast bases shall meet the requirements for flexible pipe connector and inverts listed above.
 - c. In addition, the elevation of the lateral line entering a manhole shall be at or above the spring line of the main line.
 - d. If allowed, the number of Private Lateral Wastewater Lines connecting directly to each manhole shall be limited to two (2). Exceptions shall be as approved by Ash Creek SSD.
4. Steps: Shall be removed.

C. Cast-in-Place Concrete Bases

- 1. If approved by Ash Creek SSD, Cast-in-Place Concrete Bases shall conform to standard detail "Cast-in-Place Manhole Base" in Appendix D and applicable

portions of ASTM C 478 and shall include a precast wall section with a cast-in-place invert. Typical 5 bag mix.

2. The cast-in-place concrete base shall be located at the approximate midpoint of an individual pipe section on the existing main line in order to avoid including a joint of the existing pipeline within the new manhole base.
3. The material around the existing pipe shall be removed to a level that is a minimum 12" below the bottom of the pipe extending radially from the center of the new manhole a sufficient distance to allow for placement of bedding material and concrete as discussed below.
4. The existing pipe shall be adequately supported to prevent settlement or damage.
5. A minimum 6" depth of compacted bedding material shall be placed to provide a level subgrade for the cast-in-place base.
6. The initial precast wall section shall be supported on concrete blocks and adjusted to proper alignment and grade prior to pouring the invert. The concrete blocks shall be positioned to not interfere with the coring of the base for placement of the new pipe and shall not be exposed in the finished manhole base.
7. The precast wall section may have "doghouse" cutouts to span the existing pipe.
8. The precast wall section shall not bear directly on the existing pipe.
9. Adequate separation between any part of the precast wall section and the pipe shall be provided to allow for placement of the pipe to manhole adapters and to provide a minimum 3" thickness of concrete between the pipe and the wall section.
10. Prior to placing the concrete, the outside of the existing pipe shall be cleaned and pipe to manhole adapters (2 per side), located at each outside manhole wall, shall be installed on the existing pipe.
11. Prior to placing the concrete, a circular form extending from the prepared subgrade to a minimum 6" above the top of the highest pipe entering the manhole shall be installed and anchored. The form shall be a minimum 12" greater in diameter than the outside of the manhole section wall and shall be located concentric with the manhole section.

12. The cast-in-place invert shall be a continuous pour of Class 4000 concrete and shall meet the following requirements.
 - a. Concrete shall be a minimum 8" in thickness below the bottom of the existing pipe and the bottom of the precast manhole wall section and shall extend a minimum 6" radially, measured from the outside of the precast manhole wall section.
 - b. The concrete on the outside of the manhole shall extend a minimum 6" above the top of the highest pipe that will connect to the manhole and shall be level for the full circumference of the manhole.
 - c. The concrete on the inside of the manhole shall extend to the top of the highest pipe that will connect to the manhole.
 - d. The concrete shall be formed around the existing pipe to provide an invert in the manhole. The bottom half of the existing pipe will remain in place to form the bottom of the invert. The concrete above the existing pipe shall be formed to provide a uniform channel with vertical sides that matches the diameter of the pipe from spring line to the top of pipe.
 - e. In certain situations, extra depth of the channel may be required to contain the wastewater flow in the channel.
 - f. After the cast-in-place base has been completed and cured for a minimum of 48 hours and after the wall section, cone and casting have been placed and tested, the top half of the existing pipe shall be removed to within 3" of the manhole wall in the length of the pipe and to the spring line of the pipe in the width.
 - g. Rough edges of the pipe and concrete thus exposed shall be ground smooth and, if necessary, grouted with epoxy grout in such a manner as to produce a smooth and acceptable finish.
 - h. Any gaps at the interface of the precast wall section and the cast-in-place concrete due to concrete shrinkage shall be grouted or sealed as directed by Ash Creek SSD.
 - i. A 0.2-foot drop through manhole as described in Section 4 Design Requirements.
13. Connections of new pipe to Cast-in-place manholes:
 - a. After invert has been poured and cured, the cast-in-place base shall be core drilled at the design elevation to accept a flexible pipe connector and to form a full depth invert for the new pipe.
 - b. A flexible pipe connector shall be installed in the core drilled base to provide a watertight seal.
 - c. Installation of pipe in flexible pipe connectors shall be per manufacturer's recommendation.

- d. Additional forming of the core drilled invert by chipping and grouting may be required to provide a smooth transition to the existing invert.
 - e. Core shall be 0.2 foot higher than existing flowline and/or crowns of pipe shall match.
14. Private Lateral Wastewater Line Connections to Cast-in-Place Base:
- a. The connection of Private Laterals to cast-in place bases shall meet the requirements listed in item number 13 above.
 - b. In addition, the elevation of the Private Lateral line entering a manhole shall be at or above the spring line of the main line.
15. Any portion of the existing line damaged shall be repaired or replaced by the contractor as approved by Ash Creek SSD.
16. Debris and construction material shall not be allowed to enter the existing wastewater system.
17. If debris and construction material does enter the existing wastewater system the Contractor shall be responsible for removal of the material, as approved by Ash Creek SSD.

D. Manhole Sections

- 1. Precast reinforced concrete conforming to ASTM C 478.
- 2. Joints: Tongue and groove type specifically designed for type of joint sealant material being used.
- 3. Lifting Insert: Designed to not extend completely through section wall with a minimum 3/4" cover from inside of wall.
- 4. Steps: shall be removed.
- 5. Precast base sections shall be monolithically poured.
- 6. Cone sections shall be of the eccentric type, excepting polymer manholes. The flat side of an eccentric cone shall be aligned above the primary outlet.
- 7. Concrete base, barrel riser sections and cones shall be uniform and provided by a single manufacturer.

E. Grade Rings

1. Grade rings shall only be used as a component of the adjustment of frame and cover to final grade when specifically approved by Ash Creek SSD. Standard adjustment shall be accomplished with a Thermoplastic Riser Form or Whirlygig manhole risers. If approved, grade rings shall meet the following requirements.
2. Grade rings shall be expanded polypropylene grade rings, “Pro-Ring™” as manufactured by Cretex Specialty Products or approved equal, installed per manufacturer’s specifications.
3. The joints between the grade ring and cone, between grade rings, and between the grade ring and Thermoplastic Riser Form shall be sealed with M-1 Structural Adhesive/Sealant as manufactured by Chem Link or approved equal per manufacturer’s instructions.
4. Designed to meet H-20 live loading.
5. Sizes: 6" height only.
6. Concrete grade rings shall not be used.
7. Manhole sections shall be required to meet 16” max ring adjustment.

F. Thermoplastic Riser Form

1. Thermoplastic riser form: As manufactured by Whirlygig® or approved equal.
2. Sealant for Thermoplastic riser: One-compound, all purpose, polyurethane sealant. Sikaflex® Construction Sealant as manufactured by Sika Chemical; Dynatrol®I-XL as manufactured by Pecora Corporation or approved equal.

G. Prohibited Manhole Adjustment Materials

1. Brick, block, rocks, wood, metal or plastic shims and all other similar material shall not be used for adjustment of frame and cover to final grade. Standard adjustment shall be accomplished with a Thermo-plastic Riser Form or Whirlygig trimmed to allow the frame to sit firmly on the form without any further adjustment.

H. Flat-Slab Lid

1. Precast reinforced concrete conforming to ASTM C 478.
2. Designed to meet H20 live loading.
3. Joints: Tongue and groove type compatible with manhole sections and specifically designed for type of joint sealant being used.
4. Allowed only on 5-foot diameter or larger manholes or on manholes meeting the requirements of standard detail "Shallow Manhole" in Appendix D.
5. Opening for casting on 5 foot or larger diameter manholes shall be offset to align over the primary outlet.

I. Frame and Cover

1. Standard Frame and Cover.
 - a. Cast iron conforming to ASTM A48 Class 35B.
 - b. Combined minimum weight of 400 pounds with the cover approximately 150 pounds and the frame approximately 250 pounds.
 - c. Frame.
 1. Shall be of the cone construction, D&L Supply A-1180 series or approved equal.
 2. Shall not have slots for dust pans.
 3. Low profile frames are not allowed.
 - d. Cover.
 1. 24 3/4" in diameter, vented with closed pick hole for removal.
 2. Low profile crosshatch pattern, D&L Supply A1181-10, or approved equal.
 3. Marked "Ash Creek Special Service District".
2. Oversized Frame and Cover.
 - a. Shall be used on manholes connecting to pipelines 27" diameter and greater.
 - b. Cast iron conforming to ASTM A48 Class 35B.
 - c. Combined minimum weight of 422 pounds.
 - d. Frame.
 1. Shall be of the cone construction, D&L Supply A-1353 or approved equal.
 2. Shall not have slots for dust pans.

3. Frames with flat slab construction are not allowed.
- e. Cover.
 1. 30" in diameter, vented with closed-pick pick hole for removal.
 2. Low profile cross hatch pattern, D&L Supply A-1361 or approved equal.
 3. Marked "Ash Creek Special Service District".
3. See Appendix D for Detail Drawing.
4. Odor Control Units.
 - a. Cover shall have standard 12 holes for venting if required.
 - b. Manhole Odor Eliminator (MOE) as manufactured by Inventive Resources Inc. or approved equal activated carbon filter media system.
5. Metal Adapter Rings (Risers)
 - a. Shall only be allowed for adjusting the top of frame elevation on existing manholes for pavement overlays as approved by Ash Creek SSD.
 - b. Shall not be allowed on manholes constructed as part of a new development project.
 - c. The maximum depth of adapter rings shall be 4".
 - d. The maximum number of adapter rings shall be 2.
 - e. D&L Supply G-2088 thru G-2093, Olympic Foundry or approved equal.
 - f. Shall not have slots for dust pans.
 - g. Shall include 4 set-screws to anchor ring to existing frame.
 - h. Shall be compatible with the existing frame being adjusted.

J. Manhole Steps

1. Are not allowed.

K. Flexible Pipe Connector (Boot)

1. Shall conform to ASTM C-923.
2. Manufactured and sized specifically for the type and size of pipe connecting to the manhole.

L. Pipe to Manhole Adapter

1. “Romac Style ‘LCT’ Manhole Adapter Gasket” as manufactured by Romac Industries, Inc., Fernco Large Diameter Waterstop or Manhole Adapter as manufactured by Fernco, Inc., or approved equal.

M. Joint Sealant Material

1. Shall meet the following requirements.
 - a. Preformed flexible joint sealant (mastic) meeting requirements of ASTM C 990. Ram-Nek as manufactured by Henry Company Sealants Division, Kent Seal as manufactured by Hamilton Kent, Polysealant as manufactured by J-K Polysource, Inc., or approved equal.

N. Concrete

1. Pre-cast: Shall meet the requirements of ASTM C478.
2. Cast-in-place: Class 4000: 28-day minimum compressive strength of 4000 psi and contain not less than 6 ½ bags of low alkali, Type II or Type V Portland Cement per cubic yard and air entrainment per ASTM C-150.

O. Non-Shrink Cementitious Grout

1. High strength, non-shrink, non-metallic, cement-based grout.
2. Surfaces shall be prepared, and grout shall be prepared and placed according to manufacturer’s directions.

P. Non-Shrink Epoxy Grout

1. High strength, non-shrink, 100% solids, 3 component epoxy grout system.
2. Surfaces shall be prepared and grout shall be prepared and placed according to manufacturer’s directions.

Q. Manhole Odor Control Units

1. Manhole insert, carbon filter cartridge and bladder specifically designed to remove hydrogen sulfide and other odorous components in the exhaust air from the wastewater system.

2. Manhole Odor Eliminator (MOE) as manufactured by Inventive Resources Inc. or an approved equal activated carbon filter media system.
3. The manhole frame and cover supplied for manholes with these Manhole Odor Control Units shall meet the requirements of Section I Frame and Cover above.

R. Expandable Waterstop

1. Composite bentonite clay based or expandable rubber-based water-stop designed to create watertight joints in concrete.
2. Hydrotite as manufactured by Greenstreak, Superstop as manufactured by Tremco, Mirastop as manufactured by Carlisle Coatings and waterproofing, or approved equal.
3. Provide adequate concrete cover over water-stop per manufacturer's recommendation.
4. Surface preparation and installation per manufacturer's recommendation.

S. Polymer Concrete Manholes

1. Polymer Concrete Manholes shall meet the requirements of this Section 5.4. ASTM C-478 material and manufacturing is allowed compositional and dimensional differences required by a polymer product.
2. Manhole risers, transition slabs, conical tops, grade rings and manhole base sections shall be designed, by manufacturer, to requirements of ASTM C-478 and ASTM C 857 as modified to accept polymer construction in lieu of cementitious concrete as follows.
 - a. Polymer Mixture – the mixture shall consist solely of thermosetting resin, sand and aggregate. No cementitious materials shall be allowed as part of the mix design matrix. All sand and aggregate shall be nonreactive in an acid environment.
 - b. Required wall thickness for all members will be that stated by polymer manhole manufacturer based upon loading conditions and materials properties. The wall thickness of risers and conical tops shall be not less than that prescribed by the manufacturer's design by more than 5%. A wall thickness greater than the prescribed design shall not be cause for rejection.
 - c. Thermosetting Resin – the resin shall have a minimum deflection temperature of 158° F when tested at 264 psi following Test Method D 648.

The resin content shall not be less than 7% of the weight of the sample as determined by Test Method D2584. Resin selection shall be suitable for applications in the corrosive conditions to which the structures will be exposed.

- d. Each manhole component shall be free of all defects, including indentations, cracks, foreign inclusions and resin starved areas that, due to their nature and degree or extent, detrimentally affect the strength and serviceability of the component part. The internal diameter of the manhole components shall not vary more than 1%. Variations in height of two opposite sides of risers and conical tops shall not be more than 5/8 inch. The under run in height of a riser or conical top shall not be more than 1/4 in/ft of height with a maximum of 1/2 inch in any one section.
 - e. Marking and Identification – each manhole component shall be marked on the inside and outside with the following information: Manufacturer's name or trademark, Manufacturer's location and production date.
 - f. Manhole joints shall be assembled with a bell and spigot or shiplap butyl mastic joint so that on assembly, manhole base riser and top section make a continuous and uniform manhole. Joint sealing surfaces shall be free of dents, gouges and other surface irregularities that would affect joint integrity.
 - g. Construct invert channels to provide smooth flow transition waterway with no disruption of flow at pipe to manhole connections. Invert slope through manhole is as indicated on drawings. Provide curves for side inlets and smooth invert fillets for flow transition between pipe inverts. Polymer bench and channel are to be constructed with all resin aggregate material – no alternative fill material is allowed.
 - h. Provide resilient connectors per Section I. Flexible Pipe Connector (Boot) above.
 - i. Exceptions to ASTM C-478 – components shall be designed for the intended combinations of manufacturing materials. Component designs may be as non-reinforced members as recommended by the manufacturer. Steel reinforcement is not required for circumferential reinforcement, joint reinforcement, base slab reinforcement or hoop reinforcement, but may be placed for the purpose of product handling.
3. Grouting – all material needed for grouting and patching shall be a polyester mortar compound provided by the manhole manufacturer.
4. Manhole steps will not be required in Polymer Concrete Manholes.

5. The design of Polymer Concrete Manholes to be located in areas where the groundwater level is higher in elevation than the bottom of the manhole shall consider the effects of buoyancy. An extended base footer may be necessary.
6. Polymer Concrete Manholes shall be 'Armorock' polymer manhole system or approved equal.

T. Integrated Polymer Lined Manholes

1. Integrated Polymer Lined Concrete Manholes shall meet the requirements of this Section 5.4. and ASTM C-478.
2. Manhole risers, transition slabs, conical tops, grade rings and manhole base sections shall be designed, by manufacturer, to requirements of ASTM C-478 and ASTM C-857.
3. Manholes shall be constructed dry cast and/or wet cast manufactured using Type III/V Cement which meets the requirements for both Type III and Type V Cement.
4. Joints shall be rubber gaskets per ASTM C-443 or flexible butyl mastic per ASTM C-990.
5. Linings shall be high-density polyethylene, fiber-reinforced plastic.
6. Manhole steps will not be required in Integrated Polymer Lined Concrete Manholes.
7. Perfect Lined Manholes as manufactured by Geneva Pipe and Precast – A Northwest Pipe Company or an approved equal.

U. External Joint Collar for Manholes

1. For use on existing manholes where new wall sections are placed on existing sections with nonmatching joints.
2. Shall conform to ASTM C877. Cretex Wrap as manufactured by Cretex Specialty Products or approved equal.

5.5 Low-Pressure Sewer System

A. General

1. The design of the Low-Pressure Sewer System shall meet the requirements of Section 4 Low Pressure Sewer System.
2. The proposed Low-Pressure Sewer System and appurtenances shall be consistent within each development.

