



BUENA VISTA SANITATION DISTRICT

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RULES & REGULATIONS

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**RULES AND REGULATIONS OF THE
BUENA VISTA SANITATION DISTRICT**

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**BUENA VISTA SANITATION DISTRICT
RULES AND REGULATIONS**

PART I ADMINISTRATIVE AND PROCEDURAL

I. GENERAL

A. DECLARATION OF POLICY

1. The purpose for which the District was organized was to furnish sanitary sewer services to all residential and commercial property in the District at the time it was formed, or as latter annexed thereto, and property outside the District thereafter utilized or inhabited for residential or commercial purposes subject to the availability of funds and applicable law.
2. The services and facilities of the District consist of a system of manholes, main outfall sewer lines within the District, and sewer treatment facility. The services of the District consist of accepting sewage from residential and commercial properties within the District and transporting said sewage through the District's main outfall sewer line to the District's treatment facility and, thereafter, treating such sewage at the treatment facility as required by law.
3. The various properties serviced by the District are those areas within the boundaries of the District currently utilizing the facilities of the District. The areas to be served by the District include:
 - a. All areas not presently being served which are within the boundaries of the District or
 - b. Areas later annexed to the District or
 - c. Areas otherwise served by the District by contract.
4. The District's service policies are as follows:
 - a. The District shall, at its own expense, extend its main or lateral lines to within one hundred (100) feet of the property line of each parcel of land within the District as separately described and owned as of June 1, 1995, except that the following parcels included in an area at least ten (10) acres in extent will not be served according to this policy because it is infeasible, impractical or undesirable for the good of the entire District to extend sewer lines and facilities to such part of the District (Exhibit A available upon request). Such part of the District may request the provision of services on negotiated terms.
 - b. Taxpaying electors in any area of five (5) acres or more within or without the District or any area regardless of size which is immediately contiguous to the District may agree among themselves for the construction of sanitation facilities within such area and the District may, by separate contract, allow any portion of revenue derived from sanitation charges and fees from such area to be applied on the payment of the costs of the construction of the sanitation facilities. Such payment shall be made without interest, and upon such other terms as the parties may agree, and shall not extend over fifteen (15) years. The District may, by separate resolution, impose limitations on the foregoing authority.
 - c. With respect to lands outside the District, the District will enter into connector's agreements with owners of such lands on the following terms:
 - 1) The District and such owners will enter into a connector's agreement in the form and substance acceptable to the District.
 - 2) The connector's agreement will require the owners to:
 - a) Extend the District's line from its nearest terminal point to the owners' property at the owners' expense and through the property to service adjacent parcels.
 - b) Pay for all costs and expenses associated with extending the sewer line.

- c) Transfer the line, together with any easements desired by the District to the District after construction and demonstration that the sewer line has been properly constructed and is in good working condition.
 - d) Pay a tap fee in the amount of one hundred and fifty (150) percent of the District's prevailing tap fee for properties within the District
 - e) At the District's request, annex the owners' lands to the District
 - f) Pay all expenses incurred by the District in connection with the foregoing, including engineering fees, attorneys' fees and other expenses.
- 3) The District, on a case-by-case basis and without any obligation to do so, may reimburse such owners for any marginal increase in construction costs occasioned by the District's requirement that a larger sewer line be laid than is required for development of the owners' property. Further, if the extended sewer line is located in such a manner as to permit connection to the extended sewer line of lands between such owners' property and the point of connection of the extended sewer line to the District existing line ("offsite service area") the District may require owners within the offsite service area on an equitable basis to reimburse the owners who constructed the extended line no more than fifty (50) percent of the actual construction costs of the extended line between such points for a five-year period as a condition to acquiring sewer taps from the District.
- 4) Effective August 1, 1995, except for developers who, as of April 11, 1995, had submitted letters of intent with the Buena Vista Planning Commission to initiate the subdivision approval process, the prior policy of the District to reimburse owners extending sewer lines fifty percent (50) percent of tap fees paid by such owners, not to exceed total construction costs of the extended line for a specified period of time, is abolished.
- 5) The District's obligation to issue taps or entertain negotiations for connectors' agreement is always subject to available sewer line and treatment facility capacity.

B. DEFINITIONS

ADU: Accessory Dwelling Unit is a secondary residential housing unit the occupies the same lot as a primary single-family residential dwelling. The ADU may be attached to the single-family residential dwelling, garage, or it can be built as a stand-alone unit. The ADU has its own kitchen, living space, and a separate entrance.

Applicant: Any person, persons, corporations, etc. applying for an extension to existing sewerage and/or addition to any existing facilities.

Contractor: The person or entity with whom the District contracts for the installation of sewerage extensions or the person or entity who installs private sewer lines.

District: "District" shall be taken to mean the Buena Vista Sanitation District.

EQR: Equivalent Residential Unit (a unit of sewer usage).

Inspector: The plant operator of the sewage treatment facilities of the Buena Vista Sanitation District or an individual employed by the District to oversee a particular sewer installation.

Lateral Service Line: That portion of sewerage located between collection mains and appurtenances defined above as sewerage, and a unit.

Manager: The term "Manager" as used herein shall be taken to mean the person duly appointed by the District who is charged with the enforcement of these Rules and Regulations under the direction of the Board of Directors of the District.

Multi-Family Residential Unit: Any single structure intended for occupancy by more than one family.

Sewer Lines: All collection mains and appurtenances installed to collect sanitary sewage in the District.

Single-Family Residential Dwelling: An independent residential structure that sits on its own property and is designed to be used as a single-family dwelling unit.

II. SERVICE

A. CONNECTIONS

All buildings located within the District and within four hundred (400) feet of any established sewer line, which building is used for residence or business purposes, or in which people congregate or are employed, must be connected with the District sewerage system, and all plumbing fixtures therein shall be connected to the District sewerage system. Connection lines will be made only by an employee of the District and the expense thereof will be paid to the District by the owner of the property served.

B. PERMIT REQUIRED FOR CONNECTION; TAP FEES

It is unlawful for any person to open, uncover, or in any manner make connection with any sewer line of the Buena Vista Sanitation District, or to lay or repair drain or sewer pipes on any premises, or in any street or alley within the District without paying to the District the required tap fee and obtaining written permit therefore. An inspection will be required.

C. PERMIT APPLICATIONS

Application for a permit required hereunder shall be in writing and shall be in the form provided by the District.

D. LEGAL EFFECT OF A SEWER TAP

Upon issuance of a sewer tap pursuant to an application made by an owner of property, such sewer tap shall have the following legal consequences:

1. The sewer tap constitutes a license from the District to the Owner of the property to use the facilities of the District for disposing of waste according to the rules and regulations of the District.
2. The Owner shall not connect improvements upon his or her land to the District's facilities without the District having made a prior inspection of the work and consented to the same before it is covered up.
3. A sewer tap runs with the land to which it was granted and may not be used to benefit any other land or transferred by the owner to another person for use on other land.
4. If the Owner has not connected improvements on his land to the District's facilities within six (6) months from the date of issuance of the sewer tap, the sewer tap shall be void and the District shall refund the tap fee to the Owner less a one hundred (100) dollar administrative charge.
5. If the improvements on property served by the sewer tap are demolished or removed with intent to replace them with other improvements and not to abandon the sewer tap, the sewer tap will be void six (6) months after such demolition or removal unless the Owner makes application for an extension of time to make use of the sewer tap for new improvements to be placed or constructed on such property and such extension of time is granted by the District in the exercise of its sole discretion.

E. LICENSED PLUMBER

Except for digging and back filling of ditches, the work upon or in connection with any portion of the sewer system of the District or any of the facilities which connect thereto shall be by a licensed plumber or by the owner of the premises under the supervision of the Sanitation District Manager, or by any contractor authorized by the District, and shall be performed in conformity with the design criteria of the Colorado Department of Health, and the Regulations of the Buena Vista Sanitation District.

F. SEWER LINE MAINTENANCE - LATERAL SERVICE LINE

1. General

The District shall assume no responsibility for the maintenance of any lateral service line.

2. Inspection of Property

The Manager shall have the right to enter upon any premises being served by the sewer lines of the District at any reasonable time for the purpose of making inspection of the lateral service line.

3. Cleaning of Lateral Service Line

It is the responsibility of the owner to keep the lateral service line between the Unit or Units connected and the sewer lines of the District clean and clear of any obstruction and to keep said lines in good repair at all times so there shall be no infiltration of ground water into the sewerage or exfiltration or accumulation of septic sewage therein. In case of failure of the property owner to properly maintain or clear the service line, the same may be done by the District after giving forty-eight (48) hours written notice to the owner or occupant. The costs of such maintenance shall be borne by the property owner.

G. ABANDONMENT OF CONNECTION

No person shall abandon any building connection without first obtaining a written permit therefore. Such building connection shall be effectively sealed with an approved stopper inserted in the barrel of the sewer lateral line extending to the property line, which stopper shall be sealed as directed by the District. When a service line is reconnected after being abandoned, the line must undergo an inspection and a tap fee paid.

H. SEWER LINE EXTENSIONS AND CONNECTIONS

1. General Provisions

- a. All applications for service including line extensions must be formal applications to the District Board in accordance with the requirements for application contained herein.
- b. Sewer lines shall be designed so as to ensure the development of the District.
- c. It is the general intent of this policy that applicants for service will provide for the cost of the extension which may or may not be recoverable by applicant.
- d. All materials and construction shall conform to the District specifications, must be approved by the District inspector, and be designed by either a licensed engineer or the District engineer, and approved by the District engineer. Design capacities may be in excess of applicant's requirements in order to provide for future expansion.
- e. The costs of a line extension shall include but not be limited to, all engineering, design, legal and consulting fees, right of way easement, project inspection, installation, excavation, bedding, backfill, testing and restoration of ground.

2. Applicant's Obligations

- a. The applicant shall obtain a formal approval of the District board before proceeding with any sewer line extension.
- b. The applicant agrees to pay the final project cost whenever final computation is made.
- c. The applicant shall coordinate with the District engineer throughout construction and shall allow such inspections as may be requested.
- d. The applicant shall furnish the District with "as built" drawings of the project.

3. Application Requirements

An applicant shall deliver to the District the following:

- a. Letter of application stating generally the nature and scope of extension, name and address of applicant, estimate of costs, name of contractor requested to be used and proposed dates of construction.
- b. A certified map of the subdivision or tract of land where the proposed extension and/or addition to existing facilities is to be made, prepared in accordance with the technical specifications set forth herein.
- c. Land owners, subdividers, or developers who have completed construction of the sewer lines shall, before these lines are accepted by the District for taps, dedicate these lines and appurtenances to the District free and clear of all liens and encumbrances.
- d. If premises are other than residential, the applicant shall state what the estimated daily maximum flow rate shall be in gallons per day for each such premises.

4. Review of Application

The District shall review all material submitted as herein required and authorize a contract for construction of the sewerage extension or notify the applicant in writing thirty (30) days after submission of the applications of changes necessary or other reasons why the construction cannot commence as requested.

I. UNAUTHORIZED CONNECTIONS

1. The placing of unauthorized connection on any line or other structure of the Buena Vista Sanitation District shall result in disconnection and/or penalty of five thousand (5,000.00) dollars for each unauthorized tap or connection as determined by the Board of Directors of the Buena Vista Sanitation District. This penalty shall be in addition to the applicable tap fee.
2. Any connection with any line or other structure of the Buena Vista Sanitation District without specific authorization as provided in these Rules and Regulations from the Board of Directors shall be considered unauthorized connection.

J. RIGHTS OF WAY AND EASEMENTS

Rights of way and easements for sewerage shall be of the following widths, to wit:

1. ≤12" pipe-10' each side of centerline.
2. >12" pipe-15' each side of centerline.

K. CHECK VALVE

A check valve is required in all basement drains.

