SECTION 500
SANITARY SEWER SYSTEMS

SECTION 500
SANITARY SEWER FACILITIES

501.00 GENERAL CONDITIONS

Refer to Section 100 TITLE, SCOPE AND GENERAL CONDITIONS of these CONSTRUCTION STANDARDS & SPECIFICATIONS for additional requirements that apply to all projects within Elbert County.

510.00 DESIGN CRITERIA

511.00 General

All extensions of and/or additions to Elbert County sewer systems or Metro District sewer systems within Elbert County shall comply with the requirements of these CONSTRUCTION STANDARDS & SPECIFICATIONS for sewer main and service line construction.

512.00 Design Flow

The design flow shall include the entire area tributary to the outfall point. The following wastewater flow rates, which include infiltration, shall be used:

User Type	Unit Wastewater Flow Rate
Residential	90 gallons/capita/day
Industrial	1,500 gallons/acre/day
Commercial	1,000 gallons/acre/day
Park/Recreation	50 gallons/acre/day
Elementary Schools	13 gallons/student/day
Jr. & Sr. High Schools	20 gallons/student/day

Maximum residential population density, household density and land usage shall be as noted on an approved PUD and/or Plat, or as determined by the Elbert County Director of Planning.

Wastewater flow peaking factors shall be computed using the following equation:

$$PF = 3.8/ (ADF)0.17$$

Where ADF = annual average daily flow in MGD

The peaking factor shall not be less than two and one-half (2.5) or greater than five (5.0).

513.00 Hydraulic Design

Sewers ten (10) inches in diameter and smaller shall carry the peak design flow at a maximum flow depth of eighty (80) percent of the pipe diameter. Sewer mains twelve (12) inches in diameter and larger may be designed to flow full at the peak design flow rate.

The minimum velocity at the peak design flow rate shall be two (2) feet per second. Where actual flow shall be considerably below the design flow for several years, the Road & Bridge Superintendent / Elbert County Engineer may require that the minimum velocity be attained by suitable grades at the partial peak design flow rate. Maximum allowable velocity shall not exceed ten (10) feet per second at eighty (80) percent flow depth in the pipe.

Care shall be taken to design invert elevations at manholes in such a manner that the energy gradient is consistently falling in the direction of flow. In addition, when the velocity of an upstream sewer entering a manhole at peak flow is above critical velocity, the hydraulic gradient shall be computed to insure that a surcharge shall not occur at a service connection, and that the energy gradient shall remain level across the manhole.

514.0 Design Details

514.1 Sewer Mains

Sanitary sewer mains shall be eight (8) inch diameter or larger. Service connections shall be four (4) inch diameter or larger. Six (6) inch diameter sewer mains may be installed under special conditions where no more than four (4) residential connections are to be made, if approved by the Road & Bridge Superintendent / Elbert County Engineer. The following minimum grades (based on a Manning's formula n = 0.015) shall apply:

Sewer Diameter (Inch)	Minimum Grade (Percent)
4	2.0 or 1/4 inch/foot
6	1.0 or 1/8 inch/foot
8	0.40
10	0.28
12	0.22
15	0.15
18	0.12
21 or larger	As approved by the Road & Bridge Superintendent/Elbert

When approved by the Road & Bridge Superintendent / Elbert County Engineer for specific areas, a Manning's n = 0.011 may be used and the above grades adjusted accordingly to maintain a minimum velocity of two (2) feet per second.

Sewer mains shall ordinarily have a minimum of eight (8) feet of cover to finished ground surface. Sewer lines shall be designed to ensure a two (2) percent minimum slope from one (1) foot below the bottom of the lowest foundation to the sewer service connection. Where pipe has less than (4) feet of cover, provisions shall be made to protect the pipe from impact and loading.

Sewer mains shall be extended at least ten (10) feet uphill from the lowest lot corner of the uppermost lot to be served adjacent to the sewer main. Sewer mains shall terminate in a manhole. Service connections shall not be made at manholes, unless otherwise approved by the Road & Bridge Superintendent / Elbert County Engineer. All stub-outs for future extension of the sanitary sewer shall be terminated in a pre-cast manhole base.