B. Main Line Materials

1. Low-Pressure Sewer System pipe: C900 PVC pressure pipe meeting the requirements of Section 5.3.
2. Flushing Connections.
 - a. Manhole: Minimum 5' diameter meeting the requirements of Section 5.4.
 - b. Ball Valves:
 1. 2" Main Ball Valve: PVC, True Union ball valve, full port, threaded X PE butt fused end connections, 150 psi working pressure, non-locking handle
 2. 1" Hose End Ball Valve: PVC body, ball and stem, full port, lever-style handle, threaded, minimum 150 psi working pressure.
 - c. Universal Coupling: PVC, 110 psi working pressure, 1". Air King Universal Coupling as manufactured by Dixon Valve and Coupling Co. or approved equal.
 - d. Pressure Hose:
 1. Tube: Nitrile synthetic rubber or Type P(EDPM) RMA Class A or B (High to medium oil resistance).
 2. Temperature: -20° to 190° F.
 3. Reinforcement: spiral or braided synthetic textile cord.
 4. Cover: Synthetic rubber or Type P(EDPM) RMA Class A or B (high to medium oil resistance).
 5. Pressure Class: Min 250 psi working pressure.
 6. Connectors: Threaded brass with minimum 250 psi working pressure.
 7. Size: Minimum 1" inside diameter.
 8. Manufacturers: Gates 6B Dura Master® as manufactured by Gates Corporation, Wingfoot® as manufactured by Goodyear Engineered Products Grizzly™ 500 as manufactured by Parker Industrial Hose or approved equal.

- e. Pipe Supports
 - 1. Adjustable Pipe Saddle Support w/ Strap: Two-piece, full circle porcelain coated ductile iron pipe saddle with stainless steel strap and neoprene liner to isolate and protect pipe; threaded PVC pipe w/ adjuster; and threaded PVC standpipe, cross bolted to prevent up-lift.
 - 2. Pipe supports for smaller diameter pipe (2" and 3") may consist of Unistrut, or approved equal, channel, brackets and clamps. All parts shall be PVC.
 - f. Miscellaneous Pipe and Fittings: Threaded, schedule 80 PVC.
3. Combination Air Valve.
- a. Manhole: Minimum 5' diameter meeting the requirements of Section 5.4.
 - b. Sewage Combination Air Release and Air/Vacuum Valve with Accessories. A.R.I. Series D-025, Reinforced Nylon body, as manufactured by A.R.I. Flow Control Accessories or approved equal. Size of valve shall be determined by Engineer and approved by Ash Creek SSD.
 - c. Valves: Meeting requirements of Section 5.5.B.2.b above
 - d. Tracer wire to ring and cover.
 - e. See Appendix D "Air Vac Valve" Detail Drawing.

C. Private Lateral Wastewater Line Materials

- 1. Individual Low-Pressure grinder pump station:
 - a. E/One D-Series as manufactured by Environment One Corporation.
 - b. Omni Grind or Omni Grind Plus as manufactured by Barnes.
 - c. Equivalent as approved by Ash Creek SSD.
- 2. Low-Pressure Sewer System pipe: PVC pressure pipe meeting the requirements of Section 5.3.
- 3. Private Lateral Components:
 - a. Stainless steel combination curb stop valve/check valve assembly with valve box: with compatible polypropylene compression adapter fittings for connection to PVC pipe.
 - b. Valve boxes shall include valve operator extension rod.
 - c. Valve boxes located in traffic areas shall be traffic rated iron or shall have a traffic rated frame and cover installed over the valve box.
 - d. Other components used in connecting the Low-Pressure grinder pump station to the public Low-Pressure system shall be compatible with the

components of the pump station; especially in regard to galvanic corrosion of dissimilar metals.

5.6 Wastewater Pump Stations

A. General

1. Equipment and materials proposed for wastewater pump stations shall be reviewed and approved by Ash Creek SSD during the design review process.
2. As a minimum the pump station construction shall incorporate the following features.
 - a. Wet Well Structure.
 1. Polymer, as manufactured by Armorock or similar as approved by Ash Creek SSD.
 - b. Wet Well Metal Items.
 1. All metal items within the wet well including guide rails, lifting cable or chain, anchor bolts, fasteners, clips, etc., shall be stainless steel 304 or 316.

5.7 Pipe Couplings

A. Main Line Pipe Couplings

1. Concrete Pipe, Asbestos Cement Pipe, Clay Pipe and connection of dissimilar pipe material not covered below.
 - a. Flexible PVC or rubber pipe connector with stainless steel shear ring, Strong Back - RC Series Repair Coupling as manufactured by Fernco, Inc., Flex-Seal ARC Series as manufactured by Mission Rubber Co. or approved equal. Transition couplings or bushings required for pipe material of differing outside diameter.
2. HDPE Pipe: HDPE Electro fusion coupling as manufactured by Central Plastics Company or approved equal.
3. PVC Pipe.
 - a. PVC double bell repair coupling, ASTM D 3034, SDR 35, with gasketed joints conforming to ASTM 3212.
 - b. Generally not permitted, but if approved by Ash Creek SSD, Flexible PVC or rubber pipe connector with stainless steel shear ring, Strong Back - RC

Series Repair Coupling as manufactured by Fernco, Inc., Flex-Seal ARC Series as manufactured by Mission Rubber Co. or approved equal.

4. Ductile Iron Pipe to PVC or HDPE Pipe.
 - a. Ductile iron pipe short body tee, mechanical joint with gasketed cap, transition gaskets sized for outside pipe diameters. Lining shall be Highbuild multi-component Amine cured Novolac Epoxy lining, Protecto 401 Ceramic Epoxy or approved equal, applied according to manufacturer's recommendations.
5. HDPE Pipe to PVC Pipe:
 - a. Poly-CAM Series 731 transition for HDPE/PVC, stainless steel sleeve.
 - b. Central Plastics gasketed outlet x butt-fused outlet or approved equal.
 - c. Ductile iron pipe short body tee, mechanical joint with gasketed cap, transition gaskets sized for outside pipe diameters. Lining shall be Highbuild multi-component Amine cured Novolac Epoxy lining, Protecto 401 Ceramic Epoxy or approved equal, applied according to manufacturer's recommendations.
6. Romac Repair Couplers or equivalent shall be used for all pressure line repairs. Repair couplers shall be wrapped with plastic and secured at both ends.
7. Coupling bolts shall be greased with non-oxidizing grease and the coupling shall be wrapped with polyethylene sheeting and taped.

B. Private Lateral Wastewater Line Pipe Couplings

1. Shall meet the requirements of Section 5.7 for the type of pipe being used.
2. PVC solvent ridged pipe is preferred.
3. Connection of the exterior lateral pipe to the waste pipe exiting the building.
 - a. Flexible PVC or rubber pipe connector with stainless steel shear ring, Strong Back - RC Series Repair Coupling as manufactured by Fernco, Inc., Flex-Seal ARC Series as manufactured by Mission Rubber Co. or approved equal.
 - b. Transition couplings or bushings required for pipe material of differing outside diameter.
 - c. A concentric reducer and short pipe section matching material on house side of connection may be used in conjunction with the flexible pipe connector

and sheer ring if diameter of pipe exiting house is smaller than exterior lateral pipe.

- d. “No-hub” type couplings shall not be used.

5.8 Bedding and Backfill Material

A. Bedding and Initial Backfill Material

1. Manufactured, angular, crushed stone or rock, or crushed stone/sand mixtures free from organic matter meeting one of the following gradations when tested in accordance with ASTM D 2487.

- a. For pipe diameters 4" and larger:

	Open Graded	Dense Graded
US Stand. Sieve	Percent Passing	
1 1/2"	100	100
3/4"	95-100	95-100
#4	0-10	10-50
200	0-5	0-5

- b. For pipe diameters less than 4”:

	Open Graded	Dense Graded
US Stand. Sieve	Percent Passing	
1 1/2"	100	100
1/2"	95-100	95-100
#4	0-10	10-50
200	0-5	0-5

2. Coarse, dense graded sand with 100% passing the #4 sieve and 0-5% passing the #200 sieve may be used as bedding and initial backfill material for 1 ¼” and 1 ½” Low-Pressure sewer system Private Lateral Wastewater Lines.
3. Pea gravel, squeegee, or other similar material that will flow when unconfined are not acceptable bedding and initial backfill material.

B. Final Backfill Material

1. Final backfill material in public or private roads, streets and rights-of-way shall meet the requirements of Ash Creek SSD and applicable City, County or State standards and permits.
2. Final backfill material shall be acceptable material free of hard clods, frozen material or excessive amounts of large rocks greater than 4" minus. If existing material cannot meet compaction requirements, acceptable import material will be required.
3. In areas with known collapsible, expansive, or cohesive, fine-grained soils, a geotechnical investigation report should be obtained. Laboratory testing on soil specimens retained from the investigation should include sieve analyses and Atterberg limits for soil classification, in-situ moisture content, and moisture density relationship (Proctor, ASTM D1557) in order to compare optimum moisture content with in-situ moisture content. Appropriate recommendations should be provided in the report such as soil removal and complete or partial replacement with non-cohesive, imported backfill, moisture conditioning, lift thickness, and density requirements. Recommendations from the report should be followed. The contractor must demonstrate that construction methods and compaction equipment being used produce a well compacted backfill within the trench prior to full production.
4. In areas with known groundwater, appropriate design recommendations should be provided. A geotechnical investigation may be required, and the recommendations of the geotechnical report shall be followed.

C. Cement Treated Fill Material (Flowable Fill)

1. Cement treated fill shall consist of low alkali Type II Portland cement, water, non-plastic sand or concrete aggregate, and other additives to meet the performance requirements.
2. Performance Requirements: Unconfined compressive strength per ASTM D4832.
 - a. 10 psi minimum in 24 hours.
 - b. 150 psi maximum in 28 days.

D. Untreated Base Course Material

1. Untreated base course material shall consist of clean, hard, tough, durable, and sound mineral aggregates that consist of crushed stone, crushed gravel or crushed

slag, free of detrimental and organic matter.

2. Gradation. Shall conform to Utah Department of Transportation specification for Untreated Base Course as follows:

	1 1/2"	1"	3/4"
US Stand. Sieve	Percent Passing		
1 1/2"	100	-	-
1"	-	100	-
3/4"	81-91	-	100
1/2"	67-77	79-91	0
3/8"	-	-	78-92
#4	43-53	49-61	55-67
#16	23-29	27-35	28-38
#200	6-10	7-11	7-11

E. Trench Dike Material

1. Cement Treated Fill Material: Shall meet the requirements of Section 5.8.C.

5.9 Casings

A. Casings Under Roadways

1. Casings shall meet the requirements of the applicable City, County or State standards.
2. As a minimum, casings shall be steel pipe conforming to ASTM A 139, Grade A. Alternate casing pipe material may be allowable, as approved by Ash Creek SSD and the roadway owner.
3. Joints between sections of casing pipe shall be welded around the full circumference to provide a water-tight joint.
4. Minimum casing diameter shall be 24" to allow for future upsizing of carrier pipe. In situations where upsizing of the carrier pipe is not likely, a smaller diameter casing may be allowable, as approved by Ash Creek SSD.

5. Minimum wall thickness shall be in accordance with the following:

Casing Diameter (inches)	Nominal Wall Thickness (inches)
24	0.312
30	0.438
36	0.462

6. Casing Spacers meeting requirements of Section 5.9.C. shall be installed on carrier pipe inside all casings.

B. Other Main Line Casings

1. Casings required on main lines outside of roadways shall, as a minimum, be steel pipe conforming to ASTM A 139, Grade A. Alternate casing pipe material may be allowable, as approved by Ash Creek SSD.
2. Joints between sections of casing pipe shall be welded around the full circumference to provide a water-tight joint.
3. Minimum casing diameter shall be 18" to allow for future upsizing of the carrier pipe. In situations where upsizing of the carrier pipe is not likely, a smaller diameter casing may be allowable, as approved by Ash Creek SSD.
4. Minimum wall thickness shall be in accordance with the following:

Casing Diameter (inches)	Nominal Wall Thickness (inches)
18	0.312
24	0.312
30	0.438
36	0.462

5. Casing Spacers meeting requirements of Section 5.9.C. shall be installed on carrier pipe inside all casings.

C. Casing Spacers

1. Maximum of 6' separation between spacers with one casing spacer within 2' of each side of a pipe joint and the rest evenly spaced. Maximum 12" distance between end of casing and first spacer.
2. Band shall be 14-gauge heat fused PVC coated steel.
3. Risers shall be 10-gauge heat fused PVC coated steel welded to the band.
4. Liner shall be PVC.
5. Runners shall be reinforced plastic.
6. Hardware shall be stainless steel.
7. Spacer configuration shall be restrained with spacer intervals and locations per manufacturer's recommendations.
8. Spacers shall be concentric.

D. Casing End Seals

1. Casing end seal shall be a pull-on type or approved wrap-around type comprised of 1/8" thick synthetic rubber compound sized to fit the carrier pipe and casing.
2. Stainless steel bands shall be used to secure the end seal to the pipe.

E. Private Lateral Wastewater Line Casings

1. Casings on private laterals 6" in diameter and smaller shall meet the requirements of Section 5.2 or approved equal.
2. Casings shall be sealed to prevent the migration of materials in the casing pipe.

5.10 Miscellaneous Material

A. Marking Tape

1. Marking tape shall be a type specifically manufactured for marking underground utilities and shall meet the following requirements.

- a. Tape shall be of an acid and alkali-resistant polyethylene film.
- b. Tape width shall be 2" minimum on laterals and 3" minimum on main lines. Minimum thickness shall be 0.004".
- c. Tape color shall be GREEN and shall bear a continuous printed inscription "SEWER."

B. Tracer Wire

1. Tracer wire shall be a type specifically manufactured for the purpose of detecting buried utilities and shall meet the following requirements.
 - a. Minimum 12 AWG copper wire or copper clad steel core wire coated with a minimum 30 mil High Molecular Weight Polyethylene (HMWPE) jacket designed specifically for buried use.
 - b. Jacket color shall be green.
 - c. Tracer Wire Connectors.
 1. Silicon filled direct bury wire nuts: Dryconn Direct Bury Wire Nut (10600), as manufactured by King Innovation or approved equal.
 2. Direct bury splice kit: 3M™ Direct Bury Splice Kit as manufactured by 3M Company or approved equal.

C. Caps for Main Line and Private Lateral Stubs

1. Glued, fused or gasketed cap.
2. Expansion type (Brandt™) plugs shall not be used.

D. Private Lateral Wastewater Line Stub Markers

1. 6' long Tee post. See Detail Drawing in Appendix D.
2. The marker shall extend from the top of the stub end to a minimum 3' above final grade.
3. The exposed portion of the marker shall be painted green.

E. Cleanout Cap

1. In paved areas and un-paved traffic areas: Threaded brass cap in threaded x solvent weld PVC adapter, threaded brass cap in cast iron body, cast iron blind cap or PVC threaded cap in threaded x solvent weld PVC adapter. Cast iron body shall be connected to cleanout riser pipe with flexible-type neoprene coupling as

manufactured by FERNCO or approved equal or no-hub type connector to provide a water-tight connection. Cleanout Ring and Cover per Section 5.10.F below shall be placed over the cleanout assembly.

2. In unpaved non-traffic areas: Threaded brass cap in cast iron body or cast-iron blind cap per Section 5.10.E.1 above.
3. See “Sewer Cleanout W/Lid” Detail Drawing in Appendix D.

F. Cleanout Ring and Cover

1. In paved areas and un-paved traffic areas:
 - a. 4" and 6" cleanouts:
 1. Cast iron Frame and Cover conforming to ASTM A48 Class 35B similar to D&L Supply H-8030 or approved equal. Ring and cover shall be cleaned and painted with an asphalt coating prior to delivery to site.
 2. Heavy Duty Cleanout Housing with cast iron, or other approved cover marked “SEWER”.
 3. In all cases the Ring and Cover must be large enough in diameter to provide separation from the cleanout standpipe and cleanout cap and allow access for removal of the Cleanout Cap.
 - b. Larger than 6" cleanout: a properly supported standard manhole frame and cover per Section 5.4.
2. Landscaped Areas: 10” minimum diameter, marked “SEWER”
3. See “Sewer Cleanout W/Lid” Detail Drawing in Appendix D.

G. Private Lateral Wastewater Line Connections

1. Private lateral saddles on all gravity main line pipe material except HDPE shall be JM Eagle – solvent weld sewer saddle with bands or equal.

H. Grease Interceptors, Oil Separators and Sand Interceptors

1. See “Grease and Sand Interceptor” Detail Drawing in Appendix D.
2. Precast reinforced concrete structure consisting of a vault with integral floor, vault riser sections, baffle wall, lid, approved manhole adjustment, frames and covers, and piping.

3. 3-bay, size as designed by a Registered Professional Engineer licensed in State of Utah and approved by Ash Creek SSD. Minimum 1,000 gallons.
4. Precast vault, vault riser sections, and lid.
 - a. Shall be designed by a Registered Professional Engineer licensed in the State of Utah.
 - b. Loading condition:
 1. Walls designed for a saturated equivalent fluid at rest.
 2. Design surcharge loading: AASHTO H-20 truck load.
 - c. Concrete: Minimum 28-day compressive strength of 4000 psi.
 - d. Reinforcing steel: ASTM A615 Grade 60.
 - e. Concrete cover over reinforcing steel: Minimum 1 ½”.
 - f. Manhole Adjustment Materials: meeting requirements of Section 5.4.
 - g. Frame and cover: meeting requirements of Sections 5.4.I.
 - h. Piping: PVC with solvent weld joints meeting the requirements of Section 5.2.C.
 - i. Piping connection to precast vault: Flexible Pipe Connector (Boot) meeting the requirements of Section 5.4.K.
 - j. Joints between vault, vault riser sections, lid, grade rings and frame and cover shall be sealed with flexible butyl blend sealant (mastic) meeting the requirements of Section 5.4.M.