L. DISCHARGE OF NON-ACCEPTABLE WASTES IN SEWER PROHIBITED

The discharge of non-acceptable wastes into the District sewer systems, whether directly or indirectly is prohibited and where investigation reveals the presence of non-acceptable wastes emanating from any lot, land, building or premises, the owner, lessor, renter or occupant of such lot shall be required at his own expense to treat, neutralize, or in other ways to prepare the noxious substance therein to the satisfaction of the District in order to convert the same into acceptable waste. The following are deemed to be non-acceptable wastes:

1. Any liquid or vapor having a temperature higher than one hundred five (105) degrees Fahrenheit.
2. Any water or waste having a five (5) day biological oxygen demand which may contain more than one thousand (1,000) parts per million by weight averaged during any twelve (12) hour period.

3. Any gasoline, benzene, fuel oil, flammable or explosive liquid, solvent or gas.
4. Any garbage which has not been properly shredded. Garbage disposal of domestic size only will be permitted on the system.
5. Any ashes, cinders, sand, mud, tar, straw, shavings, metal, grass, rags, feathers, plastics, paunch manure, wood, grit, cement, brick, onyx, carbide or other solid or viscous substance capable of obstruction of the floor of sewers or any other interference with the proper operation of the sewage works.
6. Any water or waste having a pH lower than five and one half (5.5) or higher than nine (9) or having any other corrosive property causing damage or hazard to structure, equipment or personnel of sewage works.
7. Any water or materials not capable of treatment by the District and which are prohibited from discharge by the District by any State or Federal law or regulation.
8. Any water or waste containing a toxic or poisonous substance in sufficient quantities to injure or interfere with the sewage treatment process, constituting a hazard to humans or animals or creating any hazard in the receiving water of the sewage treatment plant.
9. Any waters or wastes containing the suspended solids of such character or quantity that unusual attention or expense is required to handle such materials at the sewage treatment plants.
10. Any noxious or malodorous gas or substance capable of creating a public nuisance.
11. Any surface or ground water.

M. GREASE TRAPS AND GREASE INTERCEPTORS

1. Grease Trap or Grease Interceptor Requirements
 - a. When required, grease traps or grease interceptors shall be installed by all non-residential system users when, in the judgment of the District, they are necessary for the proper handling of liquid wastes containing grease or solids which may be harmful to, or cause obstruction of the publicly owned wastewater collection system, or interfere with the operation of the publicly owned treatment works. A grease trap or grease interceptor shall be installed by all non-residential customers engaged in the business of preparing and selling food to the general public.
 - b. Variance: A variance to the requirement for a grease trap or grease interceptor otherwise required for any non-residential structure may be granted after application therefore and upon due consideration by the District.
2. Definitions

For the purposes hereof, the terms "grease trap" and "grease interceptor" shall be defined as follows:

Grease Trap: A unit designed to retain grease of a size sufficient to accommodate the system user's expected grease volumes located inside or outside the building being served.

 - 1) The smallest grease trap permitted shall have a minimum grease retention capacity of forty (40) pounds and shall provide a hydraulic retention time of at least fifteen (15) minutes at the design flow rate.
 - 2) No grease trap shall be installed which has a rated capacity of less than thirty (30) gpm.

Grease Interceptor: A unit of at least seven hundred and fifty (750) gallons capacity designed to retain grease which shall be located remote from the fixtures being served, typically outside the building being served.

Fixture Unit Equivalent (FUE): A value which permits the comparison of different sized fixtures based on the drainage load produced. One (1) FUE = Discharge flow rate of seven and one half (7.5) gpm.

3. Design and Sizing

a. UPC Compliance

The design and sizing of grease traps and grease interceptors shall be in accordance with the Uniform Plumbing Code (UPC) and these regulations. The edition of the UPC currently utilized by the local building permitting authority shall be applicable.

b. District Approval Required

The size, type and location of each grease trap and grease interceptor shall be approved by the District, in accordance with these regulations. Except where otherwise specifically permitted, no wastes other than those requiring separation shall be discharged into any grease trap or grease interceptor. One set of plans, including complete mechanical and plumbing sections, shall be submitted to the District for approval prior to construction. Such plans shall include the size, type and location of each trap or interceptor. Such approval shall not exempt the user from compliance with any applicable code, ordinance, rule, regulation or order of any governmental authority. Such approval shall not be construed as or act as a guarantee or assurance that any discharge is or will be in compliance with any applicable code, ordinance, rule, regulation, or order of any governmental authority. Any subsequent alterations or additions to such facilities shall not be made without due notice to and prior approval of the District.

c. Design Requirements

1) All waste shall enter the grease trap or grease interceptor through the inlet pipe only.

2) Grease traps and grease interceptors shall be so designed and located as to be readily accessible for cleaning, and shall have a water seal of not less than six (6) inches for grease interceptors and two (2) inches or the diameter of the outlet, whichever is greater, for grease traps.

3) Grease traps shall be equipped with a flow control or restricting device installed in a readily accessible and visible location ahead of the grease trap. Flow control devices shall be designed and rated such that the flow through such a device shall at no time be greater than the rated capacity of the grease trap. No flow control devices having adjustable or removable parts will be permitted. A flow control device will not be required preceding a grease interceptor.

4) Grease interceptors shall have a minimum of two (2) compartments with fittings designed for grease retention. There shall be a minimum of two (2) manholes to provide access for cleaning and inspection of all fixtures and compartments of the interceptor but in any case, no fewer manholes than one (1) per ten (10) feet of interceptor length. In the case of small, or circular interceptors, where it is not practical to install two manholes, a single manhole shall be located so as to permit entrance to the first compartment, and inspection of the second. All areas of the second compartment shall be accessible for cleaning. Manhole covers shall be gas tight in construction having a minimum opening dimension of twenty (20) inches. In areas where traffic may exist, the interceptor shall be designed to have adequate reinforcement and cover, meeting AASHTO HS-20 load specifications.

5) Grease traps and grease interceptors shall be so designed that they will not become air bound if closed covers are used. The tank and the discharge line shall each be vented, and the vents shall not tie together less than 42 inches above the tank lid elevation.

6) An effluent sampling box shall be provided on the discharge of each grease trap or grease interceptor where so required by the District.

d. Sizing Criteria

- 1) Grease Traps: Grease traps shall be sized based on one of the following methods:
 - a. Fixture Capacity Method: Under this method, the physical size of each fixture compartment to be connected to the grease trap shall be measured and the capacity determined. The drainage load in gallons shall then be computed assuming the drainage load to be equal to 0.75 times the total physical capacity. The sum of the drainage loads for each fixture compartment to be connected to a single grease trap will be the total grease trap drainage load. The total grease trap drainage load is then divided by the drainage period for the fixture compartments connected to determine the flow rate to the grease trap in gpm. The grease trap flow rate thus determined, or the rated capacity of the flow control device, is then multiplied by the minimum retention time (15 minutes) to determine the required liquid capacity of grease trap to be installed.
 - b. Fixture Unit Method: Under this method the fixture compartment outlet or trap arm size shall be utilized to determine the fixture compartment drainage load in gpm, assuming one (1) fixture unit equivalent produces a flow rate of seven and one half (7.5) gpm. The sum of the drainage loads for each fixture compartment to be connected to a single grease trap or the rated capacity of the flow control device will be the total grease trap drainage load in gpm. This total drainage load in gpm is then multiplied by the minimum retention time fifteen (15 minutes) to determine the required liquid capacity of the grease trap to be installed. The following fixture unit equivalent values shall be utilized when sizing grease traps under the Fixture Unit Method selection of the appropriate size for a grease trap is dependent on the drainage period of the fixtures connected to the trap. By adjusting the fixture drainage period through use of a flow control device:
 - i. A smaller grease trap could be utilized for a given fixture size or capacity.
 - ii. Multiple fixtures could be connected to the same grease trap. Where the required grease trap size would exceed that which is commercially available, either multiple grease traps shall be installed in parallel or a grease interceptor shall be utilized.
- 2) Grease Interceptors: When determining the minimum size of grease interceptor required, the following shall be considered:
 - a. The minimum acceptable volume shall be not less than seven hundred fifty (750) gallons (with dishwasher one thousand (1,000) gallons).
 - b. The size of the interceptor shall be based on the maximum number of meals serviced at the maximum periods of the day (either breakfast, lunch or dinner). Volume, in gallons, of the interceptor shall be two and half (2½) gallons times the maximum meals served during the busiest period of the day.
 - c. An alternate method of determining the size of the grease interceptor is to multiply seating capacity times a turnover constant of one point six (1.6) times two and one half (2½) gallons. Seating capacity can be approximated, using ten (10) square feet of dining area per person. (Thus, VOLUME = Seating Capacity x 1.6 x 2.5 gallons).
 - d. The size of the grease interceptor shall be determined by the following formula:

Interceptor size (liquid capacity in gallons) = number of meals served per peak hour X waste flow rate X retention time X storage factor.

 - i) Meals served per peak hour to be estimated as follows:
Seating capacity X occupancy factor (0.80) X meals per hour per seat (2)
 - ii) Waste flow rate:

With dishwashing machine	6 gallons
Without dishwashing machine	5 gallons
Food waste disposal	1 gallon

iii) Retention time: 1.0 hours

iv) Storage Factor: Fully equipped commercial kitchen:

8-hour operation	1
16-hour operation	2
24-hour operation	3
Single service kitchen	1.5

- e. An appropriate volume may be determined by multiplying the total rate of flow in gallons per minute from each fixture required to be connected to the interceptor times a minimum retention time of not less than fifteen (15) minutes, the resulting volume expressed in gallons.

4. INSTALLATION

- a. The installation of grease traps and grease interceptors shall be in accordance with the Uniform Plumbing Code (UPC) and this Addendum. The edition of the UPC currently utilized by the local building permitting authority shall be applicable.
- b. The installation of grease traps and grease interceptors shall be accomplished by licensed plumbers with documented experience in the installation of such devices.
- c. Each grease trap and grease interceptor shall be readily accessible for inspection, servicing, and maintenance for proper working condition. The use of ladders or the removal of bulky equipment in order to inspect or service traps and interceptors shall constitute a violation of accessibility. Where feasible, all interceptors shall be located outside of the facility served. Interceptors may not be installed in any part of a building where food is handled. Location of all traps and interceptors shall be approved by the District, and shall be shown on the approved building plan.
- d. No dishwasher shall be connected to or discharge into any grease trap or grease interceptor of less than one thousand (1,000) gallons capacity which is utilized by other fixtures. Automatic dishwashing units shall be plumbed through their own properly sized grease trap, a properly sized grease interceptor or directly into the building sewer and waste system.
- e. No food grinder or disposal unit shall be connected to or discharge into any grease trap. Such units shall be plumbed through a properly sized grease interceptor or directly into the building sewer and waste system.
- f. All fixtures not equipped with a garbage disposal (garbage grinder) which are connected to a grease interceptor shall be equipped with a fixed or removable mesh or screen which shall catch garbage and food debris and prevent it from entering the grease interceptor.
- g. Wastes in excess of one hundred forty (140) degrees Fahrenheit shall not be discharged into a grease trap or grease interceptor, and liquid discharge from a grease trap or interceptor shall not exceed seventy degrees (70) degrees Fahrenheit.
- h. All drains from the kitchen, food preparation, and dishwashing areas shall be connected to a grease trap or grease interceptor. Fixtures to be connected include, but are not limited to, scullery sinks, pot and pan sinks, dishwashing machines, soup kettles, and floor drains located in areas where grease containing materials may exist.
- i. When deemed necessary by the District, garbage disposals (garbage grinders) may be required to be connected to an approved grease interceptor. Connection of garbage disposals (garbage grinders) to grease traps will typically not be permitted.

- j. Toilets, urinals and similar fixtures shall not waste through a grease trap or grease interceptor. Such fixtures shall be plumbed directly into the building sewer and waste system.