514.2 Manholes

Manholes shall be a minimum of forty-eight (48) inches diameter, and shall be provided at every change in direction, grade and connection to other sewer mains. The maximum spacing shall be four hundred (400) feet for lines fifteen (15) inches diameter or smaller and five hundred (500) feet for lines eighteen (18) inches diameter or larger. Where two (2) or more pipes enter a manhole, the Road & Bridge Superintendent / Elbert County Engineer shall approve the manhole design size. Sewer lines shall not be deflected between manholes, in line or grade.

Manholes shall be forty-eight (48) inches diameter for lines eight (8) inches to fifteen (15) inches in diameter, sixty (60) inches for lines eighteen (18) inches to twenty-one (21) inches in diameter, and seventy-two (72) inches for lines twenty-four (24) inches to thirty (30) inches in diameter. Special designed vaults are required for pipes greater than thirty inches (> 30") in diameter.

Where pipe slope is less than five (5) percent, the manhole flow channel shall have at least two-tenths (0.2) of a foot elevation drop from the entering pipe invert to the exiting pipe invert. Where pipe slope is greater than five (5) percent, the manhole flow channel shall match pipe slope. Where the difference in entering and exiting invert elevations is less than two (2) feet, the channel shall be sloped uniformly between the pipe inverts. Where there is greater than two (2) feet of difference between entering and exiting pipe invert elevations, a drop manhole shall be considered.

Drop Manholes. When design and function dictate a drop manhole, written permission shall be obtained from the Road & Bridge Superintendent / Elbert County Engineer. The design and proposed materials shall be approved by the

Road & Bridge Superintendent / Elbert County Engineer. **ELBERT COUNTY PREFERS THE USE OF AN OUTSIDE DROP.**

Inside Drop Manhole Bowl Systems. An inside drop manhole may be allowed in special circumstances. When the entering pipe diameter is less than fifteen (15) inches and moderate flows exist, an inside drop type system may be provided with a forceline hood, and the manhole shall be a minimum of sixty (60) inches in diameter. When the entering pipe diameter is greater than fifteen (15) inches and moderate flows exist, or where odor and corrosion control are a concern, an inside drop vortex flow type system may be provided, and the manhole shall be sized accordingly. The use of an inside drop vortex flow type system requires written permission from the Road & Bridge Superintendent / Elbert County Engineer. The design, including proposed materials, shall comply with manufacturer's specifications and must be approved by the Road & Bridge Superintendent / Elbert County Engineer.

The inside drop bowl system shall consist of a plastic composite collection device that facilitates the controlled drop of wastewater into the main stream flow of a sanitary sewer manhole. The bowl shall permit easy inspection and cleaning without the need to enter the structure. Stainless steel straps shall fully support the drop pipe. Drop ends shall be used to create a high quality transition from drop pipe to the flow channel. The bowl shall be marine grade fiberglass. The clamping pipe supports shall be 304 stainless steel with 18-8 stainless nuts and bolts. Bowl size shall be determined by entering pipe size and flow rates. Bowl shall be installed in accordance with manufacturer's instructions.

514.3 Service Connections

Wye or tee fittings shall be provided on the sewer main for service connections at each lot or building site shown on the plans. Fittings shall be angled upward so that the upper invert of one-eighth (1/8) bend connected to the fitting shall have an elevation equal to or higher than the inside crown of the sewer main. 6-inch clean-outs shall be installed at 75-foot intervals on all sanitary sewer services. Refer to Section 543.04 Service Stub-ins to Property Line of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

515.00 Location Details

Manholes shall be located a minimum of three (3) feet from the edge of gutter pans. Sanitary sewer mains installed in local or collector streets shall be located twelve (12) feet west or south of the centerline of the streets. Service connections shall not be permitted to cross an arterial street.

Where sewer mains are installed in easements, they shall ordinarily be located in the center of the easement, provided that manholes can be located to provide reasonable access for maintenance crews.

516.00 Relation to Waterlines

Sewer lines shall be located a minimum of ten (10) feet horizontally from existing or proposed waterlines (clear separation). Where sewer lines cross waterlines, the sewer line shall have a minimum of eighteen (18) inches clear separation below the waterline. If this clearance is not feasible, the crossing shall be designed and constructed so as to protect the waterline.