6.0 CONSTRUCTION REQUIREMENTS

6.1 Inspection of Public Wastewater System Extension and Modifications

6.1.1 General

- A. Inspection of Public Wastewater System extensions and modifications by Ash Creek SSD for Developer Sponsored Projects will include the following activities. Inspection of Ash Creek SSD Sponsored Projects will generally follow the same process but may be modified to meet the specific needs of the project.
 - 1. Review and approval of required submittals from Contractor.
 - 2. Preconstruction Meeting.
 - 3. Periodic Inspections.
 - 4. Preliminary Inspection
 - 5. Final Inspection.
 - 6. Warranty Inspection.
- B. All work and materials shall be subject to inspection by Ash Creek SSD until the end of the warranty period.
- C. The Ash Creek SSD Inspector shall have access to the work site at all times.
- D. Inspections conducted by the Ash Creek Inspector will be according to the Approved Construction Drawings and these Ash Creek SSD Design and Construction Standards.
- E. Inspections will be conducted as appropriate and as time and scheduling permits, as determined by Ash Creek SSD. The Developer shall make the necessary arrangements for inspection of the Contractor's work during the regular 40-hour work week. If the Contractor works more than a 40-hour week, the financial responsibility for added inspection shall be the responsibility of the Developer. The prevailing hourly rates for inspection are on file with Ash Creek SSD. Such prevailing rates will be applied at 1-1/2 times the regular rates for periods over 40 hours per week.
- F. The Contractor shall notify the Ash Creek Inspector a minimum 48 hours prior to the following:
 - 1. Start of construction.
 - 2. Any change of schedule.
 - 3. Work to be conducted on weekends, or holidays.

- G. Ash Creek SSD will notify the Project Manager of any nonconforming work or material as soon as practical after that non-conforming work or material becomes known to Ash Creek SSD.
- H. The Contractor shall make necessary corrections. Non-conforming work or material will not be approved by Ash Creek SSD. The Contractor shall promptly remove from the premises all work and materials determined to be defective or as failing to conform to the approved plans, whether operational or not, and the Contractor shall promptly replace and re-execute his own work in accordance with Ash Creek SSD's specifications.
 - 1. If the Contractor does not remove such work or materials within a reasonable time after notice, Ash Creek SSD may cause such work or materials to be removed and stored at the expense of the Developer. If the Developer does not pay the expenses of such removal within 10 days' time after such removal, Ash Creek SSD may, upon thirty days' written notice, sell such materials at private sale and shall account for the net proceeds thereof after deducting all the costs and expenses that should have been borne by the Developer.

6.1.2 Contractor Submittals

- A. Contractor shall deliver required submittals to Ash Creek SSD for review and approval a minimum 1 week prior to Preconstruction Meeting.
- B. Ash Creek SSD will advise Contractor of any deficiencies.
- C. Contractor shall make revisions and resubmit, if required.
- D. Approval of all required submittals is required prior to holding the preconstruction meeting.
- E. Product data sheets shall be marked to identify applicable products, models, options, and other data.
- F. Fabrication and/or purchase of any item shall not be commenced before Ash Creek SSD has reviewed and approved the pertinent information.
- G. Required Material Submittals.
 - 1. Pipe, fittings, and appurtenances.
 - 2. Manholes and appurtenances.
 - 3. Pipe bedding sieve analysis.
 - 4. Tracer wire and connectors.

5. Marking tape.
6. Flowable Fill.
7. Casings and appurtenances.
8. Low-Pressure sewer system materials and appurtenances.
9. Odor control units.
10. Pump station equipment, materials and appurtenances.

H. Other Required Submittals.

1. Insurance and licensing documentation.
2. Proposed construction schedule.
3. Proposed acceptance testing companies.
4. Specialized subcontractors.
5. Bypass pumping plan, if required.
6. Other submittals as required by Ash Creek SSD.

6.1.3 Preconstruction Meeting

- A. A preconstruction meeting shall be held for all projects that include extensions and modifications to the Public Wastewater System.
- B. The preconstruction meeting shall be held after final design approval and prior to the start of construction.
- C. The preconstruction meeting will generally be scheduled through the City where construction is taking place.
- D. Individuals present include the Owner, Developer, Project Manager, or designated project representative, Project Engineer, General Contractor for the project, City's Representative, Ash Creek SSD Representative, and other individuals requested to attend.
- E. The purpose of the preconstruction meeting is as follows:
 1. To discuss the work and the proposed schedule.
 2. To discuss procedures for processing the project.
 3. To designate the name of the individual who shall have the authority to act for the Contractor at all times while the work is in progress.
 4. To establish a working understanding among the parties as to the work.

6.1.4 Periodic Inspections

- A. The Ash Creek SSD Inspector conducts periodic inspections of the wastewater system extensions and modifications during the course of construction.
- B. The primary areas of interest for the periodic inspections are as follows:
 - 1. Pre-construction Checks.
 - a. Locate and become familiar with existing/proposed public wastewater system tie-ins.
 - b. Verify that necessary plugs are in-place prior to construction.
 - c. Verify that appropriate measures are in place to protect the existing wastewater system.
 - 2. Approved Drawings: Verify that Approved Construction Drawings are on site and being used by the Contractor for construction of the wastewater improvements.
 - 3. Material verification: Verify that all materials used for construction of the wastewater system conform to the approved materials submittals, the Approved Construction Drawings and these Construction Standards.
 - 4. Manholes
 - a. Verify conformance to manhole details and specifications.
 - b. Observe manhole base placement and stacking of sections.
 - c. Verify all joints are sealed according to specifications.
 - d. Verify proper grouting of pipe to manhole interface.
 - e. Verify proper core drilling, if required.
 - f. Verify acceptable conformance to cast-in place requirements, if required.
 - g. Verify proper final adjustment of manhole frame and cover to final elevation.
 - h. Verify installation of valves, supports and other fittings and features, if Low-Pressure Sewer System.
 - 5. Installation of Pipe.
 - a. Review grades and alignments with Approved Construction Drawings.
 - b. Conduct periodic inspection of main line installation.
 - c. Visual inspection of lines.

6. Pipe Bedding

- a. Verify conformance to bedding details and specifications.
- b. Observation of bedding material, backfill and compaction efforts.

7. Lateral Stubs

- a. Verify location of wye or other connection to main line.
- b. Verify length and slope.
- c. Inspect and verify bedding, pipe and end cap, initial backfill, marking tape and installation of stub marker.
- d. Inspect cleanout construction, if required.
- e. Inspect installation of curb stop valve, concrete support block and check valve assembly, if Low-Pressure Sewer System.
- f. All Sewer laterals shall be perpendicular to the main sewer line.

8. Other System Features: Verify conformance to specifications and Approved Construction Drawings.

9. Utility Encounters: Verify conformance with proper separation and crossing requirements.

10. Observe required acceptance tests.

11. Inspection reports for each visit to the site will be prepared by the Ash Creek SSD Inspector.

6.1.5 Preliminary Inspection

- A. After installation of the pipe, manholes and other features, backfilling of trenches, mandrel, air test, TV inspection and all other utilities are installed and prior to paving the Contractor shall request that Ash Creek SSD conduct a preliminary inspection.
- B. All low-pressure air tests, vacuum tests, hydraulic pressure tests, initial continuity test of tracer wires, and TV Inspections of the installed system, meeting the requirements of Section 6.16, shall be performed prior to the preliminary inspection.
- C. Plywood bottoms shall be placed in the manholes after the TV Inspection in order to protect the system from debris resulting from the paving and manhole adjustment process. The plywood bottoms shall remain in place until after the final inspection. Temporary removal of the plywood bottoms may be necessary during the preliminary inspection and during

correction of deficient items on the preliminary “punch list” but shall be immediately replaced to protect the system.

- D. Ash Creek SSD will review the test results and TV inspection video. Once failed test or faulty pipe installation identified through camera work has been corrected, the preliminary inspection will be performed.
- E. The Contractor shall provide an individual familiar with the newly constructed wastewater system to assist the Ash Creek SSD Inspector with the preliminary inspection.
- F. The primary areas of interest for the preliminary inspection are as follows:
 - 1. Construction of manholes and inverts.
 - 2. Condition of pipe.
 - 3. Cleanliness of pipe.
 - 4. Construction of other system features.
 - 5. Private Lateral stub markers.
 - 6. Deficiencies noted during periodic inspections.
- G. Ash Creek SSD will prepare a preliminary inspection letter with a “punch list” of deficient items. A copy of the preliminary inspection letter will be sent to the Developer, the Project Engineer, and the Contractor.
- H. The Contractor shall correct the deficient items listed in the “punch list” letter and advise the Ash Creek Inspector when the items are complete.
- I. The Ash Creek Inspector will verify completion of the deficient items.
- J. After the deficient items have been corrected and verified, paving and final adjustment of manholes to grade may occur.

6.1.6 Final Inspection

- A. After completion of paving and adjustment of manholes to grade, and after submittal of Record Drawings as required by Section 3.8 and results of the final continuity test on the installed tracer wire, as required by Section 6.16.8, the Contractor shall request that a final construction inspection be performed.
- B. Ash Creek SSD will perform the final inspection.

- C. The Contractor shall provide an individual familiar with the newly constructed wastewater system to assist the Ash Creek SSD Inspector with the final inspection.
- D. The primary areas of interest for the final inspection are as follows:
 - 1. Preliminary inspection “punch list” items.
 - 2. Adjustment of manholes to final grade.
 - 3. Alignment and tolerances of cone, manhole adjustment, and frame and cover.
 - 4. Private Lateral stub markers.
 - 5. “S” stamped on the curb over the sewer lateral.
 - 6. Placement of off-road manhole markers.
 - 7. Final grading around off-road manholes.
 - 8. Revegetation.
 - 9. Access roads.
 - 10. All other items required for completion of the project.
- E. Ash Creek SSD will prepare a final inspection letter with a “punch list” of deficient items. A copy of the final inspection letter will be sent to the City, Developer, the Project Engineer and the Contractor.
- F. The Contractor shall correct the deficient items listed in the final inspection letter and advise the Ash Creek SSD Inspector when the items are complete.
- G. The Ash Creek SSD Inspector will verify completion of the deficient items.
- H. When all deficient items have been completed and upon approval and direction by Ash Creek SSD, the Contractor shall remove plywood bottoms and all plugs installed on the system. The Ash Creek SSD Inspector shall observe the removal of all plugs.

6.1.7 Warranty Inspection

- A. Ash Creek SSD will conduct a warranty inspection according to Section 2.3.5 one year from the time the final completion of the project is determined.

6.2 Inspection of Private Lateral Wastewater Lines

6.2.1 Scheduling Inspection Appointments

- A. Prior to starting construction of the Private Lateral Wastewater line, and at various times during the construction process, the Contractor shall contact Ash Creek SSD to request a Private Lateral inspection.
- B. Contractors shall call Ash Creek SSD for an inspection during the regular 40-hour work week with a minimum of 48 hours (excluding weekends and Ash Creek SSD observed Holidays) prior to the time it is needed. Same day or spot inspections will not be provided. During periods of heavy inspection requests, additional notice may be necessary
- C. Inspections are scheduled on a first-come first-served basis.
- D. If an inspection is scheduled and the construction is not ready for the inspection at the scheduled time, the contractor will be required to schedule another inspection with Ash Creek SSD at the next available time slot.
- E. Excessive call-back inspections caused by the contractor not being ready for an inspection at the scheduled time may result in additional Administration Fees being charged to the homeowner, building owner or facility owner.

6.2.2 Required Inspections

- A. Inspections by an Ash Creek SSD Inspector are required at the following times.
 - 1. New Private Lateral Connections.
 - a. If a direct connection of the Private Lateral to an existing Public Wastewater System collection line or manhole is required, inspection of the coring operation and installation of the saddle or manhole connection is required.
 - b. After installation of the Private Lateral pipe, fittings, and other appurtenances but prior to backfilling and completion of bedding above spring line.
 - c. When deficiencies in the installation noted during a prior inspection are corrected and a re-inspection fee has been paid, the contractor may reschedule an inspection.

2. Grease Interceptors and Sampling Manholes.
 - a. After placement of the grease interceptor and sampling manhole but prior to backfilling.
 - b. After backfilling, paving and adjustment of frame and cover to grade.
3. Abandoned Private Laterals: If an existing Private Lateral to the Public Wastewater System is abandoned, the abandonment shall be inspected prior to backfilling.
4. Damaged Private Laterals: If an existing Private Lateral is damaged, the repair shall be inspected by an Ash Creek SSD Inspector prior to backfilling.

6.2.3 Private Lateral Cleanout Locations

- A. 54-8a-10.5 Utah Code Annotated (UCA) requires that:
 - “(a) An operator or person installing or replacing a sewer lateral cleanout beginning August 1, 2009 shall install or replace the sewer lateral cleanout in a manner so that the lateral can be located, including:*
 - a. House sheets; or*
 - b. Electronic markers.*
 - “(b) An operator or person installing a sewer lateral cleanout shall notify the sewer operator of the sewer lateral cleanout location for record keeping purposes.”*
- B. To assist the Contractor in meeting the requirements of the UCA, and to standardize the cleanout location information provided to Ash Creek SSD as the “Sewer Operator”, the Ash Creek SSD Inspector will take measurements and prepare the “lateral map” which will document cleanout locations.
- C. In addition to providing the “lateral map” information, the Contractor shall place, per detail sheet, a monument ring and cover at the cleanout location and may choose to place electronic markers. See Appendix F “Sewer Cleanout W/Lid” for Detail Drawing.

6.2.4 Inspection Procedure

- A. The primary areas of interest for inspections of Private Lateral Wastewater Lines are as follows.
 1. Material verification: Verify that pipe, fittings, couplings, bedding and initial backfill materials, cleanout caps, ring and cover, and other material conform to the specifications.

2. Installation of Pipe.
 - a. Check slope and alignments.
 - b. Visual inspection of lines prior to backfilling (after bedding to spring line is installed).
 - c. Verify that minimum cover requirements are met.
 3. Couplings: Verify alignment of pipe and couplings and conformance to specifications. See Section 5.7.
 4. Connections: Verify that connections to manholes, main lines or stubs and to the building stub meet the specifications.
 5. Pipe Bedding: Verify conformance to bedding details and specifications.
 6. Marking tape: Verify that marking tape is on site for installation.
 7. Cleanouts: Document locations and verify that standpipe is vertical and that fittings, cap, ring and cover, and other materials conform to specifications.
 8. Other Features: Verify conformance to specifications.
 9. Utility Encounters: Verify conformance with proper separation and crossing requirements.
- B. The Ash Creek Inspector will perform or witness tests on the Private Lateral Wastewater Line as required by Section 6.17.
- C. The Ash Creek SSD inspector will document the location of the Cleanouts on the Private Lateral Wastewater Line, as required by Section 6.2.3, and will document other aspects of the Private Lateral Wastewater Line.
- D. The Contractor shall provide an individual familiar with the newly constructed private lateral to assist the Ash Creek SSD Inspector with the inspection.
- E. The Ash Creek SSD Inspector will advise the Contractor's on-site representative of any deficient items at the time of the inspection and, if required, will prepare a Partial Inspection letter that documents those deficient items. A copy of the Partial Inspection Letter will be sent to the homeowner, building owner or authorized representative and the Contractor.

- F. The homeowner, building owner or authorized representative and the Contractor shall correct the deficient items listed in the Partial Inspection Letter and schedule another appointment with the Ash Creek SSD Inspector according to Section 6.2.1.
- G. The Ash Creek SSD Inspector will verify completion of the incomplete items and repair of deficient items.

6.3 General Construction Requirements

6.3.1 Protection of Existing Public Wastewater System

- A. No connection to the existing Public Wastewater System or to existing Private Lateral Wastewater Line stubs shall be made without approval of Ash Creek SSD and inspection by an Ash Creek SSD Inspector.
- B. No modification of the existing Public Wastewater System or existing Private Lateral Wastewater Lines shall be made without approval of Ash Creek SSD and inspection by an Ash Creek SSD Inspector.
- C. The Public Wastewater System and Private Lateral Wastewater Lines shall be protected from damage. Any damage to the existing system resulting from the Contractor's operation shall be corrected by the Contractor at their expense.
- D. All repairs to the Public Wastewater System shall be observed by an Ash Creek SSD Inspector.

6.3.2 Excluding Construction Debris and Material from the Existing Public Wastewater System

- A. All construction debris and material, including water, native soil, bedding material, backfill material, pipe and other construction material, garbage, etc., shall not be placed in or allowed to enter the existing Public Wastewater System.
- B. The Contractor shall conduct operations and provide adequate controls to exclude this debris and material from the system.
- C. Any debris or construction material that does enter the existing Public Wastewater System shall be removed by Ash Creek SSD at the Contractor's expense.
- D. Any costs incurred by Ash Creek SSD in removing the debris or construction material will be billed to the Contractor and must be paid prior to final project acceptance.

- E. Any wastewater overflows or damages to structures affected by wastewater backups caused by the actions of the Contractor shall be the responsibility of the Contractor and the Developer to mitigate. To include, but not be limited to regulatory fines, clean-up and reporting fees, and mitigation of damages.
- F. A video inspection of the cleaned downstream lines demonstrating that the debris and construction material has been removed shall be performed by Ash Creek SSD and shall be paid for by the Contractor.