5. **MAINTENANCE**

- a. Property owners and/or lessees shall be jointly and severally responsible for cleaning grease traps and grease interceptors and maintaining the grease traps and interceptors in efficient operating condition. Grease traps and interceptors shall be maintained by regularly scheduled removal of the accumulated grease and solids. This maintenance shall be performed before the retention capacity of the trap or interceptor is exceeded. Record of maintenance shall be maintained on-site.
- b. Maintenance of grease traps and grease interceptors shall be done only by a person normally engaged in the servicing of such plumbing fixtures or trained in such work by experience. An individual property owner will not be permitted to accomplish maintenance without receiving a permit from the District.
- c. The District shall prepare and make available a form for recording grease trap/grease interceptor maintenance. The maintenance business shall provide one copy of the form to the District immediately following completion of maintenance of any grease trap or grease interceptor within the District.
- d. As a minimum, any grease trap in service in the District shall be serviced at a maximum interval of thirty (30) days. A variance from this requirement may be obtained when the owner can confirm that there is no normal use during any given thirty (30) calendar day period. The District may inspect the trap and outlet and, if it is deemed necessary by the District, require more frequent servicing and maintenance.
- e. As a minimum, any grease interceptor in service in the District shall be serviced at a maximum interval of one hundred twenty (120) days. A variance from this requirement may be obtained when the owner can confirm that there is no normal use during any given one hundred twenty (120) calendar day period. The District may inspect the interceptor and outlet and, if it is deemed necessary by the District, may require more frequent servicing and maintenance.
- f. The District may inspect grease traps and grease interceptors monthly to determine the load on the fixture and the effectiveness of maintenance activities. These inspections may determine that more frequent maintenance than previously specified is required.

6. **GRANDFATHER**

Existing grease traps and grease interceptors which are in use in the District upon the adoption of these regulations, shall continue to be lawful, provided the District reserves the right to compel compliance with these regulations if, in its judgment, actual use of such grease traps or grease interceptors is causing public injury and, further, provided that, if and when, for any reason, any such grease trap or grease interceptor requires more than ordinary maintenance, then the owner thereof shall modify such grease trap or grease interceptor as necessary to conform to these regulations.

III. RATES AND CHARGES

A. MONTHLY SEWER RATES, EQR CLASSIFICATIONS AND FEES

The District shall make reference to the Plumbing Code used by Chaffee County and/or the Town of Buena Vista for governing the design, construction and operation of plumbing fixtures and facilities connected to the District's system. The Drainage Fixture Unit (DFU) value assigned to any wastewater fixture type by the 2009 Plumbing Code shall be used to assign an EQR value. The District shall consider an EQR equal to 18 DFUs. The tabulated DFU value for a fixture or group of fixtures shall be divided by a value of 18 DFUs per EQR, rounded to the nearest 0.05, to give an EQR value upon which plant investment fees or tap fees shall be based.

Table 1

DRAINAGE FIXTURE UNITS FOR FIXTURES & GROUPS

	Drainage Fixture Unit Value as Load Factors	Minimum Size of Trap (inches)
Automatic clothes washers, commercial	3	2
Automatic clothes washers, residential	2	2
Bathroom group (1.6 gpf water closet)	5 ^h	-
Bathtub group (water closet flushing greater than 1.6 gpf)	6 ^h	-
Bathtub (with or without overhead shower or whirlpool attachments)	2	1½
Bidet	1	1¼
Combination sink and tray	2	1½
Dental lavatory	1	1¼
Dental unit or cuspidor	1	1¼
Dishwashing machine, domestic	2	1½
Drinking fountain	½	1¼
Emergency floor drain	0	2
Floor drains	See Table 2	2
Floor sinks	See Table 2	2
Kitchen sink, domestic	2	1½
Kitchen sink, domestic with food waste grinder and/or dishwasher	2	1½
Laundry tray (1 or 2 compartments)	2	1½
Lavatory	1	1¼
Shower	2	-
Service sink	2	1½
Sink	2	1½
Urinal	4	Note d
Urinal, 1 gallon per flush or less	2 ^c	Note d
Urinal, nonwater supplied	½	Note d
Wash sink (circular or multiple) each set of faucets	2	1½
Water closet, flushometer tank, public or private	4 ^e	Note d
Water closet, private (1.6 gpf)	3	Note d
Water closet, private (flushing greater than 1.6 gpf)	4 ^e	Note d
Water closet, public (1.6 gpf)	4 ^e	Note d
Water closet, public (flushing greater than 1.6 gpf)	6 ^e	Note d
For SI: 1 inch= 25.4 mm, 1 gallon= 3.785 L, gpf = gallon per flushing cycle, gpm = gallon per minute.		
a For traps larger than 3 inches, use Table 2.		
b A showerhead over a bathtub or whirlpool bathtub attachment does not increase the drainage fixture unit value.		
c Contact District for computing unit value of fixtures not listed in this table or for		

rating of devices with intermittent flows.
d Trap size shall be consistent with the fixture outlet size.
e For the purpose of computing loads on building drains and sewers, water closets and urinals shall not be rated at a lower drainage fixture unit unless the lower values are confirmed by testing.
f. For fixtures added to a bathroom group, add the DFU value of those additional fixtures to the bathroom group fixture count.
g. Contact District for sizing requirements for fixture drain, branch drain, and drainage stack for an automatic clothes washer standpipe.
h. Bathroom Group: a group of fixtures consisting of a water closet, lavatory, bathtub or shower, including or excluding a bidet, an emergency floor-drain or both. Such fixtures are located together on the same floor level.

Table 2

DRAINAGE FIXTURE UNITS FOR FIXTURE DRAINS OR TRAPS	
<u>FIXTURE DRAIN OR TRAP SIZE</u> (inches)	<u>DRAINAGE FIXTURE UNIT VALUE</u>
1 ¼	1
1 ½	2
2	3
2 ½	4
3	5
4	6

1. TAP FEES

- a. The tap fee for connection to the Buena Vista Sanitation District system shall be four thousand one hundred (4,100.00) dollars per EQR. Out of District connections tap fees shall be six thousand one hundred fifty (6,150.00) dollars per EQR. Tap fees must be paid at the time application is made for the permit. Tapping must occur within six (6) months of applying. Tap fees shall be due at the time the permit is issued. There is a fifty (50.00) dollar inspection fee.
- b. Customers that are not in the boundaries of the Buena Vista Sanitation District will pay one point five (1.5) times the tap and monthly fees.

2. MONTHLY SERVICE CHARGES

The monthly user charges will be based on the calculation that eighteen (18) DFUs equals one (1) Equivalent Residential Unit (EQR). If a single-family residential dwelling, ADU, multi-family residential unit, or commercial building is more than eighteen (18) DFUs then the total DFUs are divided by a value of eighteen (18) DFUs per EQR and rounded to the nearest point zero five (0.05) to total EQRs for the monthly user charge. One (1) EQR is equal to a monthly fee of thirty-nine (39.00)

dollars. The minimum monthly service charge for a single-family residential dwelling, ADU, multi-family unit, or a commercial building that have less than eighteen (18) DFUs or one (1) EQR will be thirty-nine (39.00) dollars per month.

3. **LATE CHARGE**

A late charge of three (3.00) dollars per month will be charged for bills overdue for more than thirty (30) days.

4. **RETURNED CHECK**

A charge of twenty-five (25.00) dollars per account will be made for all returned items for insufficient funds, closed accounts and auto withdraw returns.

5. **METHOD OF COMPUTATION**

All users must pay a sewer service charge regardless of occupancy unless abandoned as provided herein.

6. **LIEN**

Until paid, all rates, tolls, fees and charges shall constitute a first and perpetual lien on and against the property served, and any such lien may be foreclosed in the manner provided by law.

7. **ABANDONMENT FEE**

The fee for restoring service to a line which has been properly abandoned shall be seventy-five (75) percent of the monthly rate in effect at the time of request to restore service times the number of months since abandonment, plus a fee of fifty (50.00) dollars for inspection.

8. **INCREASE IN USAGE**

At such time as a sewer user increases the usage above that for which a tap fee has been paid (said increase in usage to be determined by whether the new usage is rated at a higher EQR as specified by the rate table), the user shall pay a tap fee for the amount of increase in EQR at the tap fee rate then in effect (i.e., additional EQR times tap fee equals fee for increase). If the applicant (sewer user) disagrees with the increases in the tap fee and monthly fee, the applicant may request a public hearing before the Buena Vista Sanitation District's Board of Directors to present evidence and argument to dispute the increases. The Board of Directors will then make a final decision on the fee increases. If the applicant disagrees with the Board's final decision, then the applicant may file an appropriate claim in the Chaffee County District Court.

B. **INDEMNITY TO DISTRICT**

The user shall hold the District harmless and indemnify it against all claims and liability for injury to persons and damage to property when such damage or injury results from or is occasioned by negligent or wrongful acts by District employees.

C. **APPLICATION AGREEMENT**

The application for sewer service and the use of such service constitutes an agreement whereby user receives sewer service and agrees to pay the District therefore, in accordance with applicable rates, rules and regulations. Sewer service charges shall begin on the date the tap connection is made.

D. **SEVERABILITY**

If an article, section, subsection, sentence, clause or phrase of this Resolution is for any reason held to be unconstitutional or illegal, such invalidity shall not affect the validity of the remaining portion of this Resolution. The District hereby declares that it would have passed this Resolution and every article, section, subsection, sentence, clause or phrase thereof, irrespective of the fact that any one or more articles, sections, subsections, sentences, clauses or phrases be declared unconstitutional or illegal.

E. **PENALTY**

1. Unless these Rules and Regulations specifically provide for a particular violation/fine, the penalty for any violation shall not be less than \$1,000, plus costs for each infraction.

2. Increased fines will be imposed for repeat violations. "Repeat" offense shall mean a second or subsequent violation of the same regulation which is committed by an applicant within any 36-month period, and for which the applicant admits responsibility or is determined to be responsible.
3. The fine for committing the same offense shall increase as follows:

First offense	\$1,000.00
Second offense	\$3,500.00
Third offense	\$5,000.00
4. Failure to pay the fine within seven (7) business days after notification of the violation, may result in disconnection of said premises. The cost of such disconnection will be paid by the applicant.
5. The applicant responsible and fined for any violations, will not be allowed to do business with the District until said fines are paid in full. The District will not issue any sewer connection permits to any applicant in violation until said applicant has complied with all corrective actions and has paid said fine. Said fines are a lien and may be collected in same manner as provided for unpaid service fees.
6. Each day in which the violation continues will constitute a separate violation, and shall be subject to the penalties or sanctions as a separate offense.
7. Upon payment of the fine, reconnection costs, along with an additional inspection fee, will be paid in advance by the applicant prior to the line being reconnected.
8. The District will issue a cease-and-desist order if the applicant fails to comply with any order.

F. STUB LATERAL LINES

Lateral lines may be extended from the Buena Vista Sanitation District main lines to the property line of a prospective customer without payment of a tap fee, provided that notice is given to the District at the time of installation. The tap fee shall be payable at the time any such lateral line is connected to a structure (this connection must be inspected by the District) or is used to discharge into the Buena Vista Sanitation District system, whichever occurs first.

PART II - TECHNICAL SANITARY SEWER SPECIFICATIONS

IV. DESIGN PROVISIONS

A. PLANNING CONSIDERATIONS

Except where approved master plans exist, the following criteria for design shall be used unless specific approval for other criteria has been given by the District:

1. Design Period

The sewer system shall be designed for the estimated ultimate tributary population. The tributary areas shall be studied to determine the acres for each projected land use.
2. Population densities including public use land:
 - a. Single family units at 3.5 person per unit.
 - b. Multi-family and condominiums at 2.5 person per unit.
 - c. Three single family units per acre.
 - d. Twenty multi-family cluster housing or condominiums per acre.
3. Per capita flows

Sewer systems shall be designed on the basis of not less than the following:

- a. One hundred (100) gallons per person per day.
- b. Four hundred (400) gallons per capita per day peak flow for submains and laterals.
- c. Two hundred fifty (250) gallons per capita per day peak flow for main trunk, interceptor or outfall sewers.
- d. Infiltration of one hundred (100) gallons per day per inch of diameter per mile per manhole run.
- e. Commercial land uses at fourteen hundred (1,400) gallons per acre per day with a peak factor of 2.
- f. Industrial land uses at sixteen hundred (1,600) gallons per acre per day with a peak factor of 3.
- g. Public use, park and open space at one thousand (1,000) gallons per day with a peak factor of 2.