When minimum clearance is not feasible, minimum protection shall consist of the installation of an impervious and structural sewer. Sewer pipe shall be encased in reinforced concrete. The encasement shall be at least six (6) inches thick around the entire pipe. Extend concrete encasement a minimum distance of ten (10) feet on either side of the waterline and to a sewer pipe joint. Ensure that encasement concrete does not prevent deflection at the pipe joint. In all cases, suitable backfill or other structural protection shall be provided to preclude settling and/or failure of the higher pipe. When minimum clearance is not feasible, the sanitary sewer pipe may be installed in a steel casing in accordance with these CONSTRUCTION STANDARDS & SPECIFICATIONS if approved by the Road & Bridge Superintendent / Elbert County Engineer. The Road & Bridge Superintendent / Elbert County Engineer shall approve the crossing design.

517.0 Grease, Oil and Grit Interceptor Design and Installation

517.1 Grease Interceptors

Grease interceptors shall be required for all food preparation establishments which could contribute or cause to contribute—directly or indirectly—any water or wastewater which contains oil and grease, including but not limited to restaurants, cafeterias, cafes, and fast food establishments. Additionally, grease interceptors shall be required for all schools, fraternal organizations, churches, hospitals, and daycare centers which have the capability to engage in food preparation. The grease retaining capacity of each grease interceptor in pounds of grease shall be equal to twice the rate of flow capacity in gallons per minute of wastewater so that the interceptor shall remove and retain ninety (90) percent of the grease discharged into it up to its required capacity of accumulated grease.

Exceptions to the grease interceptor requirement shall be those facilities granted a written variance by the Industrial Pretreatment Program, following approval of the plan review process. Variances shall apply strictly to the named facility owner/operator located at the named facility address.

Each business establishment for which a grease interceptor is required shall have an interceptor that serves only that establishment. Design and construction of grease interceptors shall be in accordance with the Detail Drawings.

The design of oil and grease interceptors shall be constructed in accordance with the design approved by Elbert County and shall have a minimum of two (2) compartments with fittings designed for grease retention. The minimum size for any grease interceptor shall not be less than eight-hundred (800) gallons.

There shall be an adequate number of manholes to provide access for cleaning all areas of an interceptor, and a minimum of one (1) per ten (10) feet of interceptor vault length. Manhole covers shall be gastight in construction and shall have a minimum opening dimension of twenty-four (24) inches. In addition, an effluent sampling box shall be provided on all grease interceptors. In areas where traffic may exist, the interceptor shall be designed to have adequate reinforcement and cover.

Each grease interceptor shall be easily accessible for inspection, cleaning, and removal of intercepted grease. The use of ladders and removal of bulky equipment shall result in violation of accessibility. The interceptor vault shall be located as close to the source as practical; however, it shall be outside the facility served. In no case shall a grease interceptor be installed in any part of a building where food is handled.

The owner and lessee shall be jointly responsible for cleaning of the interceptor. It shall be maintained in efficient operating condition by regular removal of accumulated grease and solids.

The removal of grease and solids shall be performed before the capacity of the interceptor is exceeded. The owner and/or lessee shall conduct, on a monthly basis, an inspection on each interceptor. Records of these inspections shall be kept on site for a minimum of three (3) years.

Abandoned grease interceptors shall be pumped and filled as required for abandoned sewers and sewage disposal facilities.

Existing sources not connected to grease interceptors and which contribute significant amounts of oil and grease shall be identified through inspection of the wastewater collection systems by Elbert County. Once these sources are identified, they shall be required to implement Best Management Practices Plans (BMPP's) to keep oil and grease out of the wastewater collection system.

If the BMPP's are not successful at the facility and the facility continues to contribute significant amounts of oil and grease to the wastewater collection system, as documented by field inspections, then the facility shall be required to install an adequately sized grease interceptor as determined by the sizing criteria described below.