6.3.3 Maintaining Existing Wastewater Flows

- A. Wastewater flows in the existing wastewater system shall be maintained at all times.
- B. Bypass pumping, temporary bypass piping, or other means required to divert wastewater flow around the construction site shall be provided by the Contractor.
- C. Placing a plug and allowing wastewater to back up in existing wastewater lines will not be allowed.
- D. A bypass plan shall be submitted to Ash Creek SSD for review and approval prior to the start of construction.
- E. Bypass plans using pumping equipment shall include continuous (24 hr./day) monitoring of the pumping equipment.
- F. Bypass plans using pumping equipment shall include backup or redundant pumping and piping systems, as approved by Ash Creek SSD, in the event the primary system fails.

6.3.4 Isolation of New Construction

- A. At the start of construction of Public Wastewater System Extensions and Modifications, the Contractor shall install and maintain a plug near the connection of the new construction to the existing Public Wastewater System. The plug shall isolate the new system under construction from the existing system.
- B. The location of the plug shall be determined by Ash Creek SSD.
- C. The plug shall be anchored to the apron of the manhole as approved by Ash Creek SSD.
- D. The plug shall remain in-place until approval to remove the plug is given by Ash Creek SSD.

- E. Removal of the plug shall be the responsibility of the Contractor.
- F. Removal of the plug shall be witnessed by an Ash Creek SSD Inspector.

6.3.5 Record of Drawing Information Collected by Contractor

- A. During construction of Public Wastewater System Extensions and Modifications, the Contractor shall record “As-Built” measurements and information.
- B. Information measured and recorded shall include the following.
 - 1. Private Laterals:
 - a. Wye location on main line.
 - b. Pipe size, slope, and length.
 - c. Cleanout and bend locations and degree of bend.
 - d. Horizontal distance ties from the end of the lateral stub to nearest side property line and from top back of curb.
 - e. In the absence of established property lines and top back of curb, finished surface improvements, preferably sewer manholes or fire hydrants, shall be used.
 - f. If no finished surface improvements are near the lateral stub, lateral markers shall be installed on nearby trees or features and horizontal distance ties to the marker provided.
 - 2. Location of other utilities encountered.
- C. The information recorded shall be incorporated into the Record Drawings as required in Section 3.7.
- D. A set of the record information shall be maintained at the construction site.
- E. An Ash Creek Inspector may periodically and independently measure, and record installed lateral information for the purpose of verifying submitted Record Drawing information.

6.3.6 Safety

- A. In all cases, the contractor is responsible for safety.

- B. The contractor shall be responsible for full compliance with applicable excavation and trenching regulations set forth by the U.S. Department of Labor Occupational Safety and Health Administration as administered by the Utah Occupational Safety and Health Division (UOSH) of the Utah Labor Commission.
- C. The contractor shall assume full responsibility for all confined space requirements in US Department of Labor, OSHA Regulation 29 CFR Subpart AA, Confined Space in Construction, during construction of the line extension. Contractor is hereby informed that all gravity sewer lines and manholes, Low-pressure sewer valve vaults and flushing manholes, sewer force main valve vaults, wastewater pump station wet wells and other similar structures and features on Ash Creek SSD's wastewater collection system and treatment facilities and all similar new construction qualify as confined spaces according to the Federal Regulation. Entering confined spaces without following the requirements of the Confined Spaces in Construction regulations is prohibited.
- D. The contractor shall furnish and maintain all necessary safety equipment, such as barriers, signs, warning lights, guards, gas monitoring and ventilation equipment to provide adequate protection for persons and property during all phases of construction.
- E. The contractor shall give reasonable notice to the owners of public or private property and utilities when such property and utilities are within the construction area.
- F. The contractor shall at all times observe and comply with all Federal, State, and local laws, ordinances, permits and regulations which will in any manner affect the work.

6.3.7 Materials Handling

- A. All material to be incorporated into the project shall be transported, handled, and stored in a manner which will insure proper installation in an undamaged condition.
- B. The contractor shall replace all material found to be defective or which has been damaged before inclusion in the work.

6.3.8 Installation of Precast Concrete Products

- A. Precast concrete products shall not be installed within seven days of manufacture date.
- B. The date stamped on the precast concrete product will be used as the starting date in determining this time period.

- C. Any precast concrete product installed prior to completion of this seven-day period will not be approved by Ash Creek SSD and shall be removed.

6.4 Trench Excavations

6.4.1 General

- A. Trench Excavation shall include every operation necessary for excavation of all materials of whatever nature within the designated limits of the trenches.
- B. Contractor shall support and maintain the excavation with shoring, bracing, trench boxes or other methods.
- C. Contractor shall provide for the uninterrupted flow of surface water.
- D. Contractor shall protect all utilities, pipes, conduits, culverts, bridges and all other public and private improvements and property which may be endangered by the work. Contractor shall call for blue-staking of all utilities prior to commencing work and shall maintain the blue-stakes for the duration of the project.
- E. Contractor shall provide temporary support, adequate protection, and maintenance of all underground and surface structures and other obstructions affected by the trench excavation. Any structure that has been disturbed shall be restored or replaced at the Contractor's expense.

6.4.2 Pavement Removal

- A. All pavement removal shall be in accordance with applicable City, County, or State Standards and permits.
- B. If not defined the asphalt shall be cut and removed an additional 6" from edge of trench and removed prior to replacing or patching asphalt.

6.4.3 Trenching

- A. Alignment: Trench excavations shall be performed to the alignment and grade as indicated on the Approved Construction Drawings.

B. Trench Width

1. Trenches shall be excavated to provide adequate working space for proper pipe installation, jointing, and embedment.
2. Minimum sidewall clearance shall be 8".

C. Trench Depth: The trench shall be over-excavated to a minimum depth of 6" below the bottom of the pipe.

D. Fill Areas.

1. Trench excavations in fill areas shall extend to the level of native, undisturbed soil.
2. The area between the native, undisturbed soil and the normal bottom of trench shall be backfilled with suitable material in maximum 12" lifts and compacted to 95% of the Modified Proctor Density as determined by the compaction control test specified in ASTM D-1557 and verified by ASTM D-1556 or ASTM D-2922.
3. If fill areas were placed with appropriate lifts and compactive effort, evidence of that effort shall be provided to Ash Creek SSD prior to excavation.

E. Trenching Method.

1. The use of mechanical equipment will be permitted except in locations where machines may cause damage to existing structures, in which case, hand methods shall be employed.
2. The trenching method used, and the width of the trench excavated shall provide adequate space for proper installation of the pipe, manholes and other appurtenances. This shall include placement and compaction of bedding and backfill materials, jointing of pipe and manholes, and haunching of pipe.

6.4.4 Dewatering

- A. All excavations shall be dewatered before any construction is undertaken.
- B. Pipe shall be laid only in dry trenches.
- C. Concrete shall be placed only on dry, firm foundation material.
- D. The Contractor shall have adequate dewatering equipment on-site.

- E. Groundwater shall not be allowed to enter the Public Wastewater System.
- F. All trenches shall be kept free from water during excavation, fine grading, pipe laying, jointing, and embedment operations. Surface water shall be prevented from entering trenches.
- G. Where the trench bottom is mucky or otherwise unstable because of the presence of ground water, and in cases where the static ground water elevation is above the bottom of any trench or bell hole excavation, such ground water shall be lowered to the extent necessary to keep the trench free from water and the trench bottom stable when the work within the trench is in progress.
- H. The contractor shall provide and maintain at all times during construction, adequate means and devices with which to promptly remove and dispose of all water entering the excavations or other parts of the work. Ground water shall not be allowed to rise around pipe installations until the trench is backfilled.
- I. The contractor shall dispose of the water from the work in a suitable manner without damage to adjacent property. No water shall be drained into work built or under construction. Water shall be disposed of in such a manner as not to be a menace to the public health.
- J. De-watering for pipelines shall commence when ground water is first encountered and shall be continuous until such time as water may be allowed to rise in accordance with the provisions of this section.
- K. Where ground water is present manholes shall be double flex joint sealant sealed at all cleaned joints and after manholes are stacked, joints will be wrapped 6-inches above and 6-inches below each joint with mastic sealant or equal. See Section 5.4.M. Pipes, where they enter the manhole, shall be double banded.
- L. The use of Clay Dams to control ground water shall be determined on a case-by-case basis.
- M. If trenches cannot be dewatered, then:
 - 1. Trench shall be over excavated a minimum of one (1) foot.
 - 2. 4" minus granular placed.
 - 3. Then pee gravel placed as the pipe foundation.
 - 4. Additional clay dams shall be placed as determined to prevent water conveyance.

6.4.5 Blasting

- A. The Contractor shall comply with all Federal, State, and City laws, rules and regulations governing the keeping, storage, use, manufacture, sale, handling, transportation, or distribution of explosives used for blasting operations.
- B. The Contractor shall be responsible to secure blasting permits from the appropriate City Building Department, Washington County Building Department, and the appropriate Fire District, as required, prior to blasting.

6.4.6 Borings and Casings

- A. Borings and casings shall meet the requirements of Section 4.6, Section 4.7, and Section 5.9.
- B. The proposed boring method, qualifications and experience of the boring contractor, and other boring related information, as required by Ash Creek SSD, shall be submitted for approval by Ash Creek SSD prior to mobilizing the boring operation.

6.5 Pipe Embedment

6.5.1 General

- A. Bedding material meeting the requirements of Section 5.8 shall be placed and compacted from the bottom of the excavated trench to the bottom of the pipe.
- B. Bedding material shall extend a minimum depth of 6" below the bottom of the pipe.
- C. After placement of the pipe, additional bedding material shall be placed in maximum 6" lifts to the spring line of the pipe.
- D. The bedding material shall be shovel sliced and compacted in the pipe haunch areas to insure uniform and continuous bearing along the pipe.
- E. Initial Backfill meeting the requirements of Section 5.8 shall be placed and compacted in the trench simultaneously on each side of the pipe in 6" lifts for the full width of the trench in such a manner as not to damage or disturb the pipe.
- F. Initial backfill shall be placed to a minimum depth of 12" above the top of the pipe.

6.6 Pipe Installation

6.6.1 General

- A. Alignment and Grade: Non-pressurized pipe shall be laid to the alignment and grades indicated on the Approved Construction Drawings within the following tolerance limits.
 - 1. Horizontal Alignment: 2"
 - 2. Grade: $\pm 1/2"$
 - 3. When installed at minimum allowable slopes, as defined in Section 4.3.C, the variation in grade listed above shall not be applicable.
 - 4. Obvious bellies, low spots in pipe segments or abrupt changes in grade shall be corrected.
 - 5. Flat or reverse grade lines or segments of lines are not acceptable.
 - 6. Ash Creek SSD reserves the right to require whatever action is necessary to correct (including replacement of all affected sections of line including manholes) any unacceptable items generated as a result of pipe installation at less than minimum allowable slopes or with other deficiencies in alignment or grade.
- B. Pipe shall be laid in a straight line at a constant and uniform slope between manholes on main lines and between bends on Private Lateral lines.
- C. A pipe laser shall be used to install all pipe, without exception.
- D. Pipe laying shall begin at the lowest elevation and proceed upstream with the bell end of bell-and-spigot pipe positioned upstream.
- E. The interior of all pipe and fittings shall be thoroughly cleaned before installation and shall be kept clean during installation and until the work has been accepted.
- F. Pipe shall not be laid in water nor under unsuitable weather or trench conditions.
- G. All field cuts shall be made at right angles to the axis of the pipe. All pipes shall be filed and beveled to remove roughness.
- H. Pipe material shall be consistent between manholes unless specifically approved by Ash Creek SSD.
- I. If a pipe coupling is required to install a lateral wye or manhole, the following requirements shall be met:

1. The pipe coupling shall meet the requirements of Section 5.7.
 2. Clearance between pipes at the coupling shall be a maximum of 1/8".
 3. Pipes shall be aligned to provide a smooth transition without a lip or misalignment at the joints.
 4. Pipe shall be video inspected as soon as possible after backfilling to verify the above requirements.
- J. Changes of pipe material shall be at the manhole unless otherwise approved by Ash Creek SSD. If a change of pipe material between manholes is approved by Ash Creek SSD, the following requirements shall be met.
1. The connection between different pipe materials shall be made with pipe couplings meeting the requirements of Section 5.7.
 2. Clearance between pipes at the coupling shall be a maximum of 1/8".
 3. Pipes shall be aligned to provide a smooth transition without any lip or misalignment at the joints.
 4. Pipe shall be video inspected as soon as possible after backfilling to verify the above requirements.
- K. Whenever pipe laying is stopped, the open end of the pipe shall be plugged with a watertight plug and the trench shall be properly backfilled to protect the pipe from floating.
- L. If adjustment of the position of a pipe length is required after being laid, it shall be removed, re-laid and rejointed.
- M. Any pipe that has floated due to water entering the trench shall be removed from the trench, the trench shall be re-bedded, and the pipe shall be re-laid as directed by Ash Creek SSD.

6.6.2 Pipe Laying

- A. In addition to the above general requirements, all pipe installation shall comply with the specific requirements of the pipe manufacturer as follows:
1. PVC Pipe: ASTM D 2321 "Standard Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe."

2. High Density Polyethylene (HDPE) Pipe: ASTM D 2321 "Standard Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe."
3. All others as recommended by manufacturer.

6.6.3 Tracer Wire Installation

- A. Tracer wire shall be installed directly on top of the pipe, along the entire length of all Low-Pressure lines, and force mains.
- B. The tracer wire shall be attached to the pipe at maximum 5' intervals with duct tape or zip ties.
- C. The tracer wire shall be continuous from manhole to manhole and shall terminate inside at the top of the manhole according to Detail Drawing "Pressure Line Connection to Manhole" in Appendix D.
- D. Splices in the tracer wire between manholes using approved greased/silicone-based wire connectors will be allowed but shall be kept to a minimum.
- E. A successful continuity test on the installed tracer wire according to Section 6.16.8 will be required.

6.6.4 Marking Tape Installation

- A. Marking tape shall be installed vertically above the pipe, along the entire length of all sewer pressure lines.
- B. The marking tape shall be located at a depth of 12" above the top of pipe. See Detail Drawing "Typical Trench Detail" in Appendix D.
- C. The marking tape depth shall be consistent along the entire length of the line.
- D. Where other utilities are crossed, a second strip of marking tape may be required between the utility and the wastewater line.

6.6.5 Connecting to Pipe Stubs

- A. The Contractor shall verify that existing pipe stubs are acceptable (i.e., condition, alignment, grade, leakage) prior to connecting to the stub.

- B. To the extent possible, the acceptability of the stub shall be verified by Ash Creek SSD.
- C. Unacceptable main line stubs shall be removed and replaced with new pipe to the manhole or to a location on the stub where the remaining pipe to the manhole is acceptable.
- D. Unacceptable Private Lateral stubs shall be removed and replaced to the main line or to a location on the stub where the remaining pipe to the main line is acceptable.
- E. The extension of main line pipe stubs shall be accomplished with pipe having the same type, size, and joint type as the existing stub to the next manhole.
- F. If new pipe material matching the material of the existing stub is no longer available, then a change of pipe material may be approved by Ash Creek SSD.

6.6.6 Installing Private Lateral Stubs

- A. Private Lateral Wastewater Line stubs installed as part of the main line construction shall be extended at the slope and to the length or location indicated on the Approved Construction Drawings.
- B. Private Laterals shall be placed straight and erect and stubbed 3' above rough grade and marked as indicated below.
- C. Lateral stub trenches that require either blasting, rock sawing, rock hammering/chipping, or similar techniques for trench excavation shall be over excavated to a minimum of 5' beyond the installed stub end to allow re-excavation and extension of the lateral without damage to the existing lateral stub
- D. Connection to Main Line.
 - 1. The connection of Private Lateral Wastewater Lines to the main line shall be an in-line wye or tee branch made specifically for wastewater lateral connections per the standard details in Appendix D "Sewer Service Connection".
 - 2. The wye or tee shall be turned up so that the invert of the wye or tee branch at the connection is at or above the spring line of the main line.
- E. Caps: All stubs shall be plugged at the end of the pipe with a glued, fused or approved gasketed cap or plug. Expansion type (Brandt™) plugs shall not be used.
- F. Private Lateral Stub Marker.

1. Immediately following installation of the Private Lateral stub, a Private Lateral stub marker (t-post) shall be installed by the Contractor.
2. The marker (t-post) shall be placed straight and erect extended upward 3' above rough grade.
3. The exposed portion of the marker shall be painted green.
4. Record Drawing information required by Section 3.8 shall be collected.
5. Private Lateral markers disturbed or lost prior to Final Approval shall be reset using accepted survey practices and procedures.