B. MINIMUM SIZE

No public sewer shall be less than eight (8) inches in diameter. No building sewer shall be less than four (4) inches in diameter.

C. MAXIMUM DEPTH

In general, sewers shall be designed deep enough to adequately drain the structures served, prevent damage from loads applied to the ground or pavement surface. In addition, depth of cover and pipe treatment shall be sufficient to preclude damage to the pipeline from ordinary excavation activities over and across the wastewater pipeline.

On public mains and service lines that have less than four (4) feet of cover, a frost shield shall be constructed over the line. The frost shield shall be constructed with one layer of 20 mil polyethylene sheeting placed on no less than six (6) inches of pipe bedding, then no less than a two (2) inch thick piece of isocyanate insulation board covered with no less than three (3) inches of uniformly graded fine aggregate, then an additional layer of 20 mil polyethylene sheeting. The insulation board should extend to no less than 2 (2) feet each side of the pipe centerline. Compacted backfill in accordance with District construction standards can be placed on top of the polyethylene sheeting to finish grade.

A tracer wire shall be installed at the top of each collection system pipeline and wastewater service line to facilitate locating the pipeline in accordance with the requirement of the State of Colorado CRS-9-1.5-103 and the Buena Vista Sanitation District. Tracer wire shall be 1 2 AWG solid copper clad steel (CCS), 30 mil green HDPE insulating jacket by Copperhead Industries, Product 1245 HS, or acceptable equivalent. Tracer wire junction joints at service lines and splices shall utilize Copperhead Industries Snakebite Locking Connectors, Product LSC 1230 and 3WB-01.

1. Public Mains

- a. No public mains shall have less than five (5) feet of cover measured from the top of pipe to the finished ground or pavement surface unless special construction is provided. Special construction shall consist of the following:
 - 1) One of the following pipe materials may be used where there is less than five (5) feet but more than three (3) feet of cover.
 - a) Ductile iron pipe as specified (AWWA C151). Refer to the standard materials specifications for lining and coating requirements.
 - b) Schedule 40 PVC pipe as specified (ASTM 1785).
 - c) DR 18 PVC pipe as specified (AWWA C900).

- (i) AWWA C900 DR 18 PVC pipe shall not be blue in color. Only green or white pipe material may be used for wastewater collection system piping.
 - 2) All public wastewater collection system mains which have less than five (5) feet of cover shall be installed with a plastic warning tape buried in the trench backfill no less than one and a half (1.5) feet above the top of pipe and no less than one and a half (1.5) feet below the ground or pavement surface.
 - 3) Where the shallow wastewater pipeline crosses over a potable water pipeline, the design and construction requirements for separation of pipelines given in these specifications shall govern in addition to the requirements of this section.
- b. Public mains in the wastewater collection system with more than five (5) feet but less than fourteen (14) feet of cover measured from the top of pipe to the finished ground or pavement surface shall be constructed of PVC pipe materials in conformance with ASTM D-3034, SDR 35, with Class B bedding unless otherwise required due to site-specific conditions as specified.
 - c. Public mains in the wastewater collection system with more than fourteen (14) feet of cover measured from the top of pipe to the finished ground or pavement surface shall be analyzed for site specific conditions and the pipe material and construction details determined in accordance with accepted engineering practice, conformance with manufacturer's requirements and subject to the review, evaluation and acceptance of the District.
 - 1) Pipe material and construction details shall be used which will limit the long-term deflection of PVC conduits to no more than five (5) percent of inside diameter.

2. Service Lines and Building Sewers

- a. No wastewater service line connected to the District's wastewater collection system shall have less than five (5) feet of cover measured from the top of pipe to the finished ground or pavement surface unless special construction is provided. Special construction shall consist of the following:
 - 1) Within a public right-of-way, the following pipe materials may be used where there is less than five (5) feet but more than three (3) feet of cover.
 - a) Ductile iron pipe as specified (AWWA C151). Refer to the standard materials specifications for lining and coating requirements.
 - b) Schedule 40 PVC pipe as specified (ASTM 1785).
 - c) DR 18 PVC pipe as specified (AWWA C900).
 - (i) AWWA C900 DR 18 PVC pipe shall not be blue in color. Only green or white pipe materials may be used for wastewater collection system piping.
 - 2) Within a utility easement or other area outside of a public right-of-way, the following pipe materials may be used where there is less than five (5) feet but more than three (3) feet of cover.
 - a) Ductile iron pipe as specified (AWWA C151). Refer to the standard materials specifications for lining and coating requirements.
 - b) Schedule 40 PVC pipe as specified (ASTM 1785).
 - c) DR 18 PVC pipe as specified (AWWA C900). AWWA C900 DR 18 PVC pipe shall not be blue in color. Only green or white pipe materials may be used for wastewater collection system piping.

- d) SDR 21 PVC pipe as specified (ASTM 2241). ASTM 2241 SDR 21 PVC pipe shall not be blue in color. Only green or white pipe materials may be used for wastewater collection system piping.
- 3) Within a public right-of-way or utility easement, the following pipe materials and special construction may be used where the pipe has less than three (3) feet but more than one (1) foot of cover measured from the top of pipe to the ground or pavement surface.
- a) Ductile iron pipe as specified (AWWA C151). Refer to the standard materials specifications for lining and coating requirements.
 - b) Schedule 80 PVC pipe as specified (ASTM 1785). Refer to the standard materials specifications for jointing requirements.
 - c) DR 14 PVC pipe as specified (AWWA C900). AWWA C900 DR 14 PVC pipe shall not be blue in color. Only green or white pipe materials may be used for wastewater collection system piping.
 - d) In no case shall a service line or building sewer be installed with less than one (1) foot of permanent soil or pavement cover.
 - e) Where the depth of cover is less than three (3) feet, but more than one (1) foot for an interval less than ten (10) feet, such as crossing beneath drainage ditches parallel to roadways, irrigation ditches or other similar ground surface irregularities, the pipe materials described for use in installations having more than three (3) feet, but less than five (5) feet of cover may be utilized with a reinforced concrete cap. Refer to the standard construction details for reinforced concrete cap construction requirements.
- b. All wastewater service lines and/or building sewers which have less than five (5) feet of cover shall be installed with a plastic warning tape buried in the trench backfill mid-way between the pipe and the ground or pavement surface.

D. MINIMUM SLOPES

All sewers shall be designed to transport average sewage flows at a minimum mean velocity of two (2) feet per second based on a Manning's roughness factor of 0.013. The slope between manholes shall be uniform. In no case shall the slope be less than the following for sewer mains and services:

Table 3

MINIMUM GRADE TABLE

Services	
Diameter	Slope
4"	2% or 1/4" per foot
4" Ductile iron or Cast iron pipe	1% or 1/8" per foot
6"	1% or 1/8" per foot
Mains and Services	
8"	0.50%
10"	0.35%
12"	0.26%
15"	0.20%
18"	0.15%

E. HIGH VELOCITY PROTECTION

In case of sewers where the slopes are such that over fifteen (15) per cent grades are attained, special provisions shall be made to prevent displacement by erosion and shock. Such high velocity protection shall

be shown on detail drawings and approved by the District.

F. ALIGNMENT

Standard position for locating sewers, unless some major interference prevents, is along the center line of the street, easement or right-of-way. In street less than thirty-six (36) feet wide and alleys, the standard location shall be parallel to but removed two (2) feet from the center line. Manholes shall be located so as to limit possible stormwater entrance. Proposed sewer lines which may conflict with the placement of other underground facilities will require prior approval of the sewer placement location by the controlling agencies whose facilities are affected. Locations other than those specified will require specific approval of the District.

G. PIPE ALIGNMENT IN MANHOLES

1. Intersections

All pipes shall have free discharge into the collection system. Where possible, the flow line of the intersecting pipe shall be the spring line (horizontal center of the pipeline) of the collection sewer. All manhole inverts shall be designed with a zero point one (0.1) foot drop except for changes in alignment in excess of thirty degrees shall have a zero point three (0.3) foot drop in the invert through the manhole. Changes in direction at intersections shall not be greater than ninety (90) degrees.

2. Increasing size

When sewers are increased in size with no intersecting sewers, the invert of the larger sewer shall be lowered sufficiently to maintain the same energy gradient.

H. MANHOLE LOCATION

Manholes shall be installed at the end of each line, at all pipeline intersections, changes in grade, size, alignment and at distances not greater than four hundred (400) feet. Manholes must be located to allow unassisted access by District maintenance vehicles which range in size from one-half (1/2) ton to two and one-half (2½) tons. Lines and manholes located in areas where access, in the opinion of the District, is not possible, will not be approved for construction.

I. MANHOLE DETAILS

1. Manhole size

The inside diameter of the manhole shall not be less than four (4) feet on lines eight (8) inches through twelve (12) inches in diameter; not less than five (5) feet on lines fifteen (15) inches through thirty-six (36) inches in diameter; not less than six (6) feet on lines in excess of thirty-six (36) inches in diameter for standard design manholes. (Detail sheets for standard manhole designs available upon request.) Refer to standard manhole design for minimum wall thickness and reinforcing.

2. Drop manhole

External drop manholes will be permitted only in extreme and special conditions where approval has been granted by the District. The external drop sections must be totally encased in reinforced concrete and placed on an adequate foundation. (Detail sheets for standard drop manholes designs available upon request.)

3. Manhole channels

The flow channel shall be made to conform in slope and shape to that of the sewer pipe and wherever possible shall use the lower one-half (1/2) of the sewer pipe for the invert of the open flow channel. At intersections with other lines, channels shall be formed with a curve to minimize turbulence.

4. Rings and covers

Manhole rings and covers shall conform with the attached detail sheets for manhole design. The ring and cover shall be constructed of cast iron for traffic bearing conditions and cast aluminum or cast iron for non-traffic bearing conditions. All manholes located outside of dedicated street or alley rights-of-way will be designed and constructed with locking type cover and the ring bolted to the concrete cone. Grade adjustment rings or blocks between the ring and cover and the concrete cone cap shall not exceed eight (8) inches.

5. **Watertightness**
Precast manhole joints shall be made watertight with a rubber 'O' ring, Ram-nek or similar approved material. Manholes of brick or segmented block shall be waterproofed by interior and exterior plaster coating five-eighths (5/8) inches thick supplemented by a bituminous waterproof coating on the exterior surface.
6. **Stub outs from manhole**
Stub outs from manholes shall not exceed twenty (20) feet except lines which will be extended in the future. Designs to complete the manhole run shall be submitted for review in insure proper grade and alignment for future constructions. Future extension of stub outs shall be of like material using the same grade and alignment.

J. RELATION TO WATER MAINS

Sewer shall be located a minimum of ten (10) feet horizontal from existing or proposed water mains and the sewer pipe shall be a minimum of eighteen (18) inches clear distance vertically below the water main. If this clear distance is not feasible the crossing must be designed and constructed so as to protect the water main from potential cross connections and minimize the potential for structural damage to either pipeline. Minimum protection shall consist of the installation of an impervious and structural sewer as follows:

1. One length of pipe at least eighteen (18) feet long centered over the water main constructed of ductile iron pipe jointed to sanitary sewer pipe with a manufactured adapter specifically for such jointing. It should include rubber gasket fittings with stainless steel tightening bands.
2. Concrete or vitrified clay sewer pipe with reinforced concrete encasement. Encasement shall be at least six (6) inches thick and extended a distance of ten (10) feet on either side of the water main crossing. Reinforcing shall consist of a minimum of four (4) No. 4 bars placed at quarter points around the pipe being encased.