The sizing criteria for grease interceptors are as follows:

(Turn-Over Rate) x (Categorical Use Factor) x 2.5 (gallons of water) x (Seating Capacity)

The varying sizing applications are broken down into the following categories and formulas:

Category A - Restaurants/Cafeterias

Full or limited service with the capability to serve or prepare 100 meals per day.

Plumbing fixtures: one pot sink, one 2 or 3 compartment sink, one hand sink, one mop sink, one floor sink, one dishwasher, and one garbage disposal that is directed to the grease interceptor.

Equipment: one grill, one fryer, one to three ovens

FORMULA: 2.0 x 1.25 x 2.5 x Seating

For each additional garbage grinder and dishwasher that is to be directed to the Grease Interceptor there shall be a factor of 0.25 added to the Categorical Use Factor (C.U.F.) For each additional "Wok" stove, deep fryer and grill there shall be a factor of 0.50 added to the categorical factor.

Category B- Hospitals, Schools, Institutions and Care Facilities

FORMULA:

Hospitals/Schools
2.0 x .75 x 2.5 x bed usage or seating

Institutions/Care facilities
x 1.0 x 2.5 x seating or bed usage

These formulas shall be adjusted by the following when necessary:

A value of .25 shall be added to the Categorical Use Factor for each dishwasher or garbage disposal directed to the Grease Interceptor above the number of one each.

A value of .50 shall be added to the Categorical Use Factor for each additional deep fryer or grill above the number of one each.

Category C- Deli Stores and Super Markets with Meat Cutting Capabilities and/or Bakeries, Retail and Wholesale Bakery Facilities and Butcher Shops

FORMULA: (Hours of Operation) x 4.0 x 10

For each of the following conditions a factor of .50 is to be added to the Categorical Use Factor value of 4.0 when dealing with meat cutting:

A. More than one floor drain.
B. Complete cooking of meats.

When dealing with retail types bakeries or Super Markets that have bakery facilities in addition to a deli and/or meat cutting, the bakery shall be sized separately using the same formula as above with the deletion of the .50 adjustment and instead an addition of 1.5 shall be added to the Categorical Use Factor when dealing with bakeries that are wholesale only or are of the industrial classification.

Category D-Food Courts or "Common" Interceptors

Each case shall be sized by separating each of the potential contributors into its own category then combining the operations for a total interceptor size.

Category E- Commissaries, Commercial Kitchens and Caterers

Each facility must be sized on an individual, case by case basis. However, it should be noted that the minimum acceptable size for a commercial kitchen shall be fifteen-hundred (1,500) gallons.

Category F-Food Manufacturing Types

Each case is evaluated separately. Whenever a food manufacturing operation is evaluated, a control manhole shall be required in addition to the minimum of fifteen-hundred (1,500) gallons.

517.2 In-Floor and Under Sink Grease Traps – Requires Special Review

Users may receive approvals to install an in-floor or under-the-sink grease trap for small volume facilities, provided that: 1) the grease trap is no more than fifty (50) gallons in liquid/operating capacity; 2) proper methods are implemented (e.g. absorb liquids into solid form and dispose into trash, collect grease in container and recycle, or contract a grease hauler) and 3) detailed records of these activities are maintained and are available for review upon request.

The size of the trap depends upon the number of fixtures connected to it. The following table provides criteria for sizing grease traps:

Total number of fixtures connected	Required rate of flow, gpm	Grease retention capacity, lbs
1	20	40
2	25	50
3	35	70
4	50	100

517.3 Oil Separators and Sand/Grit Interceptors

At repair garages, car washing facilities with engine or undercarriage cleaning capability, and at factories where oily and flammable liquid waste are produced, all oil-bearing, grease-bearing, and flammable wastes shall be discharged to a separator before emptying in the building drainage system or other point of disposal.

Oil separators shall have a depth of not less than two (2) feet below the invert of the discharge drain. The outlet opening of the separator shall have not less than an eighteen (18) inch water seal.

Where automobiles are serviced, greased, repaired or washed or where gasoline is dispensed, oil separators shall have a minimum capacity of six (6) cubic feet for the first one-hundred (100) square feet of area to be drained, plus one (1) cubic foot for each additional one-hundred (100) square feet of area to be drained into the separator.