G. Lateral and marker (t-post) shall be in-place and visible at the Final Inspection.

6.7 Trench Backfill and Paving

6.7.1 Trench Backfill in Roads

- A. If settlement of pavement over installed wastewater lines is observed at the final inspection or warranty inspection, the contractor shall remove the settled pavement and any unsuitable or uncompacted backfill, replace the backfill with appropriate compaction efforts, and reinstall the pavement.
- B. Trench backfill in public or private roads, streets and rights-of-way shall be in accordance with the applicable City, County, or State standards, permits, and/or as designated on Approved Construction Drawings. The responsibility for compaction testing shall be with the developer and their contractor.
- C. Trench backfill in privately owned paved areas, such as parking lots and driveways, shall be placed such that settlement of the paved areas over the wastewater line trenches does not occur. The responsibility for any necessary compaction testing shall be with the developer and their contractor.
- D. Backfill shall be carefully placed around and over pipes and shall not be permitted to fall directly on a pipe from such a height or in such a manner as to cause damage.
- E. The backfill in all sewer/utility trenches shall be compacted. The in-place density shall be a minimum of 95 percent of laboratory standard maximum dry density as determined by ASTM D-1557

- F. Backfill material shall be approved by Ash Creek SSD and shall not contain any wood, grass, roots, broken concrete, trash or debris of any kind that may cause unequal settlement or improper consolidation. No gravel larger than 1 inch as a mixed aggregate shall be used at the pipe zone.
- G. Backfill procedure above the pipe zone shall be as follows: the backfill above a point 1 foot above the top of the pipe shall be backfilled in horizontal layers 12 inches thick or less with materials containing no brush, perishable or objectionable material, rocks, stones, or boulders larger than 4 inches in the greatest dimension.
- H. When directed by Ash Creek SSD, mechanical compaction shall be completed in accordance with the following:
 - 1. Structural and trench backfill shall be deposited in horizontal layers and compacted so that the compacted material will be homogenous and free from lenses, pockets, streaks, and other imperfections.
 - 2. The excavation and filling operations shall be such that the materials when compacted will be blended sufficiently to secure the best practicable degree of compaction, impermeability, and stability. Prior to and during compaction operations, material shall have the optimum moisture content and shall be uniform throughout each layer. Where feasible, moistening of the materials shall be performed at the site of excavation. If the moisture content is not optimum for compaction, the compaction operations shall be delayed until such time as the material has been brought to the optimum moisture content. When the material has been properly conditioned, it shall be compacted using mechanical equipment.
 - 3. When hand compacted methods are specified or required because of the location. Approved hand compaction equipment shall be used.
- I. In areas with known collapsible soils, a geotechnical report should be obtained. The report should provide a stabilization means to prevent settlement. Recommendations from the report should be followed.

6.7.2 Pavement Replacement

- A. All pavement replacement shall be in accordance with the applicable City, County, or State standards, permits, and/or as designated on Approved Construction Drawings.
- B. Pavement shall be cut and removed 6" beyond the trench wall or 6" beyond ripped asphalt.

- C. For Ash Creek SSD projects, asphalt shall be replaced 7' on either side of the sewer center line where asphalt exists. Contractor will be responsible for damages to and replacement of asphalt outside of the 14' width.

6.8 Trench Dikes

6.8.1 General

- A. Trench dikes shall be constructed at the locations indicated and in accordance with details as shown on the Approved Construction Drawings and standard detail drawings.
- B. Additional trench dikes may be required at other locations to prevent migration of ground water along the sewer trench as determined and directed by Ash Creek SSD.

6.8.2 Construction Method

- A. Trench dikes shall be constructed of cement treated fill material or clay.
- B. Placement of the cement treated fill material shall occur after pipe installation and placement of bedding and initial backfill material.
- C. The trench dike shall be keyed into undisturbed soil a minimum 12" below the bottom of the pipe embedment material (18" below bottom of pipe) and a minimum 12" beyond each side of the excavated trench.
- D. The trench dike shall extend a minimum 12" above the top of the pipe embedment (24" above the top of pipe).
- E. Care shall be taken while placing the cement treated fill material to assure that displacement or distortion of the pipe does not occur.
- F. The area around the trench dike shall remain dewatered for a period of 24 hours after placement of the cement treated backfill material and until the backfill is brought to approximate final grade.

6.9 Manholes

6.9.1 General

- A. Manholes shall be constructed at the locations indicated and in accordance with details as shown on the Approved Construction Drawings and standard detail drawings.

6.9.2 Subgrade

- A. Manholes shall be constructed on a stable foundation capable of supporting the imposed loads.
- B. A minimum 6" depth of bedding material shall be placed, leveled, and compacted prior to placing the manhole bases.

6.9.3 Manhole Bases

- A. Precast Concrete Bases:
 - 1. Shall meet the requirements of Section 5.4.B.
 - 2. Shall be placed to be fully and uniformly supported in proper horizontal and vertical alignment.
- B. Cast-in-Place Bases on Existing Lines: (prior approval required)
 - 1. Before installation, contractor must meet with the Ash Creek SSD inspector to discuss and confirm installation.
 - 2. Shall meet the requirements of Section 5.4.C.
 - 3. Shall be constructed to be fully and uniformly supported in proper horizontal and vertical alignment. See Detail Drawing "Cast-In-Place Manhole Base" contained in Appendix D.
- C. Installation of pipe in manhole bases with flexible pipe connectors shall be per manufacturer's recommendation.
- D. Installation of pipe in manhole bases where use of a flexible pipe connector is not possible, as approved by Ash Creek SSD, shall include a pipe to manhole adapter placed around the pipe and centered on the manhole wall and grouted with non-shrink grout to form a watertight seal.

- E. In all cases, a watertight manhole to pipe connection is required.
- F. Installation of a manhole base on an existing lined pipe:
 - 1. Visual inspection by Ash Creek SSD is required prior to placing manhole base.
 - 2. Any annular space between the host pipe and the pipe lining shall be filled with an epoxy gel, installed per manufacturer's specifications.

6.9.4 Wall and Cone Sections

- A. Precast wall and cone sections shall be placed and aligned to provide vertical sides.
- B. The flat side of an eccentric cone shall be oriented over the outlet invert.
- C. Steps are not permitted.
- D. Joints:
 - 1. Mastic installed according to manufacturer's recommendations. See Section 5.4.M. Grouted joints shall not be used.
 - 2. Mastic shall be installed when the temperature of the material is above 70 degrees to assure a watertight seal. Heating of the material may be required to achieve a proper seal.

6.9.5 Backfilling Manholes

- A. All backfilling shall be in accordance with the applicable City, County, or State standards, permits, and/or as designated on Approved Construction Drawings. See Section 5.8.
- B. Backfilling shall be accomplished in a manner to prevent damage or disturbance to the installed manholes.
- C. Manhole sections disturbed during backfilling shall be removed, rejointed and restacked.
- D. Manhole sections damaged during construction shall be replaced with new sections of the same material and from the same manufacturer.

6.9.6 Installation of Temporary Plywood Bottoms

- A. Plywood bottoms shall be placed in the manholes after the TV Inspection in order to protect the system from debris resulting from the paving and manhole adjustment process.
- B. The plywood bottoms shall remain in place until after the final inspection and removal is authorized by Ash Creek SSD.
- C. Temporary removal of the plywood bottoms may be necessary during the preliminary inspection and during correction of deficient items on the preliminary “punch list” but shall be immediately replaced to protect the system.
- D. Plywood bottoms shall be constructed of minimum 3/4" CDX plywood with adequate bracing to prevent sagging.
- E. The plywood bottom shall be constructed in two or three pieces with a 1/8" maximum clearance at the joints.
- F. The plywood shall be placed in the manhole bottom such that the joint is perpendicular to the flow channel.
- G. A means to prevent the plywood from shifting out of place, such as 2x4's attached to the plywood, metal, or rope hinges, etc., shall be incorporated. The plywood bottom shall be placed above the crown of all pipes entering the manhole.
- H. Removal of the plywood bottoms shall be the responsibility of the Contractor.
- I. All debris collected on the plywood bottoms shall be removed from the manhole prior to removal of the plywood bottoms.

6.9.7 Adjustment of Manhole Frame and Cover to Final Grade

- A. Manholes in Asphalt Paved Areas.
 - 1. Manholes located in asphalt paved areas shall be raised to final grade after final paving is completed.
 - 2. Shall conform to standard details in Appendix D “Manhole Adjustment to Grade”.
 - 3. The top of the manhole frame shall be 1/8” – 1/4” below and parallel to the plane of the asphalt paving at the outside edge of the collar.

4. The distance from the top of the cone to the top of the frame shall generally not exceed 22" and the height of the Plastic Riser Form shall not exceed 16". Distances greater than 22" from the top of the cone to the top of the frame require specific approval by Ash Creek SSD and will require use of an Expanded Polypropylene grade ring per Section 5.4.E. In no case shall the distance exceed 24". Distances greater than approved will require the addition of a manhole wall section and retesting.
5. The distance from the top of the cone to the lowest point on the bottom of the frame shall not be less than 3". Any collars with a depth less than 12" shall have a ring of 4" rebar or fiber mesh.
6. Prior to paving, a manhole frame and cover or a circular metal plate shall be placed on top of the cone temporarily to prevent material from entering the manhole.
7. After the final lift of asphalt is placed, the asphalt and base course material shall be removed to accommodate a minimum 12" collar at the top of the manhole frame and to the level of the top of the cone and 6" outside the cone. The edge of the asphalt shall be smooth and uniform.
8. Manhole Adjustment with Whirlygig® or Approved Equal.
 - a. Install per manufacturer's recommendations and standard details.
 - b. Set thermoplastic riser form in a bead of sealant meeting requirements of Section 5.4.F. to achieve a watertight seal between form and top of manhole cone.
 - c. After the frame has been set to final grade, Class 4000 concrete shall be placed and consolidated in the excavated area around the cone, riser form and frame. Care shall be taken to assure that the thermoplastic form does not become displaced during placement of concrete.
 - d. The concrete shall be allowed to cure for a minimum of seven days prior to allowing traffic over the manhole.
9. Metal adapter rings (risers) shall not be used for final adjustment of the frame on new development projects.

B. Manholes in Concrete Paved Areas.

1. Manholes located in concrete paved areas shall be raised to final grade after placement of concrete paving.
2. Shall conform to standard details in Appendix D "Manhole Adjustment to Grade".

3. When installation is complete, the top of the manhole frame shall be 1/8" - 1/4" below and parallel to the plane of the surrounding concrete paving.
4. The distance from the top of the cone to the top of the frame shall generally not exceed 22" and the height of the Plastic Riser Form shall not exceed 16". Distances greater than 22" from the top of the cone to the top of the frame require specific approval by Ash Creek SSD and will require use of an Expanded Polypropylene grade ring per Section 5.4.E. In no case shall the distance exceed 24". Distances greater than approved will require the addition of a manhole wall section and retesting.
5. The distance from the top of the cone to the lowest point on the bottom of the frame shall not be less than 3". Any collars with a depth less than 12" shall have a ring of 4" rebar or fiber mesh.
6. Prior to paving, a manhole frame and cover or a circular metal plate shall be placed on top of the cone temporarily to prevent material from entering the manhole.
7. Prior to placement of concrete pavement, block out area around the manhole adequate for manhole adjustment.
8. After concrete pavement is placed, the base course material shall be removed to a diameter a minimum 30" greater than the diameter of the top of the manhole frame and to the level of the top of the cone and 6" outside the cone.
9. Manhole Adjustment with Whirlygig® or Approved Equal.
 - a. Install per manufacturer's recommendations and standard details.
 - b. Set thermoplastic riser form in a bead of sealant meeting requirements of Section 5.4.F. to achieve a watertight seal between form and top of manhole cone.
 - c. After the frame has been set to final grade, Class 4000 concrete shall be placed and consolidated in the excavated area around the cone, riser form and frame. Care shall be taken to assure that the thermoplastic form does not become displaced during placement of concrete.
 - d. The concrete shall be allowed to cure for a minimum of seven days prior to allowing traffic over the manhole.
10. Metal adapter rings (risers) shall not be used for final adjustment of the frame on new development projects.

C. Manholes in Roadway Shoulders.

1. Shall conform to standard details in Appendix D “Manhole Adjustment to Grade”.
2. Roadway shoulders without curb.
 - a. Adjustment to final grade shall occur after placement of pavement around manhole.
 - b. Adjustment shall meet the requirements of Section 6.9.7.A or 6.9.7.B.
3. Roadway shoulders with curb.
 - a. The top of manhole frames shall be set horizontal and flush with the finished grade.
 - b. A standard Manhole Collar conforming to standard details in Appendix D shall be placed around the frame.
 - c. The distance from the top of the cone to the top of the frame shall generally not exceed 22" and the height of the Plastic Riser Form shall not exceed 16". Distances greater than approved will require the addition of a manhole wall section and retesting.

D. Manholes in Off-Road Areas.

1. Shall conform to standard details in Appendix D.
2. Grading around the manhole shall not result in a depressed area around the manhole.
3. The manhole frame shall be placed directly on the manhole cone or adjusted to grade according to the requirements of Section 6.9.7.C. When the frame is placed directly on the cone, the joint between the cone and frame shall be made by placing mastic around the cone, placing the frame, and applying pressure to distribute the mastic material and form a watertight seal.
4. Mastic shall be installed when the temperature of the material is above 70 degrees to assure a watertight seal. Heating of the material may be required to achieve a proper seal.
5. A standard Manhole Collar conforming to standard details in Appendix D shall be installed around the frame and cone.

E. Manholes in Concrete or Asphalt Walkways.

1. When installation is complete, the top of the manhole frame shall be flush with the surrounding walkway and lids shall be smooth.
2. Adjustment shall meet requirements of Section 6.9.7.A or 6.9.7.B.

F. Adjustment of Existing Manholes

1. Shall conform to standard detail in Appendix D “Manhole Adjustment to Grade”.
2. Remove all grade rings, concrete collars and other adjustment material to top of cone.
3. Clean and repair the top of cone, if necessary, to provide clean, smooth surface for placement of new adjustment material.
4. Repair of top of cone may require cutting down or grinding top surface of cone, patching with approved patch material or a combination of both.
5. Adjust frame to final grade in accordance with Sections 6.9.7.A thru E.
6. If distance from top of cone to top of rim exceeds 20”, up to three – 6” expanded polypropylene grade rings per Section 5.4.E. installed per manufacturer’s recommendations may be installed in addition to the plastic riser form.

6.9.8 Drop Manholes

- A. Ash Creek SSD does not approve the use of drop manholes.

6.9.9 Connection to Existing Manhole

- A. Prior to the start of construction, the condition of the existing manhole shall be assessed by Ash Creek SSD.
- B. If the existing manhole is determined by Ash Creek SSD to be suitable for core drilling the following procedure shall be followed:
1. The existing manhole wall and bench shall be core drilled to allow for placement of the new pipe and flexible pipe to manhole connector (boot) in the manhole at the design elevation and provide a channel in the bench for the new line.
 2. The Ash Creek Inspector shall witness all core drilling of manholes.

3. A flexible pipe to manhole connector (boot) shall be installed in the core drilled wall to provide a watertight seal.
 4. The existing bench shall be built up with class 4000 concrete anchored to the existing concrete with stainless steel anchors or as otherwise directed by the Ash Creek SSD Inspector to provide a full depth channel from the new pipe to the existing channel as directed by the Ash Creek SSD Inspector.
 5. Chipping, cutting, and grinding of the existing bench and channel and finishing with epoxy grout may be required, but not preferred.
 6. The transition from the new invert to the existing invert shall be smooth and uniform and shall provide a long radius sweep to redirect flow to the existing downstream pipe.
- C. If the existing manhole is determined by Ash Creek SSD to not be suitable for core drilling, the existing manhole shall be removed and replaced with a new manhole with precast base. Size of the manhole shall meet construction standard or direction of Ash Creek SSD.
- D. During the connection of new sewer lines to existing manholes, the alignment of the existing precast sections, grade rings, and castings shall be maintained and the joints between sections, grade rings, and casting, lift holes and connections of existing inflow and outflow pipes shall be watertight.
- E. The Contractor shall provide for continuous wastewater flow and shall prevent entrance of any ground water, storm water, debris or dirt into the existing facilities during this construction process.
- F. The Contractor shall meet all the requirements for entry into a Confined Space as specified in Section 6.3.6.C.

6.10 Wastewater Pump Stations

6.10.1 General

- A. Wastewater pump stations shall be constructed in accordance with the requirements of the Approved Drawings. See Section 7.0.

6.10.2 Startup Services

- A. Prior to acceptance of the wastewater pump station, the manufacturers of all major equipment installed in the pump station, in conjunction with the contractor and Project Engineer, shall provide start-up services for the equipment.
- B. Reports by the manufacturers confirming that the installation complies with the manufacturer's requirements shall be submitted.
- C. All changes recommended by the manufacturer shall be completed.
- D. A one-year warranty of the equipment shall be included in the report. The one-year warranty will begin on the date the pump station receives Final Project Approval by Ash Creek SSD.

6.10.3 Training

- A. A minimum of 4 hours of training shall be provided by the manufacturers of all major equipment for Ash Creek SSD operation and maintenance personnel. Training shall be completed and organized in conjunction with the contractor and Project Engineer.
- B. A proposed training outline and schedule shall be submitted by the Project Engineer for approval by Ash Creek SSD.

6.11 Repair of Existing Wastewater System

6.11.1 General

- A. Existing wastewater lines, manholes and other appurtenances damaged or disturbed during construction shall be repaired or replaced by the Contractor at the Contractor's expense.
- B. Notify the Ash Creek SSD Inspector 24 hours prior to making repairs. The inspector must be present during the repair.
- C. Provide for pumping or diversion of wastewater around the damaged section as required.
- D. The Contractor shall meet all the requirements for entry into a Confined Space as specified in Section 6.3.6.C.