K. STREAM AND DRAINAGE CHANNEL CROSSINGS

1. All stream and drainage channel crossings shall be ductile iron or cast-iron pipe encased in reinforced concrete where the installation is below the flow line of the stream or drainage channel.
2. Crossing less than four (4) feet below existing or proposed channel bottoms shall be supported by reinforced concrete caissons constructed in accordance with approved special design.
3. Where the pipeline crossing will be above the stream or drainage channel flow line, special design will be required by the District. All details of the design shall be submitted to the District for review and approval.

L. RAILROAD AND HIGHWAY CROSSINGS

1. All work shall be accomplished in accordance with the appropriate permit issued by the responsible agency having jurisdiction over the work.
2. Crossings under railroads and highways shall consist of cast iron or coal tar enamel lined steel pipe laid inside steel pipe conduits, which are jacked beneath the track or roadway. The steel conduit pipe shall be jacked horizontally through the ground on substantially the grade of the sewer, with due allowance for the bells of the cast iron pipe or dresser coupling of the steel pipe. As the pipe is jacked along, the earth shall be excavated from the face and removed so that it will not be necessary to force the pipe through solid ground.
3. The conduit diameter for sixteen (16) inch and smaller carrier pipes shall be a minimum of eight (8) inches larger than the carrier pipe; and the conduit diameter for larger than sixteen (16) inches diameter carrier pipe shall be a minimum of twelve (12) inches larger than the carrier pipe.

4. After the conduit has been completed, the cast iron or steel carrier pipe shall be placed inside and blocked-in exact position and grade with a block behind each bell or coupling. The casing shall be blown full of sand for the entire length of conduit.
5. Each end of conduit shall then be plugged tight around the cast iron or steel carrier pipe and inside the conduit pipe. The plug may consist of eight (8) inch brick wall laid up with Portland cement mortar or a prefabricated rubber boot with stainless steel tightening bands specifically for sealing casing pipe ends.

M. SERVICE LINES (BUILDING SEWERS)

1. Service lines and stub outs from main sewers shall be extended to each property at a point two (2) feet inside the property line and generally fifteen (15) feet above the low lot corner. Service stubs for flag lots shall be extended through the flag stem to the main body of the lot except where approved otherwise by the District.
2. Stub outs for a sewer main may be made to an unoccupied lot provided it is part of an officially platted and recorded subdivision. Such stubs shall be extended to two (2) feet inside property line and plugged with a watertight cap or plug insert. Records of the depth and location of the end of the service stub shall be recorded by the District for future reference.
3. Four (4) inch diameter service lines shall have a maximum length of three hundred (300) feet. A four (4) inch diameter cleanout shall be installed on the service lines where the total length exceeds one hundred (100) feet and at one hundred (100) foot intervals thereafter up to a maximum of three hundred (300) feet in length. Cleanout shall have proper waterproof cap. For cleanout access, a prefabricated formed wye with a riser pipe shall be installed to the finished grade. A cleanout shall be installed near the building foundation (exterior) on all service lines.
4. One service line may be used for multi-family buildings which have two (2) or more dwelling units per building constructed on a single lot subject to the following conditions:
 - a. The service lines shall be sized sufficiently for the multi-family structure. A structure having four (4) or more units shall have a minimum six (6) inch diameter service line.
 - b. The owner of the property is responsible for operation, maintenance, repair and replacement of service lines for multi-family buildings.
 - c. Duplexes and/or other multi-family dwelling units which are located one above the other may be on one service line provided that a condominium declaration acceptable to the District has been filed with the District, the local land use authority and Chaffee County. The condominium declaration shall establish the responsibility for operation, maintenance, repair and replacement of the service line(s) both within and outside the building.
 - d. Where duplexes and/or other multi-family dwelling units are side by side, a separate service line shall be constructed to each duplex unless an acceptable condominium declaration has been accepted by the District and filed with the local land use authority and Chaffee County.
 - e. Multi-family structures commonly referred to as zero-lot line structures such as town homes constructed on separately platted lots but with the structures connected shall each be provided a separate sanitary sewer service line to each dwelling unit on each lot.
 - f. If the dwelling units are ever sold for separate ownership of one or more dwelling units within a building, a condominium declaration shall be filed with the District, the local land use authority and Chaffee County indicating responsibility for operation, maintenance, repair and replacement of the service line(s) both within and outside the building.
 - g. Condominium declarations required by this section shall contain provisions for establishing

responsibility for private sanitary sewer service pipeline operation, maintenance, repair and replacement. The provisions shall apply to all portions of the sanitary sewer service from the District's public wastewater collection system to the building served and to the interior drainage plumbing subject to common use by residents of the building. Such condominium declarations shall be prepared by the property owner subject to guidelines provided by the District. The declarations shall be submitted to the District for review and acceptance prior to filing with the local land use authority and Chaffee County as specified.

N. PUMP STATION DESIGN PARAMETERS

Design of pump stations within the Buena Vista Sanitation District's collection system shall be accomplished on a case-by-case basis. Preliminary considerations and a rationale for the need of the pump station shall be reviewed in detail with the District's Board of Directors prior to proceeding with preliminary and final design.

O. SANITARY SEWERAGE PLAN SUBMITTAL REQUIREMENTS

1. Plans and specifications

Three (3) copies of all plans and specifications for facilities to be installed under these rules and regulations shall be furnished to the District. One (1) copy will be returned to the applicant when approved by the District and bear evidence of such approval.

2. Plan content

The information required on all plans shall be as a minimum the following:

- a. A plan view showing streets, alleys, rights-of-way and utility easements with the location and size of the sewers, location and distance between manholes, the slope and other appurtenances indicated. It is desirable for plans to show the proposed size and location of service stubs and the location of all existing or proposed underground utilities and structures located within twenty (20) feet horizontally or vertically, of the center line of the proposed sewer extension. (The scale is optional).
- b. A profile view with the vertical and horizontal grids showing the existing ground surface (dotted) and proposed surface (solid). Also, show the proposed sewer with elevations of manhole rims and inverts, the distance and percent grade between manholes and elevations of utility crossings.
- c. Special detail drawings, made to scale, shall clearly show the nature of design of the following:
 - 1) Special sewer appurtenances such as non-standard manholes, inverted siphons and elevated sewers.
 - 2) Special joints and utility or storm sewer crossings.
 - 3) Stream and drainage channel crossings with elevations of normal high and low water levels.

3. Supporting data

- a. Submit with the plans and specifications all necessary supporting data to fully describe the proposed installation. This data shall include but not necessarily be limited to a copy of the recorded plat of the subdivision in which the improvements are proposed to be installed, copies of dedicated rights-of-way and easements in which improvements are proposed to be installed. Submit copies of necessary permits from other governmental or private agencies having jurisdiction in the area of the proposed work.
- b. Should a site application for a collection system extension be required by the Colorado Department of Health, the individual party responsible for construction of the facility shall also be responsible for obtaining this site approval.

4. Upon completion of construction and prior to acceptance by the Buena Vista Sanitation District, two (2) copies of "as-constructed" plans shall be submitted to the District for record. The two (2) copies shall be complete with all "as-constructed" information together with a certification by the party responsible for construction that all data thereon is accurate and represents actual "as-constructed" conditions.
5. All plans, specifications and supporting documents shall be prepared by or under the direct supervision of a professional engineer registered to practice in the State of Colorado. All plans and specifications shall bear the seal and signature of said registered professional engineer.

P. ACCEPTANCE OF NEW SEWER LINES CONSTRUCTED BY DEVELOPER

1. Promptly upon completion of a sewer line extension, the developer or owner extending the sewer line under a Connection Agreement with the District, shall comply with all provisions performable upon such completion as set forth in the Connection Agreement including those hereafters set forth and the District shall thereupon proceed as set forth herein.
 - a. Two (2) copies of "as-constructed" plans, complete with all "as-constructed" information together with a certification by the party responsible for construction that all data thereon is accurate and represents actual "as-constructed" conditions.
 - b. A list of all lots in the subdivision which will be serviced by the new sewer line extension. Such list will contain the lot numbers, assigned street addresses and current ownership of each lot.
 - c. A certificate by the developer or contractor that after completion of construction, all collection system lines and manholes in the sewer line extension were jetted and cleaned of all construction or other debris and that the last down gradient manhole in the new line has been blocked to stop any flow into the District's existing system until such time as the new lines have been verified as clean from all debris and other refuse by the District.
 - d. Upon request of the developer or contractor, the Buena Vista Sanitation District will provide jetting services at a rate of one hundred fifty (150.00) dollars per hour with an hour minimum charge, as long as the rental of the unit does not unreasonably interfere with the duties of the District and as long as the unit is operated by the District personnel.
2. Upon receipt of the information provided for in subparagraph O.2. above, the District shall request that its engineer review and approve the "as-constructed" plans, shall request that its maintenance supervisor inspect the line and verify the accuracy of the representations made and shall request that the District verify compliance with all terms of the Connection Agreement or other such agreement as may have been approved by the District as a condition to preliminary acceptance of the sewer line extension.
3. When all requirements referred to above have been satisfied and all provisions of the Connection Agreement have been performed by the developer or owner, as the case may be, the District, subject to the terms of the Connection Agreement, being in most cases no sooner than one year from the developer's preliminary acceptance of the sewer line extension, shall assume responsibility for maintenance and operation of the sewer line extension.

V. TRENCHING, BACKFILLING AND COMPACTING

A. GENERAL PROVISIONS

1. Unless otherwise indicated on the drawings, all excavations shall be made by open cut. Provisions for installation of sanitary sewer pipeline and appurtenances in other than open cut conditions shall be specifically detailed in the drawings and contract documents for the project.
2. The contractor and/or developer shall be responsible for obtaining all permits necessary to accomplish the work. This includes all permits by any local general purpose governing agency relative

to excavation and construction within public rights-of-way, permits required by state highway agencies, permits required by railroad and other utility agencies and permits required by the State of Colorado, Water Quality Control Division including necessary site approvals.

3. All work to be accomplished shall be done under the review and inspection of the Buena Vista Sanitation District representatives. Notification to the District shall be made by the contractor and/or developer indicating proposed schedules and times of work. Work accomplished without prior notification and review of the District's representatives may not be acceptable to the District. It shall be the responsibility of the owner/developer to adequately demonstrate to the Buena Vista Sanitation District that all facilities have been constructed in accordance with the rules and regulations of the District. Any cost relative to testing and/or inspection of such facilities which are requested to be accepted by the District but were not inspected by District representatives at the time of construction shall be borne by the owner/developer.
4. The owner and/or developer shall comply with all applicable regulations of the State, County and municipality including all ordinances concerning subdivision development and excavation requirements. All rules and regulations of the District shall be applicable to all construction and operation of sanitary sewer facilities within the boundaries of the Buena Vista Sanitation District and those which are proposed for acceptance by annexation to the District. These rules and regulations shall be supplemented by all rules and regulation of the State of Colorado, Water Quality Division, in so far as they do not conflict with these rules and regulations. Any conflict with these rules shall be governed by an interpretation and ruling by the Board of Directors whose decision shall be final.

B. JOB CONDITIONS

1. Protection of existing facilities
 - a. Surface improvements
Protect from damage or restore to their original condition all surface improvements encountered during trenching or construction. Said improvements shall include but not be limited to the following: surfacing, sidewalks, curbs, valley gutters, trees and shrubs, other surface vegetation, driveways, mailboxes, utilities, signs or other improvements.
 - b. Underground utilities and obstructions
 - 1) Protect from damage any underground pipes, utilities or structures encountered during construction. Restore any damaged underground obstruction to their original condition at no cost to the District unless evidence of other arrangements satisfactory to all parties is presented to the District.
 - 2) Before commencing work, obtain information concerning location, type and extent of concealed existing utilities on the site and adjacent properties. Consult records and personnel of local utility companies, municipal utility department and telephone company. File Notice of Excavation with these agencies prior to commencing work.
 - 3) Underground obstructions known to exist, except service lines, are to be shown on the drawings or otherwise referred to in the specifications. The locations shown may prove to be inaccurate and other obstructions not shown may be encountered. In any case, it shall be the responsibility of the Contractor to protect or restore all underground obstructions encountered.
2. Sheeting, shoring and bracing
Except where trench banks are cut back on a stable slope, provide and maintain all sheeting necessary to protect adjoining grades and structures from caving, sliding, erosion or other damage, and suitable forms of protection against bodily injury, all in accordance with applicable codes and governing authorities. Do not remove any sheeting unless the pipe strength is sufficient to support the trench loads based on trench width measured to the back of sheeting. Remove sheeting and shoring as excavations are backfilled in a manner to protect the construction or other structures, utilities or property. Do not remove any sheeting after back filling.