6.11.2 Repair of Wastewater Lines

- A. Cut and remove the broken pipe section. Locate the repair to reduce the number of repair couplings required.
- B. Check remaining pipe for splits and cracks.
- C. Remove the existing material below the pipe in the area of the broken pipe section to 6" below the bottom of the pipe.
- D. Bedding material meeting the requirements of Section 5.8 shall be placed from the bottom of the excavated trench to the bottom of the pipe and compacted prior to placement of the pipe. Assure that the bedding material is worked under the existing pipe.
- E. Insert new pipe section of the same pipe material, inside diameter and outside diameter.
- F. The Contractor shall notify Ash Creek SSD if the same pipe material is not available, and a suitable replacement pipe material will be determined.
- G. Clearance between pipes at the coupling shall be a maximum of 1/8".
- H. Pipes shall be aligned to provide a smooth transition through the repaired section without any lip or misalignment at the joints.
- I. Install pipe couplings meeting the requirements of Sections 5.7 and 6.6.1.I.
- J. Additional bedding material shall be placed in maximum 6" lifts to the spring line of the pipe.
- K. The bedding material shall be shovel sliced and compacted in the pipe haunch areas to insure uniform and continuous bearing along the pipe.
- L. Prior to placing initial backfill above the spring line of the pipe, the alignment of the repaired pipe section with the existing pipe and the coupling installation shall be inspected to assure proper alignment and installation. If the repair is not properly aligned or installed, remove the couplings and reinstall the repaired section.
- M. Initial backfill meeting the requirements of Section 5.8 shall be placed and compacted in the trench simultaneously on each side of the pipe in 6" lifts for the full width of the trench in such a manner as not to damage or disturb the pipe.

- N. Final backfill above the pipe zone, and pavement replacement, shall meet the requirements of Section 6.7.

6.11.3 Repair of Manholes and Other Appurtenances

- A. Remove damaged frame and covers, grade rings, wall sections or other features and replace with new materials. Reinstall new materials according to requirements of Section 6.9.
- B. Remove disturbed frame and covers, grade rings, wall sections or other features and install new material according to requirements of Section 6.9.
- C. Some existing manholes may have joints that do not match new manhole construction material. Ash Creek SSD shall review and approve the proposed method of connecting the new manhole material to the existing manhole. Exterior grout seal may be required.

6.12 Abandoning Existing Wastewater System

6.12.1 General

- A. Existing public wastewater lines, manholes and other appurtenances and private lateral wastewater lines and appurtenances that are approved by Ash Creek SSD for abandonment shall meet the following requirements.

6.12.2 Abandoning Public Wastewater Lines

- A. Ash Creek SSD approved pipe may be abandoned in place if pipe removal is deemed to be excessively cumbersome.
- B. The line to be abandoned shall be filled with cement treated fill.
- C. Contractor shall provide the means to deliver the cement treated fill to the full length of the line to be abandoned, as approved by Ash Creek SSD.
- D. Cement treated fill shall be introduced into the line through an up-gradient manhole that is being abandoned or an excavated up-gradient end of pipe to facilitate flow of material to the full pipe length.
- E. Alternatively, the pipe may be removed and disposed of by the Contractor and the excavated area backfilled with compacted granular fill.

6.12.3 Abandoning Manholes

- A. As a minimum the manhole frame and cover, grade rings or other manhole adjustment material, and cone or flat slab lid shall be removed and disposed of by Contractor.
- B. The manhole shall then be filled with cement treated fill.
- C. Alternatively, the entire manhole, including base and wall sections may be removed and disposed of by Contractor and the excavated area backfilled with compacted granular fill.
- D. In certain limited cases and as approved by Ash Creek SSD, where removal of the cone section is not possible due to conflicts with adjacent utilities, structures or other features, the cone or flat slab lid may be left in place.

6.12.4 Abandoning Private Lateral Wastewater Lines

- A. The end of the pipe to be abandoned shall be capped with a glued cap, if PVC, or an expansion type “Brandt” plug if other type pipe material and the excavated area backfilled with compacted granular material.
- B. Grease interceptors, sampling manholes and septic tanks shall be abandoned by one of the following methods:
 - 1. Crushed in place and the void filled.
 - 2. Completely filled with earth, sand or gravel (As a minimum, the lid shall be removed or crushed).
 - 3. Removal of entire structure.

6.13 Private Lateral Wastewater Lines

6.13.1 General

- A. Private Lateral Wastewater Lines shall meet or exceed the minimum submittal and design requirements contained in Section 4.8.
- B. It shall be the responsibility of the Property Owner and the Contractor to verify and/or determine the bury depths of the existing private lateral stubs and new private lateral extension. Factors such as elevation and surface features over the lateral (driveways vs. landscaping) should be considered.

- C. The Ash Creek SSD Inspector shall witness all Private Lateral Wastewater Line installations before backfilling.
- D. Buried Private Laterals not inspected, witnessed, or verified shall be re-excavated at the Contractor's expense. As approved by Ash Creek SSD, a video inspection of the installed private lateral meeting the requirements of Section 6.16.7 may be allowed in place of re-excavation of the buried pipe.
- E. Existing Public Wastewater System lines shall remain in service while connecting Private Laterals.
- F. Any damage to Public Wastewater System lines resulting from the connection of Private Laterals shall be corrected by the Contractor as directed by Ash Creek SSD at the Contractor's expense.
- G. The cost to remove any debris that enters the Public Wastewater System as a result of the connection of the Private Lateral shall be the responsibility of the Contractor.

6.13.2 Connection to Existing Private Lateral Stubs

- A. Prior to connecting to or extending existing gravity or Low-Pressure Private Lateral stubs, it shall be the responsibility of the Contractor to verify acceptability of the existing stubs (condition, alignment, grade, elevations, depths, leakage, etc.). Non-functional stubs shall not be used. Ash Creek SSD shall be notified immediately and prior to making a connection to any stub found to be unacceptable.
- B. The extension of Private Lateral stubs shall generally be accomplished with pipe of the same material and size as the existing stub.
- C. A change in pipe material or size may be approved by Ash Creek SSD on a case-by-case basis.
- D. Requirements for approved changes of pipe material.
 - 1. The connection between the different pipe materials shall be made with couplings meeting the requirements of Section 5.7.
 - 2. Clearance between pipes at the coupling shall be a maximum of 1/8".
 - 3. Pipes shall be aligned to provide a smooth transition without any lip or misalignment at the joints.

6.13.3 Connection to Existing Gravity Public Wastewater System Main Lines

- A. The connection of Private Lateral Wastewater Lines to existing gravity main lines shall be made by installing a Private Lateral connection fitting meeting the requirements of Section 5.10.G.
- B. A saw shall be used to core the existing main line. The edges of the cored hole shall be filed to remove burrs from the coring operation. Rough or jagged edges on the cored hole shall not be allowed.
- C. The cored hole shall be large enough to prevent the formation of a lip between the saddle fitting and the main line.
- D. The Ash Creek SSD Inspector shall witness the coring operation.
- E. The invert of the saddle fitting shall be at or above the spring line of the main line.
- F. Inserta Tee® Fatboy® sewer tap:
 - 1. Only to be used for lateral connections to lined pipe, with specific Ash Creek SSD approval.
 - 2. Sewer tap shall be custom built for the proper fit on the lining and host pipe.
 - 3. Sewer tap shall be installed per manufacturer's specifications.
 - 4. Any annular space between the host pipe and the pipe lining shall be filled with an epoxy gel and installed per manufacturer's specifications.
 - 5. Following the installation of the tap, and prior to backfilling, the main line shall be video inspected to verify proper installation.
 - 6. Connections to lined concrete or other rigid pipe shall require the removal of the host pipe 2" wider than the diameter of the sewer tap fitting. Sewer tap shall be placed on the pipe liner, with the annular space between the fitting and the host pipe filled with Class 4000 concrete.

6.13.4 Connection to Existing Public Low-Pressure Main Lines

- A. The connection of Low-Pressure Private Lateral Wastewater Lines to existing Low-Pressure Main Lines shall be made by installing a Private Lateral saddle fitting meeting the requirements of Section 5.10.G.

- B. The installation of the electrofusion branch saddle shall require the main line to be locally shut off (depressurized). Approval to shut off the main line shall be obtained by the Ash Creek SSD and must be coordinated with downstream users. The Ash Creek SSD Inspector shall witness the shut off of the main line and the installation of the electrofusion branch saddle.

6.13.5 Connection to Existing Manhole

- A. 4" Private Lateral Wastewater Lines shall not connect directly to manholes but shall connect to a Public Wastewater System Line by way of a wye for new construction and an approved Saddle connection according to Section 6.13.3 for connections to existing public lines.
- B. Connection of 6" and larger Private Lateral Wastewater Lines to existing manholes, where approved, shall be made in accordance with Section 6.9.9.

6.13.6 Cleanout Requirements

- A. Cleanouts shall meet the requirements of Section 4.8.D.
- B. Cleanout risers shall be the same size and material as the lateral.
- C. Cleanout risers shall be located directly above the private lateral line. Offsetting or laying the cleanout riser over to avoid surfacing in a paved area or other obstruction shall not be allowed.
- D. Cleanout risers shall be capped with a cleanout cap.
- E. The top of the cleanout cap shall be located 4" to 6" below the finished paved or landscaped surface
- F. Cleanouts within paved surfaces and unpaved traffic areas, shall be provided with a traffic rated cleanout frame and cover. In unpaved traffic areas, a concrete collar shall be installed around the frame and cover to provide additional protection for the cleanout riser.

6.13.7 Connection to Building Sewer

- A. Connection of the Private lateral to the building sewer exiting the building shall be made with couplings meeting the requirements of Section 5.7.

- B. Clearance between pipes at the coupling shall be a maximum of 1/8".
- C. Pipes shall be aligned to provide a smooth transition without any lip or misalignment at the joints.

6.14 Grease Interceptors and Sampling Manholes

6.14.1 General

- A. Grease interceptors, oil separators, sand interceptors and sampling manholes shall be constructed in accordance with the Standard Detail in Appendix D Grease and Sand Interceptor.
- B. Grease interceptors, oil separators, sand interceptors and sampling manholes shall meet the submittal and design requirements contained in Section 4.9 and the material requirements contained in Section 5.10.H.
- C. The frame and cover shall be adjusted according to the requirements of Section 6.9.7.
- D. The distance from the top of the interceptor or separator concrete lid to the top of the frame shall not exceed 20". If this distance exceeds 20", a vault riser section shall be added to the interceptor, the concrete lid replaced, and the manhole retested.
- E. Sampling manholes shall meet the requirements of Section 6.9.

6.16 Acceptance Testing for Public Wastewater System Extensions and Modifications

6.16.1 General

- A. One or more of the following acceptance tests and inspections are required for Public Wastewater System Extensions and Modifications depending on the type of component being tested.
 - 1. Visual inspection by the Ash Creek SSD inspector.
 - 2. Low-pressure air test.
 - 3. Hydrostatic Test.
 - 4. Manhole leakage test.

5. Manhole vacuum test.
 6. Continuity test of tracer wires.
 7. Visual inspection of removed and extracted heat fusion bead on HDPE pipe.
 8. TV inspection.
 9. Pump station and force main testing.
 10. Compaction testing.
 11. Deflection testing
- B. All costs associated with testing and TV Inspections, including retesting and reinspection, shall be the responsibility of the Developer or Contractor.
- C. All tests and TV Inspections shall be witnessed by the Ash Creek SSD Inspector.
- D. The contractor shall give the Ash Creek SSD Inspector two working days' notice of any test or inspection to be performed.
- E. Testing firms and TV Inspection firms shall be approved by Ash Creek SSD prior to the testing or inspection. The Contractor shall confirm the status of the testing and TV Inspection firms with Ash Creek SSD prior to the Contractor authorizing testing or inspection.
- F. Contractor, testing firm or TV Inspection firm shall provide all plugs, compressors, pumps, gauges, water, video equipment, etc., required to perform tests and TV Inspections.
- G. All testing and TV inspection, with the exception of compaction testing, shall occur after backfilling of all pipe and manholes and all other utility pipe (i.e. gas, water, etc.) installation is completed but prior to paving.
- H. Test Results Form.
1. Each item tested shall be noted on a form upon request. See Appendix B.
 2. Acceptances, failures, reasons for failure, and retests shall be shown on the form.
 3. The completed form shall be submitted to Ash Creek SSD.
- I. A passing test is required on each item tested.

- J. Items failing any test or TV inspection shall be repaired or replaced according to the requirements of Section 6.17.8 and the test or inspection repeated until successful performance of all tests and inspections is achieved.
- K. Any testing nullified by repairs or replacements of any component shall be re-done and passing tests achieved.

6.16.2 Visual Inspection

- A. A visual inspection by the Ash Creek SSD Inspector of the installed pipe, manholes, laterals, and other features on the Public Wastewater System Extension or Modification is required.
- B. The visual inspection shall include all items discussed in Section 6.1 and shall verify that the system has been installed according to these Ash Creek SSD Standards.

6.16.3 Low-Pressure Air Test

- A. A Low-Pressure Air Test shall be performed on the following installed pipes after all other utilities have been installed.
 - 1. The full length of each installed section (manhole to manhole) of gravity flow Public Wastewater main line.
 - 2. Private Lateral stubs installed in conjunction with the gravity flow main line.
 - 3. Gravity flow main line stubs.
 - 4. Gravity flow private lateral stubs connecting directly to a manhole.
- B. Method of Testing.
 - 1. The reach or span of pipe to be tested shall be isolated by completely blocking all outlets in the section under test. Careful attention must be given to blocking all plugs. The pipe must be wetted to minimize any loss of air through the pipe wall as a result of permeability in the dry condition. One of the plugs used at the manhole must be equipped to control the air entry rate and to prevent the pressure from exceeding 5 psi. This can be done by means of a blow off valve set to operate at 5 psi.

2. Stabilization period:

- a. After the pipe has been wetted and plugs installed, the air should be allowed to slowly fill the pipe until a constant pressure of 4.0 psi is attained. After 4.0 psi is attained, the air hose is disconnected, and pressure maintained for at least 2 minutes.
- b. Check during this 2-minute stabilization period, with a soap solution, all plugs and exposed fittings. If a leak is found, bleed off the air, repair the leak and start a new 2-minute stabilization period.
- c. When the temperature of the air has reached equilibrium with that of the pipe wall, bring the air pressure to 4.0 psi and disconnect the air supply. The gauge is then watched at which time a stopwatch is started and then stopped with the 2-minute time lapse. If the pressure falls below 3.5 psi, then investigate the pipe to determine the nature of the air loss. If the air pressure remains above 3.5 psi, then proceed to the air test portion.

3. Air Test:

- a. Refill the pipe with a constant pressure of 4.0 psi if necessary. The pipeline may be considered to have passed the air loss test successfully if the loss of air is not greater than a rate of 0.5 psi for the duration of the test. The following table shows the allowable time for the pressure to go from 4.0 to 3.5 psi for respective pipe diameters.

Pipe Diameter	Time		Pipe Diameter	Time	
	Min.	Sec.		Min.	Sec.
6"	3	00	18"	8	30
8"	3	45	20"	9	30
10"	4	45	21"	10	00
12"	5	45	24"	11	15
14"	6	30	27"	12	45
15"	7	00	30"	14	00
16"	7	30	36"	17	00

- b. If the time lapse exceeds that shown in the table, the pipe shall be presumed to be within acceptable limits; if the time lapse is less, the contractor shall make the necessary corrections to reduce the leakage to acceptable limits by repair methods.

6.16.4 Hydrostatic Test

- A. A hydrostatic test shall be performed on the following installed pipes.
 - 1. Force Mains.
 - 2. Low-Pressure Sewer System main lines.
 - 3. Low-Pressure Sewer System main line stubs.
 - 4. Private Lateral stubs installed in conjunction with the Low-Pressure Sewer System main lines.
- B. Prior to the hydrostatic test the line shall be flushed with an adequate flow volume and rate to remove any debris, silt, gravel, or other material in the line. The Ash Creek SSD Inspector shall witness the flushing operation.
- C. Method of Test.
 - 1. C900 Pipe
 - a. Test shall be conducted after the pipe has been installed and the line has been backfilled.
 - b. The lines to be tested shall be slowly filled with clean water. Water added to maintain the pressure shall not exceed 0.4 gallons per inch diameter of pipe per 1,000 lineal feet being tested.
 - c. All air in the system shall be expelled before the test. Air release taps shall be provided at the pipeline's highest elevations if necessary and air release valves installed. Insert approved permanent plugs after test has been completed.
 - d. The specified test pressure, measured at the lowest point of elevation, shall be applied by means of a pump connected to the pipe in a satisfactory manner.
 - 1. The pump, pipe connection, gauges and all necessary apparatus shall be furnished by the contractor. Gauges and measuring devices must meet with the acceptance of Ash Creek SSD and the necessary pipe taps made as directed.

- e. The pipe, unless otherwise directed by Ash Creek SSD, shall be subjected to hydrostatic pressure of not less than 200 pounds per square inch.
- f. The duration of the test shall be 2 hours.

2. HDPE Pipe

- a. Test shall be conducted after the pipe has been installed and backfilling has been completed but not sooner than a time which will allow sufficient curing of any concrete that may have been used. Typical minimum concrete curing times are 36 hours for early strength and 7 days for normal strength.
- b. Test shall be conducted after the pipe has been installed and the line has been backfilled.
- c. The test procedures consist of two steps: the initial expansion and the test phase. When test pressure is applied to a water filled pipe, the pipe expands. During the initial expansion of the pipe under test, sufficient make-up water must be added to the system at hourly intervals for 3-hours to maintain the test pressure. After about 4-hours, initial expansion should be complete, and the actual test can start.
- d. When the test is to begin, the pipe is full of water and is subjected to a constant test pressure 1.5 times the system design pressure. The test phase should not exceed 3-hours, after which time any water deficiency must be replaced and measured. Add and measure the amount of make-up water required to return to the test pressure and compare this to the maximum allowance in the table below.
- e. Under no circumstances shall the total time under test exceed 8-hours at 1.5 times the system pressure rating. If the test is not complete within this time limit (due to leakage, equipment failure, etc.), the test section shall be permitted to “relax” for 8-hours prior to the next test sequence.
 - 1. Air testing is not recommended.