3. **Blasting**
Should the use of explosives be necessary, exercise all possible precautions in the use, storage or transport of the same. Employ only competent, experienced personnel. Comply will all local and state requirements.
4. **Drainage**
Maintain the excavations and site free from water throughout the work. Remove any water encountered in the trench to the extent necessary to provide firm subgrade, to permit joints to be made dry at the final grade and to prevent entrance of water into the pipeline. Accomplish the foregoing by the use of sumps and gravel blankets, well points, drain lines or other means approved by the District.
5. **Interruption of service**
 - a. Coordinate interruptions of utility services with the utility owner. Make connections to the existing system requiring the interruption of service during the time designated by the utility owner.
 - b. Obtain permission to cut and replace existing service lines to facilitate trenching. Notify affected users two hours in advance of, and restore service within four hours after any interruption. Repair all lines at no cost to the District unless otherwise provided for.
6. **Detours and other traffic controls**
 - a. When construction operations are located within streets make provisions at cross streets and walks for free passage of vehicles and pedestrians by bridging or other approved methods. Do not block streets or walks without prior approval. Maintenance of access through the construction site by the traveling public shall be maintained by the contractor unless a street closure is approved in writing by the local governing authority. Access to all abutting residences and properties shall be maintained to the maximum extent possible. It shall be the responsibility of the contractor and/or developer to coordinated access to all adjacent private properties with the respective owners.
 - b. The contractor shall furnish sufficient signs and other controls including flagmen to facilitate the directing of traffic. Controls shall be in accordance with the "Manual on Uniform Traffic Control Devices", latest edition; and the provisions of all local governing authorities including the Town of Buena Vista, State of Colorado and Chaffee County.
7. **Sequencing**
Pipeline installation shall follow trench excavation within one hundred (100) lineal feet. Trench backfill shall follow pipe installation within one hundred (100) lineal feet. Approved cleanup shall follow trench excavation within four hundred (400) lineal feet.

C. GUARANTEE

1. The contractor and/or developer shall guarantee all materials and workmanship for a period of one (1) year from the date of initial acceptance by the District. Initial acceptance shall be made by the District's Board of Directors by official written action documented in the proceeding of the District.
2. The guarantee shall include the maintenance of acceptable trench backfill for a period of one (1) year from initial acceptance. Acceptable trench backfill shall include maintenance of an acceptable surface configuration matching surrounding grade or conforming to the finished street cross section. Removal and replacement of finished street surfacing due to excessive settlement shall be the responsibility of the contractor and/or developer within the one (1) year warranty period.

D. PRODUCTS

1. **Embedment materials**

- a. Concrete: The pipeline embedment with concrete shall utilize concrete having a twenty-eight (28) day compressive strength of a minimum of three thousand (3000) psi as specified in Section III.F, Cast-in-place concrete.
 - b. Granular material: Well graded crushed stone or gravel meeting the requirements of ASTM C33, gradation 67 (3/4" to No. 4).
 - c. Fine granular material: Natural or manufactured sand meeting the requirements of ASTM C33, gradation for fine aggregate (3/8" to No. 100).
2. Backfill materials
- a. Suitable material
Soil obtained from the excavation that is free of frozen material, stumps, roots, brush, other organic matter, debris and other items. In addition, suitable material shall meet the following requirements:
 - 1) Upper portion of trench
Material placed within one foot of pavement subgrade or finished surface in unimproved areas shall be soil, free from rocks greater than six (6) inches in nominal diameter.
 - 2) Other portions of trench
Material within six (6) inches below and eighteen (18) inches above the pipe shall contain particles of a size to conform to the embedment class required but in no case shall it contain rocks greater than one and one-half (1-1/2) inches in any dimension. From a point eighteen (18) inches above the pipeline to within one (1) foot of the pavement subgrade or finished surface in unimproved areas, maximum size of any rock in the trench backfill shall be eighteen (18) inches nominal diameter.
 - b. Public highways
Provide and install material in conformance with the Colorado Department of Highways requirements where they do not conflict with other provisions of these regulations. Should a conflict exist, submit a request for clarification to the District in writing prior to proceeding with work.

E. PREPARATION OF TRENCHING

- 1. Construction staking
 - a. All work shall be constructed in accordance with lines and grades shown on the drawings and as established by the Engineer-of-record and/or District. These lines and grades may be modified by the Engineer-of-record only after reapproval by the District.
 - b. Line and grade stakes shall be set for each manhole or other appurtenances and at each twenty-five (25) foot station along the pipeline. When laser beam equipment is being utilized for alignment of the pipeline, construction stakes shall be set at each manhole and twenty-five (25) feet, fifty (50) feet, seventy-five (75) feet and each one hundred (100) feet thereafter proceeding upstream from the manhole. The contractor shall check the elevation at each grade stake and at intervals between stakes from a stringline placed between the grade stakes. Should a variance from the design elevation be found, the pipeline shall be removed to a point where vertical and horizontal alignment is satisfactory and reconstructed in accordance with these specifications.
 - c. All facilities, equipment and assistance shall be furnished by the contractor and/or developer to facilitate checking alignment and grade of the pipe by the District's representative and workmen involved in the construction.
- 2. Pavement removal

- a. Before trenching begins, remove any pavement, curbs, gutter, sidewalks and other surface improvements necessary to install the pipeline and appurtenances.
 - b. Remove bituminous pavement to clean, straight lines at locations necessary to accommodate the work. Width of removal for pipelines shall be kept to a minimum as dictated by trenching operations but shall extend six (6) to twelve (12) inches beyond limits of trench excavation. Make pavement cuts with spade-bitted air hammer, saw or other approved method so as to provide a straight and square edge. Should a cut edge become damaged during the course of construction, the edge will be re-cut prior to placement of surface material.
 - c. Remove concrete surfacing materials to neatly sawed edges with saw cuts made to a minimum depth of one and one-half (1-1/2) inches or as otherwise required to neatly remove surfacing materials. Make saw cuts in straight lines and at right angles to the alignment of sidewalks or curb and gutter. If the saw cut should fall within thirty (30) inches of an existing construction joint, expansion joint or edge, the concrete shall be removed to the joint or edge.
3. Clearing: Remove all stumps, roots, brush, other vegetation and debris from areas that will be disturbed by the construction operations.
 4. Sod removal: In lawn areas, cut and roll back sod before trenching. Store sod for reinstallation after completion of back filling operations.
 5. Topsoil: Strip existing topsoil from areas to be disturbed by construction operations. Stockpile in areas designated by the Engineer-of-record. Keep topsoil segregated from non-organic trench excavation materials and debris.

F. EXCAVATION - OPEN CUT

1. Limitation of disturbed areas
The area disturbed by construction activities shall be confined within the construction limits as shown on the plans. The length of trench to be opened at any one time shall be limited in accordance with the requirements of Section V.B.7 of these specifications.
2. Drainage and protection
 - a. The sides of the trench shall be sloped or braced and the trench drained so that workmen can work safely and efficiently. All work must be done in a dry trench and no water will be permitted to discharge down the pipe previously laid. The discharge from pumping shall be laid to an approved natural drainage channel or other location to prevent drainage into sanitary sewer facilities and damage to public or private property.
 - b. Pile material suitable for back filling in an orderly manner a sufficient distance from banks of the trench to avoid overloading and prevent slides or cave ins.
 - c. Remove and waste excavated materials not suitable or not required for back filling from the site.
3. Excavation to grade
Accurately grade trench bottoms to provide uniform bearing and support for each section of pipe on undisturbed soil at every point along its entire length. Provide a smooth, uniform surface in the pipe subgrade where bedding material will be placed. If the subgrade material is over-excavated more than two (2) inches, backfill shall be accomplished with compacted granular material in accordance with the bedding requirements.
4. Limiting trench width
Excavate trenches to provide adequate working space and pipe clearance for proper pipe installation,

jointing and embedment. Provide a minimum clearance of six (6) inches on each side of pipe for a pipe twelve (12) inches in diameter or less, eight (8) inches for pipe between fourteen (14) and thirty (30) inches in diameter. The maximum allowable width of trench at one (1) foot above the top of the pipe shall not be greater than the outside diameter of the pipe plus twenty-four (24) inches for all sizes.

5. **Bell holes**
Dig bell holes and depressions for joints after the trench bottom has been brought to final grade. Bell holes and depressions shall be only of such length, depth and width as required for properly making the particular type of joint. The use of earth mounds for bedding the pipe and adjusting for grade shall not be allowed.
6. **Preparation of pipe bearing areas**
Shape the pipe subgrade or bedding material to provide a continuous uniform bearing support at all points along its length except at required bell holes.
7. **Pipe clearance in rock**
Where rock excavation is necessary, over-excavate the trench bottom a minimum of six (6) inches below the bottom of the pipe twenty-four (24) inches in diameter or less, and nine (9) inches for pipe larger than twenty-four (24) inches. Back fill over-depths with granular material specified.
8. **Unstable pipe subgrade**
Whenever wet or otherwise unstable material that is incapable of supporting pipe is encountered in the bottom of the trench, over excavate such material to a depth suitable for construction of a stable pipe bedding. Backfill trench to proper grade with compacted granular material.

G. PIPE EMBEDMENT

1. **Placement of embedment material**
Embedment material shall be placed in the trench on prepared subgrade in accordance with requirements of these specifications. The embedment material shall be brought to a density beneath the proposed pipeline as required herein. The embedment material shall be shaped to conform to a cylindrical surface with a radius equal to the radius of the outside pipe with a width sufficient to allow sixty (60) percent of the width of the pipe barrel to be uniformly supported by the bedding. Bedding material shall be placed in two (2) lifts, each being compacted to the densities specified herein to a depth of one and one-half (1-1/2) feet above the top of the pipe.
2. **Embedment classes (Detail drawings available upon request.)**
 - a. **Class A - Concrete cradle or arch**
 - 1) **Concrete cradle**
The pipe shall be bedded in a monolithic cradle or plain or reinforced concrete as specified on drawings, having a minimum thickness of one-fourth (1/4) the inside pipe diameter or a minimum of four (4) inches under the barrel and extending up the sides for a height equal to one-fourth (1/4) the outside diameter. The cradle shall have a width at least equal to the outside diameter of the pipe barrel plus eight (8) inches. Backfill above the cradle and extending to twelve (12) inches above the crown of the pipe shall be compacted carefully.
 - 2) **Concrete arch**
The pipe shall be embedded in carefully compacted granular material having a minimum thickness of one-fourth (1/4) the outside diameter between barrel and bottom of trench excavation and extending halfway up the sides of the pipe. The top half of the pipe shall be covered with reinforced concrete arch having a minimum thickness of one-fourth (1/4) the inside diameter at the crown and having a minimum width equal to the outside pipe diameter plus eight (8) inches.
 - b. **Class B - First class bedding**

- 1) Refer to description of embedment placement above, Section G.1.
- 2) Class C and Class D embedment classes will not be acceptable for sanitary sewer construction in the Buena Vista Sanitation District.

H. TRENCH BACKFILLING AND COMPACTING

1. Place backfilled material above embedment materials in a manner to prevent damage to or misalignment of the pipeline. Place in lifts of a thickness necessary to acquire the specified backfill density or in conformance with other regulatory requirements. Backfilled material shall conform to the requirements of Section V.D.2. of these regulations.
2. Backfill density requirements
 - a. Unless otherwise specified or required by local governing authority, all backfill should be placed in a manner to achieve the density specified below:
 - 1) State highway:
 - a) 100% of maximum in paved and shoulder areas
 - b) 95% of maximum in all other areas
 - b. Paved roadways, sidewalks and other areas to receive pavement:
 - a) Top twelve (12) inches to 95% of maximum density
 - b) Remainder of trench to 90% of maximum density
 - c. Gravel roadways: 90% of maximum density for entire trench length
 - d. Sod or lawn areas: 90% of maximum density
 3. Method of compaction

In general, backfill shall be mechanically compacted by means of trollers, sheep foot rollers, pneumatic tire rollers, vibrating rollers or other mechanical tampers. Compaction by jetting shall not be permitted unless material is of suitable granular material as determined by the District. In no case will compaction by jetting be permitted in state highways or paved or gravel roadways.

I. FIELD QUALITY CONTROL

1. Density testing and control

Density testing as may be required by the District's representatives shall be the responsibility of the contractor and/or developer. Results of such density testing shall be reported directly to the District by the testing agency. All reports shall be submitted with the seal and signature of a registered professional engineer experienced in testing of soil materials.
2. Soil compaction tests
 - a. Conduct in accordance with the requirements of ASTM C698-70 or AASHTO T99, "Standard Method of Test for Moisture Density Relations of Soils Using a 5.5 lb. Rammer and a Twelve (12) Inch Drop."
 - b. Use Method A, B, C or D as appropriate on soil condition and judgment of the testing laboratory. Samples tested shall be representative of materials to be placed (or altered). Obtain optimum moisture density curve for each type of material or combination of materials encountered or utilized. Use test results as a basis for compaction control. Testing includes Atterberg Limits,

grain size determination, and specific gravity.

c. Density control

Conduct tests for density control during compaction operations in accordance with the requirement of the following:

- 1) ASTM D2922-71-Tests for Density of Soil and Soil- Aggregate In-Place by Nuclear Methods.
- 2) ASTM D1556-71-Tests for Density of Soil and Soil-Aggregate In-Place by Sand Cone Method or
- 3) ASTM D2167-66(1972)-Test for Density of Soil In-Place by the Rubber-Balloon Method.

3. Test Frequency

The District representative shall determine the location of all density testing to be accomplished. As a minimum, three (3) tests for every one thousand (1000) lineal feet of trench shall be performed. The contractor and/or developer shall excavate backfilled material to the depths directed by the District representative to accommodate the testing and backfill test holes in accordance with these regulations.

J. SURFACE RESTORATION

1. Fine grade: All areas disturbed by the construction operations after completion of back filling and compacting. Areas which are to receive pavements, surfacing, topsoil or landscaping shall be graded as required to allow installation of the specific surface treatment. Grade all other areas to match the existing ground line.
2. Replace suitable topsoil to the depth of stripping over all areas disturbed by the construction that do not receive other surface treatment. Do not compact topsoil during stripping, stockpiling or placing.

K. SURFACE IMPROVEMENT REPAIR AND RESTORATION

Replace and repair any surface improvements damaged or removed. Meet the requirements specified for the particular type of improvement to be repaired or replaced. All surface improvements shall meet the requirements of the local governing agency and/or the requirements shown on the contract drawings as approved by the District.

VI. PIPE AND MANHOLE MATERIALS

A. PVC PIPE AND FITTINGS (POLYVINYL CHLORIDE)

1. ASTM D3034 PVC non-pressure pipe
 - a. Standard Dimension Ratio (SDR) shall be maximum of thirty-five (35).
 - b. Fittings: Conform to ASTM D3034.
 - c. Joints and jointing:
 - 1) ASTM D3212; bell and spigot, push-on with single rubber gasket.
 - 2) Gaskets: ASTM F477.
 - 3) Jointing of dissimilar pipe materials shall be accomplished with a specially manufactured rubber connection with stainless steel tightening bands (Mission Rubber Company, Fernco or equivalent).

- d. Length of Joints: The length of joints for flexible conduits shall not exceed thirteen (13) feet for pipe slopes less than one percent.
2. ASTM D1785 Iron Pipe Size (IPS) PVC pipe
 - a. Conformance: ASTM D1785, Schedule 40 or 80 as required by these specifications:
 - b. Joints and jointing
 - 1) ASTM D3212, bell and spigot, push-on with single rubber gasket.
 - 2) ASTM D2672, solvent cement bell joints.
 - a) ASTM D2564, solvent cements.
 3. Pressure rated PVC ductile iron (DI) outside diameter (OD) base pipe
 - a. Conformance with AWWA C900.
 - b. Dimension Ratio (DR) 14 or 18 as required by these specifications.
 - c. Joints and jointing
 - 1) ASTM D3139 integral bell gasketed joint.
 - 2) Gaskets: ASTM F477.
 4. Pressure rated PVC iron pipe size (IPS) outside diameter (OD) base pipe
 - a. Conformance with ASTM D2241.
 - b. Standard Dimension Ratio (SDR) 21 as required by these specifications.
 - c. Joints and jointing
 - 1) ASTM D3139 integral bell gasketed joint.
 - 2) Gaskets: ASTM F477.
 5. Criteria for Acceptance of PVC Pipe, Fittings and other Materials
Pipe which has any of the following visual defects will not be accepted:
 - a. Improperly formed pipe such that pipe intended to be straight has an ordinate, measured from the concave side of the pipe exceeding one sixteenth (1/16) inch per one (1) foot of length.
 - b. Pipe which is out of round to prohibit proper jointing.
 - c. Improperly formed bell and spigot ends or bells which are less than one and a half (1½) inches in length.
 - d. Pipe which is fractured, cracked, chipped or damaged in any manner.
 - e. Pipe that has been damaged during shipment or handling.
 - f. Pipe or fittings not properly marked as required by the specifications.
 6. Marking of Material
The following shall be clearly shown on the exterior of the pipe:

- a. Manufacturer's name.
 - b. Appropriate ASTM designation.
 - c. Appropriate SDR or DR value.
 - d. Homemark.
7. Material Handling and Storage
- a. Avoid damage to pipe from impact, bending, compression or abrasion during handling and storage.
 - b. Store pipe on flat surface which provides even support for the pipe barrel with bell end overhanging.
 - c. Do not stack pipe higher than five (5) feet.
 - d. Do not store pipe and fittings in direct sunlight for extended periods (greater than two to three weeks).
 - e. Any discoloration of the pipe material may be evidence of ultraviolet damage and shall be reason for rejection and the removal from the project.
 - f. Ship rubber gaskets in cartons and store in a clean area away from grease, oil, ozone producing electric motors, heat and the direct rays of the sun.
 - g. Use only nylon protected sling to handle pipe. The use of hooks, bare cables or chains will not be permitted.
 - h. PVC pipe shall not be installed at depths in excess of fourteen (14) feet without specific approval of the District.

B. DUCTILE IRON PIPE AND FITTINGS

- 1. Pipe
 - a. ANSI 21.51/AWWA C151.
 - b. ASTM A536, Grade 60-42-10.
 - c. Thickness Class 50
 - 1) Thickness Class 51 or greater may be required based on external loading.
 - 2) Pressure Class 350.
- 2. Fittings: ANSI 21.10 for flanged, mechanical joints and push on joints (AWWA C110 or C153).
- 3. Joints
 - a. Mechanical Joint: ANSI A21.11.
 - b. Push-On: ANSI A21.11.
 - c. Flanged: ANSI B16.1, 125 lb. drilling.

- d. Rubber Gaskets: AWWA C111 (ANSI A21.11).
- 4. Protective Coatings and Linings
 - a. Exterior Coating: Manufacturer's standard bituminous coating approximately 1 mil thick.
 - b. Interior Lining
 - 1) Calcium aluminate cement
 - a) Thickness: Single calcium aluminate lining.
 - b) Design Basis: Griffin-20, SewperCoat or equivalent.
 - 2) Ceramic Epoxy: Protecto 401
 - 3) Coat Tar Epoxy
- 5. Criteria for Acceptance
 - a. In addition to any deficiencies covered by the reference specifications above, any of the following visual defects will not be accepted.
 - 1) Improperly formed pipe such that pipe intended to be straight has an ordinate, measured from the concave side of the pipe exceeding 1/16 inch per foot of length.
 - 2) Pipe which is out of round to prohibit proper jointing.
 - 3) Pipe which is fractured, cracked, chipped or damaged in any manner.
 - 4) Pipe that has been damaged during shipment or handling.
 - 5) Pipe which has lining which is fractured, cracked, chipped or damaged in any manner and would not provide satisfactory service under the conditions intended.
- 6. Marking of Material & Certification of Manufacturer
 - a. All materials shall be marked with the name of the manufacturer of origin.
 - b. Manufacturer will provide a certification to the District that all products supplied to the project site are in conformance with these specifications.
- 7. Material Handling and Storage
 - a. Handle pipe fittings and accessories using lifting hoist or skidding to avoid shock or damage.
 - b. Do not drop such materials.
 - c. Do not allow pipe unloaded on skidways to be skidded or rolled into pipe previously unloaded.
 - d. Protect the pipe coatings and linings from damage during delivery and handling.

C. MANHOLES

- 1. Conformance: Precast concrete in conformance with ASTM C478.
- 2. Size of Manholes

- a. Four (4) foot inside diameter for sewer pipe eight (8) inches through fifteen (15) inches in diameter.
 - b. Five (5) feet inside diameter for sewer pipe eighteen (18) inches through thirty (30) inches in diameter.
3. Cement:
- a. All cement used in manhole construction shall be Type II or Type IILA.
 - b. All concrete shall have a 28-day compressive strength of at least 3,000 pounds per square inch (psi).
4. Precast concrete manhole segments may be joined with flexible plastic/rubber gaskets constructed of Ram Nek, Rubber Nek, Con-Seal or equivalent.
- a. Type: Preformed flexible plastic.
 - b. Conformance: Fed. Spec. SS-S-00210 (GSA-FSS).
 - c. Classification: Type 1-Rope Form.
 - d. Diameter: 1½" for 48" diameter manhole.

D. CAST-IN-PLACE CONCRETE

- 1. All cast in place concrete utilized in sanitary sewer construction shall have a minimum compressive strength of 3000 psi at 28 days unless specifically required otherwise by the project.
- 2. Aggregates: Conform to ASTM C33, maximum size shall be 3/4-inch nominal diameter.
- 3. Cement: Portland Cement in accordance with ASTM C150, Type II or IILA will be used for all concrete
- 4. Admixtures
 - a. Air entraining admixtures will be permitted in conformance to ASTM C260. Maximum entrained air shall be 6.5% and minimum shall be 5.0%.
 - b. Water reducing and retarding admixtures may be utilized with the specific approval of the District. Such admixtures shall be in conformance with ASTM C493.
 - c. Flyash or calcium chloride are not permitted for use.
- 5. Water/Cement Ratio: Maximum water cement ratio shall be 0.45.
- 6. Slump: Maintain within the following limits:
 - a. 1" minimum.
 - b. 3" maximum for all concrete to be incorporated in sanitary sewerage facilities.

E. CASTINGS

- 1. Cast Iron
 - a. Conformance: ASTM A48.

- b. Applicable Items: Manhole rings and covers with non-slip surface with "SEWER" cast in the cover. Combined weight will not be less than 310 pounds. Ring shall be a minimum of 4 inches in height and 22" minimum diameter clear opening.

F. STEPS

1. Material: Copolymer polypropylene plastic encapsulating a ½" grade 60 reinforcing rod.
2. Conformance: ASTM C478, paragraph 11.
3. Capacity
 - a. 1,000 pounds at 6" from wall.
 - b. 1,500 pounds at 4" from wall.
 - c. 1,500-pound pullout capacity.
4. Width: fourteen (14) inch nominal.
5. Construction: Furnish with non-skid grooves and safety nosings.