2. Above procedure taken from PPI Technical Report TR-31 by the Plastic Pipe Institute.

Allowance for Expansion Under Pressure

Nominal Pipe Size	U.S. Gallons/100 Ft of Pipe*		
	1 Hour	2 Hours	3 Hours
4"	0.13	0.25	0.40
6"	0.3	0.60	0.90
8"	0.5	1.00	1.50
10"	0.75	1.30	2.10
12"	1.1	2.30	3.40
14"	1.4	2.80	4.20
16"	1.7	3.30	5.00
18"	2.2	4.30	6.50
20"	2.8	5.50	8.00
22"	3.5	7.00	10.50
24"	4.5	8.90	13.30

* multiply by 11.53 to convert to liters/100 meters of pipe

- D. Any cracked or defective pipes and fittings shall be removed and replaced by the contractor with sound material in the manner specified by these Standards.
- E. The test shall be repeated until the line passes the pressure test and is accepted by Ash Creek SSD.

6.16.5 Manhole Leakage Test

- A. A manhole water leakage test shall be based on observed manhole installation.
- B. Manhole shall be filled with water.
- C. The allowable leakage shall be 1.0 gallon per hour.
- D. Any manhole that does not pass the test shall be repaired and retested until satisfactory results are obtained.

6.16.6 Manhole Vacuum Test

- A. A vacuum test shall be performed on manholes installed in a well protection zone.
- B. Each manhole shall be tested to the top of the cone/flat slab section.
- C. Method of Testing: ASTM C 1244, Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test.

6.16.7 TV Inspection

- A. Ash Creek SSD provided TV inspection shall be at the present fee per linear foot. Contact the Ash Creek SSD Inspector for the project for pricing per foot.
- B. A TV Inspection shall be performed after all other utilities have been installed.
- C. A TV Inspection shall be performed on the following installed system.
 - 1. The full length of each installed section (manhole to manhole) of gravity flow Public Wastewater main line.
 - 2. Gravity flow main line stubs.
 - 3. Manholes.
 - 4. Where new manholes are installed on existing public wastewater lines, the connections to the new manhole and the existing wastewater lines 50 feet each side of the new manhole shall be TV Inspected.
- D. The TV Inspection shall be performed after all other acceptance testing has been completed and passing tests are achieved.
- E. The TV Inspection shall be performed after the lines have been thoroughly cleaned and all dirt, debris, and obstructions have been removed.
- F. The TV Inspection shall be performed while water is in the pipes.
- G. The video equipment shall provide adequate illumination of the interior of the pipe to produce a clear and viewable image.

- H. The TV Inspection shall not be performed while steam or mist in the pipe obscures visibility. Venting of the line to remove the steam or mist will be required prior to proceeding.
- I. Any debris on the camera lens that obscures the video shall be removed prior to proceeding with the TV Inspection.
- J. TV Inspection video recordings shall be of an acceptable quality subject to the discretion of Ash Creek SSD. Inadequate results will require reinspection.
- K. The TV Inspection video shall consist of a color digital video in electronic (thumb drive) format.
- L. The TV Inspection video and supporting data for each section of line inspected shall include the following information.
 - 1. Project name.
 - 2. Date and time of inspection.
 - 3. Camera direction (with flow or against flow).
 - 4. Starting distance (0' at end of pipe at manhole wall).
 - 5. Ending distance (to end of pipe a manhole wall).
 - 6. Type of pipe.
 - 7. Diameter of pipe.
 - 8. Lateral connections; location (distance from manhole), orientation (12 o'clock to 11 o'clock), diameter.
 - 9. Pipe and joint defects identified (type of defect and location).
 - 10. Low spots or bellies and changes in grade identified (location of beginning and end).
- M. All TV Inspection videos and supporting data shall be turned over to and become the property of Ash Creek SSD.
- N. Evaluation Criteria.
 - 1. Straight Alignments: Each section shall be straight and uniformly graded.

2. Curvilinear Alignments: Each section shall have uniform horizontal and vertical curves with no signs of distorted or irregular pipe.
 3. Lines with debris, silt or other construction material will not be approved.
 4. Lines that are flat or reverse grade or with a belly or low spot will not be approved.
 5. Lines with damaged pipe, misaligned or displaced joints, or other defects will not be approved.
 6. Lines with improperly installed Private Lateral wyes will not be approved.
 7. Lines with improper connections to manholes will not be approved.
 8. Lines with evidence of infiltration will not be approved.
 9. Other defects, as determined by Ash Creek SSD, will not be approved.
- O. Review of TV footage is required prior to asphalt. Any required correction shall be made prior to asphalt.

6.16.8 Tracer Wire Continuity Testing

- A. A continuity test shall be performed on all tracer wire segments installed on sewer main lines.
- B. The continuity test shall be performed after installation and backfilling of the sewer lines and prior to paving and adjustment of manholes.
- C. The method of performing the continuity test shall be approved by Ash Creek SSD.

6.16.9 Visual Inspection of Heat Fused HDPE Pipe Bead Removal and Extraction

- A. Removal and extraction of the HDPE pipe internal bead resulting from the heat fusion jointing process shall be required for all gravity flow HDPE pipe.
- B. An Ash Creek SSD inspector must be on-site during the fusion operation to perform the visual inspection of the removed and extracted fusion bead.
- C. The visual inspection shall include:
 1. Verification that complete internal fusion bead removal was performed.

2. The extracted internal fusion bead appearance shall have the same double roll back appearance as the external fusion bead.
 3. The extracted internal fusion bead shall possess a smooth root cut.
 4. Removal of the internal bead may include pipe wall mass. However, any wall mass that is removed shall not exceed 1/10th of the pipe wall thickness.
- D. Any joints not meeting the visual inspection requirements shall have the joint cut out, a new heat fusion joint made, and the interior bead removed and extracted.

6.16.10 Wastewater Pump Station Testing

A. 72-Hour Test.

1. The pump station shall be operated continuously for a period of 72 hours without any failure. If a failure occurs, the 72-hour test period shall be restarted.
2. The test shall be conducted with clear water provided by the Contractor. Recycling of the test water shall be provided to minimize the impact on the wastewater system.
3. All equipment, valves, controls, etc. shall be successfully operated during the 72-hour test.

B. Electrical and Control System Testing.

1. According to International Electrical Testing Association Incorporated (NETA).
2. As recommended by equipment manufacturers.

6.16.11 Deflection Testing

- A. Deflection testing shall be performed on wastewater main lines installed within a source protection zone.
- B. Testing shall be conducted after the final backfill has been in place at least 30 days.
- C. The deflection test is run by mandrel with a diameter equal to 95% of the inside diameter of the pipe. All mandrels will be tested for accuracy prior to performing deflection test.
- D. Test shall be performed without mechanical pulling devices.

6.16.12 Failed Test Correction

A. Procedure.

1. Notify Ash Creek SSD Inspector of test failure.
2. Locate leak or defect location, expose, and identify defect.
3. Contact Ash Creek SSD for approval of the proposed correction procedures.
4. Evaluation is on a case-by-case basis.

B. General evaluation considerations for corrections are as follows.

1. Damaged main line, damaged wye, or defective joints.
 - a. Within 3 pipe lengths or 30' of a manhole or other structure: remove and replace main line to the manhole or structure.
 - b. Beyond 3 pipe lengths or 30' of a manhole or other structure: remove and replace the defective area or section. Make pipe coupling repair in accordance with Section 6.11.2.
2. Damaged Private Lateral stubs - remove and replace entire length of lateral stub from wye to end cap.
3. Damaged or defective manholes.
 - a. Remove and replace the defective section(s), joint sealant material or other defective feature, re-stack the manhole, backfill and re-vacuum test.
 - b. Repairs using supplemental sealants or surface grouting of wall sections without removing the sections are not acceptable repair methods and shall not be approved.
 - c. Cracked, broken, misaligned, improper/noncompatible section shall be removed and manhole section or stack replaced.

6.17 Acceptance Testing for Private Lateral Wastewater Lines

6.17.1 General

- ##### A. One or more of the following acceptance tests are required for Private Lateral Wastewater Lines depending on the component being tested.

1. Visual inspection by the Ash Creek SSD Inspector.
 2. Exfiltration test or low-pressure air test of all gravity flow private laterals.
 3. Hydrostatic test of all Low-Pressure Sewer System private laterals and ejector pump pressure lines.
 4. Exfiltration test or vacuum test of grease interceptors, sampling manholes and private exterior pump stations.
 5. Dye test.
 6. TV inspection
 7. Exterior pump operation
- B. All tests shall be performed or witnessed by the Ash Creek SSD Inspector.
- C. The Contractor shall provide all plugs, compressors, pumps, gauges, water, etc., required to perform tests.
- D. Additional tests may be required by Ash Creek SSD.
- E. Defects identified by acceptance testing shall be repaired prior to backfilling, prior to the wastewater lines being approved, or prior to issuance of an authorization to use by Ash Creek SSD.

6.17.2 Visual Inspection

- A. A visual inspection of the entire length of Private Lateral Wastewater Line, from the connection to the Public Wastewater System or Private Lateral Stub installed as part of the Public Wastewater System, to the connection to the building drain line, including clean-outs and other appurtenances, is required.
- B. The visual inspection will include items contained in Section 6.2.

6.17.3 Exfiltration Test or Low-Pressure Air Test of Gravity Flow Private Laterals

- A. An Exfiltration Test or Low-Pressure Air Test shall be performed on the following installed pipes.

1. The full length of each gravity flow Private Lateral Wastewater Line from the Test Tee installed at the connection to the Public Wastewater System or Private Lateral Stub installed as part of the Public Wastewater System, to the connection to the building sewer.
2. Cleanouts installed as part of the Private Lateral Wastewater Line.

B. Method of Testing:

1. Exfiltration Test. The Test shall be underway prior to the inspector arriving on-site.
 - a. Install plugs in Test Tee and end of lateral line at connection to building drain line to isolate newly installed line.
 - b. Install cleanout standpipe to a height 3' above finished grade.
 - c. Fill lateral line with water to top of installed cleanout standpipe.
 - d. Test shall be maintained as long as necessary to locate all leaks but not less than 15 minutes.
 - e. Leakage shall not exceed 0.16 gallons/diameter inch/100 feet/hour.
 - f. Pipe shall be dewatered upon completion of testing.

2. Low-Pressure Air Test: According to the requirements of Section 6.16.3.

- C. Installation of additional test tees and performing tests in sections may be required for long private lateral lines or private lateral lines with a large elevation difference between each end.

6.17.4 Hydrostatic Test

- A. A Hydrostatic test shall be performed on the following installed pipes.

1. Low-Pressure Sewer System private laterals.
2. Ejector pump pressure lines.

- B. The full length of each Low-Pressure Private Lateral Wastewater Line or ejector pump pressure line from the Test Tee installed at the connection to the Public Wastewater System or Private Lateral Stub installed as part of the Public Wastewater System, to the connection to the building sewer or pump station shall be tested.

- C. Method of Testing: According to the requirements of Section 6.16.4. The test pressure shall be 5 psi above the pump maximum rating and shall be held for 15 minutes. Pumping system

information that provides the pump maximum rating shall be provided to the Ash Creek SSD inspector.

- D. The hydrostatic test for pressure lines from an ejector pump located interior to the structure shall be performed after the pressure line has been extended through the foundation wall and capped or connected to a closed valve.
- E. The hydrostatic test for pressure lines from an exterior pump station shall be performed after the pressure line has been connected to the installed pump station and against a closed valve.

6.17.5 Testing of Pressure to Gravity Transitions

- A. Testing of the pressure to gravity transition shall consist of a separate test of the pressure portion of the transition and a separate test of the gravity portion of the transition.
- B. Testing of the pressure portion of the transition shall be a hydrostatic test per Section 6.16.4 performed prior to the connection of the pressure line to the gravity line.
- C. The piping shall be arranged, and the testing performed such that the final connection into the pressure to gravity transition is a single cut or glue joint. Dis-assembly and re-assembly of any previously tested compression or threaded joint to make the final connection will invalidate the test.
- D. Testing of the gravity portion of the transition shall be either a static head test or a low-pressure air test and shall occur after the pressure portion of the transition is successfully tested and connected to the gravity portion of the transition. The contractor should schedule two inspections, separated, to allow the glued joint adequate time to cure.

6.17.6 Exfiltration Test or Vacuum Test of Grease Interceptors, Sand/Oil Interceptors, Sampling Manholes and Private Exterior Pump Stations

- A. An exfiltration test or vacuum test shall be performed on the following items.
 - 1. Grease interceptor.
 - 2. Sampling manhole.
 - 3. Private exterior pump stations

B. Method of Testing:

1. Exfiltration Test: The Test shall be underway prior to the inspector arriving on-site.
 - a. Install plugs as required to isolate newly installed grease interceptor, sampling manhole, or private exterior pump stations.
 - b. Completely fill structure with water
 - c. After water level has stabilized additional water shall be added to bring water level back to fill level.
 - d. Test shall be maintained as long as necessary to locate all leaks but not less than 30 minutes.
 - e. No drop in water level shall occur during the 30-minute test period.
 - f. Any identified water leaks shall be addressed.
2. Vacuum Test: According to the requirements of Section 6.16.6.
3. Exfiltration or vacuum testing of private pump stations may be waived if the pump basin and pipe connections are factory installed and tested.

6.17.7 Dye Test

A. A dye test shall be performed on the following installed pipes.

1. Gravity flow Private Lateral Wastewater Lines.
2. Ejector pump pressure line connected to a gravity flow Public Wastewater line.

B. Method of testing for gravity flow lines.

1. The Ash Creek SSD Inspector will add dye to the water placed in the private lateral for the exfiltration test through the cleanout standpipe.
2. At the direction of the Ash Creek SSD Inspector, the plug in the test tee will be removed to release the dyed test water.
3. The Ash Creek SSD Inspector will observe the dyed test water as it passes the nearest manhole downstream to the connection of the private lateral to the Public Wastewater System.
4. If dyed test water is not observed at the nearest downstream manhole or if the flow characteristics of the dyed test water as it passes the nearest downstream manhole are unusual, the Ash Creek SSD Inspector will require a second dye test.

5. If the second dye test is also unsuccessful, the cause of the failed test shall be investigated by the Contractor, the problem causing the failed test shall be identified and corrected by the Contractor as approved by the Ash Creek SSD Inspector, and another dye test shall be performed.
6. A TV inspection of the lateral, performed at the cost of the Contractor, may be required to verify acceptability of the Private Lateral connection to the Public Wastewater System.

6.17.8 TV Inspection

- A. A TV inspection of the lateral, performed at the cost of the contractor, may be required to verify acceptability of the Private Lateral connection to the Public Wastewater System.
- B. The video equipment shall provide adequate illumination of the interior of the pipe to produce a clear and viewable image.
- C. The TV Inspection shall not be performed while steam or mist in the pipe obscures visibility. Venting of the line to remove the steam or mist will be required prior to proceeding.
- D. Any debris on the camera lens that obscures the video shall be removed prior to proceeding with the TV Inspection.
- E. TV Inspection video recordings shall be of an acceptable quality subject to the discretion of Ash Creek SSD. Inadequate results will require reinspection.
- F. The TV Inspection video shall consist of a color digital video in electronic or DVD format.
- G. All TV Inspection videos and supporting data shall be turned over to and become the property of Ash Creek SSD.
- H. Video shall include a footage counter.

6.17.9 Exterior Pump Operation

- A. The operation of the exterior pump station shall be observed by an Ash Creek SSD inspector.

- B. For pumps on Low-Pressure sewer system laterals, the pump supplier shall perform a pump start-up service.
- C. For pumps on standard ejector pump pressure lines, dye is placed upstream of the ejector pump and the pump is operated until the dyed test water is observed at the nearest downstream manhole.

6.17.10 Failed Test Correction

- A. Procedure.
 - 1. Locate leak or defect location, expose, and identify defect.
 - 2. Receive approval of the proposed correction procedures from the Ash Creek SSD Inspector.
 - 3. Evaluation of the proposed correction procedures is on a case-by-case basis.

6.18 Cleanup

6.18.1 General

- A. All surplus materials, tools, and any temporary structures shall be removed from the construction site by the contractor.
- B. All rubbish, dirt or excess earth from the excavation shall be removed by the contractor at the earliest possible date and the construction site left clean and acceptable to Ash Creek SSD.
- C. All components of the Public Wastewater System and Private Lateral Wastewater Lines shall be clean and free of any foreign material and will be subject to a high pressure, high volume water wash or a high pressure jet wash.

7.0 Wastewater Pump Stations

7.1 General Requirements and Policies

- A. The Ash Creek SSD Wastewater Pump Station policy in Section 1.2.3.D 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.

7.2 Development Procedures for Wastewater Pump Stations

7.2.1 Preliminary Design Report

- A. Detailed calculations for the wastewater pump station and appurtenances shall be submitted for review and approval. At a minimum the following shall be included:
 - 1. Description of design criteria to be utilized
 - 2. Flow computations
 - 3. Design calculations
 - 4. Calculated system curves
 - 5. Identification of right-of-way requirements
 - 6. Number of property owners involved
 - 7. Listing of permit requirements
 - 8. Geotechnical investigation
 - 9. Cost estimate based on unit costs of major elements of work.
- B. In addition, the following design criteria shall be developed:
 - 1. Site Development and drainage
 - 2. Structural Design
 - 3. Architectural Design
 - 4. Hydraulic Analysis
 - a. The hydraulic analysis shall include calculation of the system curve. The system curve shall be plotted on the pump curve with the operating point identified. Every effort shall be made to select a pump that operates at its best efficiency point. Peak and average flows shall be considered when selecting the appropriate pump. Pump manufacturer data sheets shall also be included in the preliminary design report submission.

- b. The friction head shall be determined as accurately as possible taking into account all pipe and minor losses.
- c. Engineer shall include in the calculations the net positive suction head available (NPSHA) as well as the net positive suction head required (NPSHR).

- 5. Mechanical Design
- 6. Electrical Design
- 7. Instrumentation and Process Control
- 8. Corrosion Control
- 9. Odor Control
- 10. Noise Control

7.3 Design Requirements

7.3.1 Pump Station Site Location

A. Topography

- 1. Wastewater pump station site selection shall be compatible with suitable site access, and soil capability with respect to land grading in conjunction with site development.

B. Accessibility

- 1. All wastewater pump stations shall be sited to allow access by all-weather surface roads capable of accommodating Ash Creek SSD vehicles and a 40-foot Vactor type truck with the nose of the vehicle over the wet well.
- 2. Site slopes or grades must be adequate to accommodate low-hanging hose reels on Vactor trucks.
- 3. Whenever possible, provisions shall be made for entry into traffic nose first.
- 4. All paved surfaces at the site shall be designed for the expected vehicular and equipment loads but shall not have less than 4 inches of asphalt and 6 inches of road base.
- 5. Unpaved surfaces at the site shall be designed for the expected vehicular and equipment loads but shall not have less than 6 inches of road base along with filter fabric and 1" minus gravel.

C. Land Use

1. Pump station sites shall conform to City land use requirements and zoning.

D. Aesthetics, Noise and Odors

1. Remoteness of the site and building setbacks shall be considered to provide minimal impact to neighboring properties.
2. Where pump stations are sited in proximity to developed areas, consideration should be given to minimizing noise from generators and ventilation fans.
3. Every effort shall be made in site selection to reduce potential odor pollution.

E. Overhead Clearance

1. Adequate overhead clearance shall be provided over the entire pump station site so that maintenance equipment does not interfere with overhead utilities or structures.

F. Site Improvements

1. Perimeter Block Wall and Gate

- a. All wastewater pump stations must have a minimum 8-foot-high perimeter block wall surrounding the lift station site. Block wall materials shall be approved by Ash Creek SSD.
- b. A 3-foot wide mangate as well as a double 10 foot wide (20 foot total) swinging gate shall be provided for access to the site. A 20 foot sliding gate may be allowed in lieu of the swinging gates if circumstances warrant. All gates must be capable of achieving full open position. All posts shall be steel set-in concrete.

2. Potable Water

- a. A potable water yard hydrant shall be installed within the pump station site near the wet well.
- b. The hydrant shall have a threaded spigot for a standard garden hose.

3. Grading

- a. On-site cross slopes should be limited to no greater than 4 percent away from the structures.

- b. Site grading shall be designed to prevent local ponding and to provide drainage away from structures.
- c. The site shall be graded so as to not create a low-point in relation to the adjoining properties.

4. Landscaping

- a. Landscaping shall not be done within the site.
- b. Perimeter landscaping shall be allowed as required by the City or the particular subdivision where the pump station is located.

5. Lighting

- a. Exterior lighting shall be provided to adequately light the equipment area.
- b. Lights shall be shielded to prevent spillage on to neighboring properties.
- c. Exterior lighting shall be fitted with day/night sensors for automatic on-off operation as well as fitted with manual on/off switches.
- d. LED is preferred.

G. Ownership

- 1. The property on which the pump station is located shall be deeded to Ash Creek SSD.
- 2. Construction and Operation costs shall follow the policy in Section 1.2.3.D

7.3.2 Pump Station Components

A. Pump Selection

- 1. All pumps shall be Gorman-Rupp surface mount, self-priming. Pumps shall also be centrifugal non-clog solids handling designed specifically for raw, unscreened domestic sanitary wastewater.
- 2. A minimum of two pumps, set in a line, each capable of pumping the total design flow, shall be provided.
- 3. Proper pump selection is critical and applications where pumps must operate near their shutoff head shall be avoided.

4. A complete back-up pump unit and/or a rotating assembly, as applicable, shall be provided in a crate ready for installation in the event that any of the pumps malfunction. Manufacturers recommended stock items packet shall also be included.
5. The pump station controls shall provide for automatic alternating of the lead pump.
6. A Gorman-Rupp vibration dampener pad should be provided for the pump skid.
7. In special cases, where approved by Ash Creek SSD, submersible pumps may be necessary. Such cases may include sites where the net positive suction head available (NPSHA) is less than the net positive suction head required (NPSHR). In such cases, submersible pumps shall be Hidrosta PreroClean self-cleaning pump sump or an approved equal.

B. Motor Selection

1. Motors shall operate on 460 Volt, 3 phase, 60 Hz electrical service.
2. Selected motor horsepower shall be sufficient to prevent motor overload over the entire range of the pump performance curve.
3. Motor starters greater than 10 HP shall be VFD.

C. Approach Manhole

1. The manhole just prior to the wet well shall be Polymer and 5 foot in diameter.
2. Shall serve as a common point of connection for all sewer pipes tributary to the pump station.

D. Wet Well

1. Structure
 - a. Wet wells shall be Polymer with a minimum diameter of 10 feet.
 - b. Shall be sized to provide adequate volume to prevent the excessive cycling of pumps.
 1. Volume shall be calculated to optimize pump operation to meet peak hour flow and minimum hour flow. The diurnal nature of wastewater flow as well as the pump manufacturer's recommendations regarding pump start frequency shall be

considered when determining the wet well volume. These calculations should be provided to Ash Creek SSD.

2. Every effort shall be made to prevent the wastewater in the wet well from becoming septic.
3. The wet well shall contain adequate vertical room for level sensing adjustments above and below the design levels.
4. Primary high-water alarm shall be set to wet well influent invert. A redundant high-water alarm shall be installed six inches above the primary high-water alarm.
5. Minimum elevation difference between control elevations is 12 inches.

2. Access

- a. Wet well access shall be through a standard ring and cover.
- b. Wet well access shall be sufficient to remove all equipment from the wet well, but in no case smaller than 36 inches by 36 inches.

3. Floor Slopes

- a. Wet wells shall have sloping sides to form a hopper at the bottom of the wet well in all areas outside of the dedicated sump.
- b. Slopes shall be approximately 1 to 1.
- c. Square corners should be avoided, and the flat portion of the wet well floor should be minimized.

4. Level Control System

- a. Levels shall be controlled by a continuously run bubbler system with a redundant back up float switch for a high-water alarm.
- b. Bubbler systems shall be manual purging and shall have a pressure gauge.
- c. Other types of level control may be used in lieu of the standard bubbler system with approval of Ash Creek SSD.

E. Flow Monitoring

1. Continuous measuring and recording of wastewater flow shall be provided at each pump station.
2. Flow metering shall be included in the SCADA system.

F. Odor Control

1. Some form of odor prevention/mitigation measures may be required based on the detention time of wastewater in the wet well.

G. Piping Systems

1. Pump Station Piping

- a. Pump suction piping velocity should be within the range of 4 to 8 feet per second.
- b. Pump discharge piping shall be sized to provide velocities in the range of 4 to 8 feet per section.
- c. Pump suction piping design and installation shall not permit the accumulation of air in the suction piping or induce excessive turbulence in the pump suction area.

2. Valves

- a. Each pump shall have isolation valves to permit the removal or maintenance of the pumps and check valves without affecting the operation of remaining pumps.
- b. Isolation valves shall be gate valves. Gate valves shall be 100 percent port opening. Larger gate valves shall have geared operators with hand wheels. Gate valves shall be positioned so that when closed, the valve body is isolated from the actively flowing portion of the piping system.
- c. Each pump shall have a high-quality swing check valve with an external swing arm.
- d. Check valves must be installed horizontally.

3. CamLock Cleanout

- a. An 8" camlock cleanout shall be installed. CamLock Cleanout detail sheet available upon request from Ash Creek SSD.

7.3.3 Force Main

A. Line Size

1. Force Main shall be sized to provide a minimum velocity of 2.0 feet per second while minimizing head losses through the system during system operation.
2. Force Mains shall be a minimum of 4 inches in diameter.

B. Design Friction Loss

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.

C. Design Pressure

1. Force mains and fittings shall be designed to withstand normal pressure and pressure surges (water hammer).

D. Detailed Calculations

1. Calculations for the Force Main shall be submitted with the pump station calculations.

E. Material

1. Force Mains shall be C900 pressure rated pipe.
2. No metal fittings are allowed.
3. Fittings shall be epoxy coated and mortar lined ductile iron.

F. Alignment

1. Force mains shall be located North and West of roadway centerline. Within the public right-of-way or in appropriate easements.

2. Force mains shall be located at least 5' from toe of curb to eliminated disturbances during possible future repair of the line.
3. A minimum of 10 feet of horizontal separation shall be maintained between the force main and other utilities.

G. Minimum Line Depth

1. A 7-foot minimum depth of cover as measured from the proposed finish grade to the top of pipe is required.
2. A minimum of 18 inches of vertical separation shall be maintained between other utilities.
3. A continuous upward slope from the lift station to the discharge point is required. In the event that a high point cannot be avoided, an air release valve shall be installed. See Appendix F for Air Valve detail sheet.

H. Tracer Wire and Marking Tape

1. The horizontal location of the force main shall be identified with corrosion proof solid 14-gauge tracer wire extending from manhole to manhole.
2. Sewer marking tape shall be placed directly over and 1' above the pressure sewer pipe. The ribbon shall be green in color and shall have clearly printed "Buried Sewer Line".

I. Drain Line

1. Shall discharge to the wet well with an inline valve.

J. Appurtenances

1. Combination air valves shall be included in the design of the force main. See Appendix F for Air Valve detail sheet.
2. Combination air valves shall be installed at system high points, at significant changes in grade where air pockets can form and at intervals of 1,200 feet in long horizontal runs.
3. A manually controlled isolation valve shall be installed between the force main and the air release valve.

K. Force Main Termination

1. The force main shall terminate in a Polymer manhole.
 - a. Termination manhole shall contain an odor control unit. See Section 5.4.Q
2. The flow transition from the force main to the gravity sewer shall be smooth and non-turbulent.
 - a. The invert of the force main shall enter the manhole 0.2' above the invert elevation of the gravity line.
 - b. The force main shall enter the manhole as near to 180 degrees from the gravity line as possible.
 - c. 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.
 - d. 4" and 6" force mains shall transition to an 8" gravity line. 8" force mains shall transition to a 10" gravity line and so forth.

L. Cleaning

1. All pump stations shall be provided with a "Y" branch and gate valve of adequate opening size within the pump station for the launching of a "pig" for cleaning of the pressure sewer line.

7.3.4 Pump Station Building

A. Pump Station Building: The emergency generator, pump and equipment controls, electrical panels, communication equipment, odor control equipment, etc. shall be housed in a vented weatherproof building. It shall be the responsibility of the Developer to obtain approval of the building and site improvements from the City planning and building departments. Buildings shall be required to meet the minimum architectural standards of the City or as directed by the Development or Ash Creek SSD.

B. Access

1. Door
 - a. Key entry shall be required. Doors shall be openable from the inside without the use of a key or any special knowledge or effort.

- b. Steel door sized to code with louvre.
- c. Doors to be painted a non-shiny finish.

2. Roll-up Overhead Doorway

- a. An overhead roll-up door Size 10' by 10' shall be installed over the wet well.

C. Structure

1. Building Size

- a. Sized to contain all components and provide adequate space for maintenance and repair of components.
- b. A minimum open space of 5 feet between pump components and the interior wall is required.
- c. Geneva CMU Block construction with color to match City code or theme of the development.

2. Roof

- a. Metal or tile roof with aluminum soffit and fascia.
- b. Color to match City code or theme of the development.

3. Floor

- a. Epoxy coated with chips.

4. Walls

- a. Interior walls shall be painted white.

D. Maintenance

- 1. An overhead hoist on steel I beam will be installed to assist in maintenance of pumps.
- 2. Manual winches rated for weight to be lifted shall be provided. An electrical winch may be required for submersible pumps.

E. Lighting

1. Interior lighting shall be provided to adequately light the building and equipment area.
2. Exterior building lighting shall be provided over all entrance and roll-up doors.
3. A red emergency light with an audible alarm with a silence button shall be provided on the exterior of the building.
4. LED should be provided for all lighting.

F. Ventilation

1. Pump stations shall be provided with a separate ventilating system and shall be sized to provide a minimum of 12 air changes per hour.
2. Vandal proof air circulation vents of adequate size shall be near the floor.
3. Ventilation systems shall be capable of matching inside air temperature to outside air and shall automatically begin operation once inside air temperature reaches 90 degrees F. In addition to manual control, time clock operation of the ventilating fans shall be provided.
4. Ventilation shall be accomplished by the introduction of fresh air into the lift station under positive pressure.
5. The air shall be filtered.
6. Fans shall automatically come on whenever the light switch is turned ON.

G. Heating

1. Thermostatically controlled electric unit heaters shall be provided.
2. Heating systems shall provide adequate space temperature for maintenance personnel in cold weather.

H. Potable Water Supply

1. Water will be installed inside of building with a standard hose bib.
2. The potable water system shall be metered as required by the City water authority.

I. Electrical

1. Power Requirement

- a. Electric service shall be 480V 3-phase.
- b. Service shall be sized to allow all station fixtures, equipment, and pumps to operate together.

2. Lift Station Control Panel

- a. Control panels shall be enclosed in NEMA 4X watertight enclose panels.
- b. Adequate space shall be provided for mounting of bubbler controls and instrumentation as required.
- c. All switches, breakers, and wires shall be clearly marked or labeled.
- d. Standard control panel layout for 2 or more pumps shall be provided with the following section of panels:
 - 1. Power company metering and main breakers
 - 2. Circuit breakers and starters for unit heaters, portable pump, main wastewater pumps, fans, compressors, station power transformer and 240/120V panelboard.
 - 3. Flow recorder and pump controls including cycle counters and running time clocks that will measure in the hundredth position.
 - 4. Solid-state reduced voltage starters for constant speed main wastewater pumps.

3. Alarms

- a. All pump stations will be equipped with an audible and visual alarm outside of the building that will function with loss of power to the lift station.
- b. Any alarm from the motor control cabinet shall trigger exterior alarms.

4. Convenience Receptables.

- a. 120v, 1-phase receptables shall be provided within the pump station.
- b. One GFCI duplex outdoor weatherproof convenience outlet shall be provided.

5. Lightning and Surge Protection

- a. Transient voltage surge suppression rated at 80 KA minimum shall be provided at the service entrance.

J. SCADA System

1. SCADA shall be provided for all Wastewater Pump Stations.
2. SCADA System Input/Output requirements shall be site specific. Coordinate SCADA with Ash Creek SSD.
3. Ignition software should be utilized.
4. Allen Bradley PLC equipment should be utilized or equivalent as approved by Ash Creek SSD.
5. A fiber connection shall be provided.

K. Security Systems

1. The pump station equipment and controls shall be adequately protected with appropriate buildings and fencing to prohibit unauthorized entry by the public.
2. Where required by Ash Creek SSD, security systems shall be included at the wastewater pump station.

L. Signage

1. A 2' by 2' facility sign shall be provided with white background and bold black letters.
2. Sign should include the pump station name, address of the pump station, and Ash Creek emergency number.

M. Emergency Station Operation

1. An in-place, engine driven, emergency generator with an automatic transfer switch shall be provided at each pump station.
2. A piping connection for a portable pump with appropriate valving and a vault located connection shall be provided at the pump station to allow pumping of wastewater around the pump station. The valve vault shall be configured to allow the manual operation of valves and the connection of a portable pump to occur outside of the valve vault, thus eliminating the necessity of a confined space entry.

3. The generator shall be fueled by natural gas, if the natural gas supply is available near the pump station, or by diesel if natural gas is not available.

7.3.4 Documents and Construction

- A. Construction Drawings shall be provided for review to Ash Creek SSD. Approval of Construction Drawings shall conform to section 3.0 Plan Design and Review.
- B. For typical pump station material requirements see section 5.6 Wastewater Pump Stations.
- C. An Operation and Maintenance Manual shall be submitted according to the requirements of Section 3.8 Operation and Maintenance Manuals.
- D. Wiring Diagrams, Panel Drawings, and As Built Drawings shall be provided to Ash Creek SSD.
- E. Start-up services and training on the completed pump station shall be completed according to the requirements of Section 6.10 Wastewater Pump Stations.
- F. Acceptance testing of the completed pump station shall be completed according to the requirements of Section 6.16.10 Wastewater Pump Station Testing.