G. CEMENT MORTAR

1. Conformance: ASTM C270, Type M.

H. CEMENT GROUT

1. Cement: Portland Cement in accordance with ASTM C150, Type II or II LA.
2. Sand: Clean, well-graded, natural sand in accordance with ASTM C33.
3. Proportioning: One part Portland Cement, 2½ parts sand, by weight, with minimum water required for placement and hydration.

I. NON-SHRINK GROUT

1. Approved commercial factory mix product made especially for intended use.
2. Utilize non-metallic chemical grout for non-shrink applications.

J. DAMPPROOFING MATERIAL

1. Coal tar solution type coating; Tnemec "47-461 Foundation Coating," International "Intertuf 100," Carbolite "Bitumastic Super Service Black" or similar approved material.
2. External concrete joint wrap; elastomeric protective film wrap; Henry Company Sealants Division, "RUB'R-NEK External Concrete Joint Wrap" or similar approved material.

K. PIPE PENETRATION WORKSTOP

1. Pipe penetration waterstop is required for all material type gravity flow piping entering and exiting a cast-in-place manhole or manhole base, except for concrete pipe.
2. Bell gasket of same type as for pipe entering manhole such that when placed on the outside of the pipe a watertight seal will be formed when encased in concrete.

3. Kor-N-Seal boot as manufactured by Dukor, to be used only when a smooth circular knockout is cast in the concrete.
4. Equivalent products for pipe penetration waterstop will be considered for use by the District.

VII. PIPE INSTALLATION

A. **SUBGRADE PREPARATION**

See Section V of these regulations.

B. **PIPE LAYING**

1. Begin pipe laying at the lowest point, unless directed otherwise by the District and install the pipe with the spigot ends pointing in the direction of the flow.
2. Unless required or directed otherwise by the District, lay all pipe straight between changes in alignment and at uniform grade between changes in grade or slope.
3. As each length of pipe is placed in the trench, the joint shall be completed in accordance with the pipe manufacturer's recommendations and the pipe shall be brought to the correct line and grade. The offset at the invert shall be less than 1 (one) percent of the inside diameter of the pipe.
4. Secure the pipe in place with the specified bedding material tamped under and around the pipe. Do not walk on small diameter pipe or otherwise disturb any conduit after jointing has been completed.
5. All foreign matter or soil shall be removed from the inside of the pipe before it is lowered into its position in the trench and shall be kept clean at all times during and after laying. All openings along the line of the sewer shall be securely closed and during suspension of work at any time, suitable pipe plugs or closures shall be placed to prevent water, soil or other materials from entering the pipeline.

C. **FITTINGS, COUPLINGS, WYES AND SADDLES**

1. Fittings, couplings, wyes and saddles shall be the same material as the pipeline or as specifically manufactured for a particular installation.
2. Jointing of dissimilar materials shall be permitted only with approval of the District representative. Jointing of such dissimilar materials shall be through the use of fittings, couplings, wyes, saddles adapters or adhesives specifically manufactured for such transitions.

D. **SERVICE LINES**

1. Prepare subgrade in accordance with Section V of these regulations.
2. Connect all service lines to mains with a wye or saddle in the top one-half of the sewer main. Connections made in the lower half or at mid-point of the main shall have prior approval of the District and require the installation of a backflow prevention device.
3. Connection of service lines to mains shall only be accomplished with the use of an acceptable tapping machine or hole saw. Wye saddles will be permitted when holes are cut using the appropriate hole template and cuts are no larger than one-quarter (1/4) inch larger than the template outline.
4. Plug all service line stubs with water and air tight caps or plugs unless the service line will be immediately connected to a building sewer. Where new street construction is proposed immediately following construction of sanitary sewer facilities, extend the service line to two (2) feet inside the right of way line, install the appropriate plug and mark with a vertical wood marker extending a minimum of two (2) feet above the ground surface and having dimensions of 2" X 4" minimum.

5. The contractor and/or developer shall provide complete as-built information on each service line connection installed in the District's system. As a minimum this information shall include the location of the connection to the main referenced to the nearest manhole or other permanent improvement, the location of the end of the service line stub, the direction of the service line as it relates to surrounding permanent surface improvements, the size and the material of construction, the date installed and name of the installer. All such information shall be provided to the District's representative for incorporation into the District's permanent records.

E. MANHOLES

1. Where cast-in-place concrete bases are proposed for construction, prepare the subgrade and excavation in accordance with Section V of these regulations. Place the concrete against undisturbed soil to the depth, thickness and other dimensions shown on the detail drawings.
2. Provide segmental precast concrete barrel sections a maximum of four (4) feet in length with preformed flexible gasket material between each barrel section as jointing material.
3. Provide one, one (1) foot high barrel section beneath a reducing ring or cone cap to bring the manhole ring and cover to within eight (8) inches of desired grade.
4. Provide precast concrete two (2) inch high grade adjustment rings to bring the ring and cover to desired grade.
5. Where the pipeline passes through a manhole in straight alignment without changing directions, the sanitary sewer pipe may be laid through the manhole base and the top of the pipe cut out after a cast-in-place concrete base has been installed. The bottom of the manhole shall be smoothly shaped to conform to the pipe as shown on the detail drawings. Concrete floors in the manhole shall have a broom finish.
6. Where intersecting pipelines or pipelines requiring deflections at manholes require that the invert on the manhole be shaped to match the pipe cross sections, such construction shall be accomplished in accordance with the detail drawings provided upon request. Form the flowline configuration of intersecting pipes to allow for free uninterrupted flow of sanitary sewage through and out of the manhole. All channel inverts shall be finished smooth by steel troweling. All inverts shall be placed and finished with a single pour of cast-in-place concrete. Placement of grout and/or other material to repair and/or the manhole invert shall not be permitted unless specifically approved by the District's representative.
7. Cast-in-place bases for manholes shall be constructed in a manner to provide for a smooth, level surface on which vertical barrel sections shall be placed. Completely watertight joints shall be made utilizing preformed flexible gasket material or a precast concrete base section may be utilized.

VIII. TESTING OF PIPELINES AND APPURTENANCES

A. INFILTRATION

Use where ground water may be above the pipeline invert.

1. Infiltration tests shall be conducted on each segment of the sanitary sewer system where it could be anticipated that ground water may rise above the flow line of the pipeline. Tests shall be conducted by placing an approved calibrated V-notch weir in the line just above the next lower manhole and plugging the line just above the next higher manhole. Sufficient time will be allowed to permit the water level behind the weir to stabilize before reading. Successive readings shall be taken until consistent readings are obtained.
2. The maximum allowable infiltration shall be 100 (one hundred) gallons per day per inch of pipe diameter per mile of pipe.

3. Each segment of pipeline between manholes or other major appurtenances must satisfy and pass the infiltration tests.
4. Should it be determined that the infiltration rate is in excess of that permitted by these regulations, any repair and/or replacement of the pipelines, manholes or other appurtenances shall be at the contractor's and/or developer's expense. Satisfactory repair and replacement shall be accomplished prior to the consideration of acceptance of any facility by the District.
5. The contractor and/or developer will furnish all labor, equipment and materials required to accomplish such testing.

B. EXFILTRATION

Exfiltration testing will be required where existing ground water levels are below the invert of the pipeline to be tested.

1. Exfiltration shall be limited to 100 (one hundred) gallons per day per inch of diameter per mile of pipeline.
2. Each segment of pipeline between manholes must pass the exfiltration test.
3. Each test section between successive manholes shall be prepared by plugging the pipe just above each manhole. Fill the upper manhole and pipe with water to a point four (4) feet above the invert of the sewer at the center of the upper manhole. Observe the water level for a minimum period of two (2) hours. Allowable leakage shall be as specified above.
4. Where pipe grade does not allow filling of segment to specified depths, contractor shall accomplish air testing as specified.

C. AIR TEST

As an alternative to the exfiltration testing specified above, the contractor, at his option, and with the approval of the District, may conduct an air test on gravity sewers where the ground water table is below the elevation of the conduit at any point along the section to be tested.

1. The contractor may conduct an initial air test of the sewer main line after compaction of the backfill but prior to the installation of any service lines. Such tests shall be considered for the contractor's convenience in quality control of the project construction. Final consideration for acceptance of the sanitary sewer by the District shall be based on satisfactory completion of testing with all service line stubs installed.
2. Preparation for tests
Flush and clean the sewer line prior to testing in order to wet the pipe surfaces and produce more consistent results. Plug and brace all openings in the main sewer line and the upper end of any connections. Check all pipe plugs with a soap solution to detect any air leakage. If leaks are found release the air pressure, eliminate the leaks and start the test procedure over again.
3. Procedure of test
Add air until the internal pressure of the sewer line is raised to approximately 4.0 psi gage at which time the flow of air shall be reduced and the pressure maintained between 3.5 and 4.5 psi gage for a sufficient time to allow the air temperature to come to equilibrium with the temperature of the pipe.
4. After the temperature has stabilized the pressure shall be permitted to drop to 3.5 psi gage at which time a stop watch or a sweep second hand watch shall be used to determine the time lapse required for the air pressure to drop to 2.5 psi gage.
5. If the time lapse is less than that shown in the following table, the contractor shall make the necessary corrections to reduce the leakage to acceptable limits.

Table 4

AIR TEST TABLE
MINIMUM HOLDING TIME IN SECONDS REQUIRED
FOR PRESSURE TO DROP FROM 3.5 TO 2.5 PSIG

Main Diameter	Length of Main								
	50'	100'	150'	200'	250'	300'	350'	400'	500'+
8"	35	70	106	141	176	211	227		227
10"	55	110	165	220	275	283			283
12"	79	158	238	317	340				340
15"	124	248	371	425					425
18"	178	356	510						510

6. Where service lines are connected to the main line refer to additional tables published by the National Clay Pipe Institute and comply with provisions thereof.
7. **Safety**
 The air test may be dangerous if proper precautions are not taken. All plugs must be sufficiently braced to prevent blowouts and the pipeline must be completely vented before attempting to remove the plugs. As a safety precaution, pressurizing equipment shall be provided with a regular set of 5 psi to avoid over pressurizing and damaging an otherwise acceptable line.

D. ALIGNMENT TESTING

1. Each section of pipeline between manholes will be subject to testing by lamping by the District's representatives to determine where proper alignment has been accomplished and whether any displacement of the pipe has occurred during construction. The contractor and/or developer shall provide suitable assistance to the District's representative in accomplishing this work. The contractor and/or developer shall be responsible for repairing any alignment, displaced pipe or other defects discovered during this testing in accordance with these specifications.
2. For pipelines installed at grades less than one (1) percent a minimum of ninety (90) percent of the full pipe cross section shall be visible at the opposite end of the segment being observed.
3. For pipeline installed at grades greater than one (1) percent a minimum of seventy-five (75) percent of the full pipe cross section at the opposite end of the segment shall be observed.
4. The determination of the acceptability of the pipeline alignment by lamping shall rest solely with the District's representative and his decision shall be final.
5. Pipelines not meeting the requirements of alignment test shall be completely excavated, removed and re-laid on prepared bedding material, backfilled and compacted in accordance with these regulations and then retested for infiltration, exfiltration and alignment tests performed.

E. DEFLECTION TESTS

1. Proper construction in accordance with these specifications and the manufacturer's recommendations should result in a vertical deflection of the pipe less than five (5) percent of the internal diameter. At the option of the District, the contractor and/or developer may be required to perform testing to determine conformance with this requirement.
2. Should the District determine that deflection testing is required, the contractor and/or developer shall provide all necessary equipment, labor and other facilities to accomplish this testing. A mandrel certified by the pipe manufacturer's representative for dimensional quality shall be utilized.
3. Should the vertical deflection of the pipe be found to exceed five (5) percent of the internal

diameter, the contractor will remove the pipe, install proper bedding, replace the pipeline material and properly place and compact all backfill material in accordance with these specifications. Any areas removed and replaced shall be subject to infiltration, exfiltration and alignment testing.