Parking garages in which servicing, repairing or washing is not conducted, and in which gasoline is not dispensed, shall still require a separator. Areas of commercial garages utilized only for storage of automobiles are required to be drained through a separator.

Sand/grit and similar interceptors for heavy solids shall be designed and located to provide ready access for cleaning, and shall have a water seal of not less than six (6) inches.

Commercial laundries shall be equipped with an interceptor with a wire basket or similar device, removable for cleaning, that prevents passage into the drainage system of solids one-half (½) inch or larger in size, string, rags, buttons, or other materials detrimental to the public sewage system.

Bottling plants shall discharge process wastes into an interceptor that shall provide for the separation of broken glass or other solids before discharging waste into the drainage system.

Slaughtering room and dressing room drains shall be equipped with approved separators. The separator shall prevent the discharge into the drainage system of feathers, entrails and other material that could cause clogging.

Separators shall be designed to not become air bound where tight covers are utilized. Each separator shall be vented where subject to loss of trap seal.

Access shall be provided to each separator for service and maintenance. Separators shall be maintained by periodic removal or accumulated grease, scum, oil, or other floating substances and solids deposited in the separator.

520.00 GENERAL PROVISIONS

521.00 General

All sanitary sewer main construction within the Elbert County system and all sanitary sewer service line construction connecting to Elbert County's sewer mains shall comply with these CONSTRUCTION STANDARDS & SPECIFICATIONS and the approved plans. These CONSTRUCTION STANDARDS & SPECIFICATIONS govern new sanitary sewer service line construction and repairs to existing facilities within Elbert County.

522.00 Permits Required

A Public/Private Improvements Permit (PPIP) shall not be issued until the Road & Bridge Superintendent / Elbert County Engineer has approved the sanitary sewer line plans.

523.00 Maintenance of Traffic

When street cuts are required for sanitary sewer facilities construction, maintenance of traffic shall comply with Section 141.12 Traffic Control, Barricades and Warning Signs of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

530.00 SANITARY SEWER MAIN CONSTRUCTION

531.0 Site Work and Earthwork

531.1 General

Site work and earthwork shall comply with Section 300.00 SOILS AND EARTHWORK of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

531.2 Trenching, Backfilling and Compacting

Except where otherwise approved in writing by the Road & Bridge Superintendent / Elbert County Engineer, all existing arterial and collector streets shall have pipe installed by pushing or boring. Directional boring may be approved at the discretion of the Road & Bridge Superintendent / Elbert County Engineer.

Trenching, backfill and compaction shall comply with Section 350.00 TRENCHING, BACKFILLING AND COMPACTING of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

531.3 Preservation of Monuments

Refer to Section 141.00 Protection of Public, Private and Utility Interests of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

532.0 Materials

532.1 Sewer Pipe

Unless otherwise approved by the Road & Bridge Superintendent / Elbert County Engineer, all sewer pipe and fittings shall be Polyvinyl Chloride (PVC) and shall comply with ASTM D3034 or F679 (SDR 35), or ASTM F794 and F949 for profile wall pipe. All pipe and fittings shall be subject to inspection by Elbert County. All joints shall be factory prepared compression type (elastomeric gasket joint), providing a watertight seal. **SOLVENT CEMENT JOINTS SHALL NOT BE USED**.

For pipe installation depths greater than twenty-five (25) feet, pipe material and bedding conditions shall be determined by engineer design calculations and submitted for approval by the Road & Bridge Superintendent / Elbert County Engineer.

532.2 Plugs

A gasketed plug, as recommended by the pipe manufacturer, shall be provided to seal the end of a wye connection or a dead-end stub. Plug locations shall be marked below ground with a wood 2x4 and above ground with a steel T-post with green flagging.

532.3 Manholes

All manholes shall be supplied with a Saint-Gobain REXUS or similar approved manhole cover and frame. Covers and frames shall be manufactured from ductile iron to comply with ISO 1083. Covers shall be hinged and shall incorporate a ninety (90) degree blocking system to prevent accidental closure. All covers shall be operable by one person with standard tools and shall be capable of

withstanding a test load of 120,000 lbs. Frames shall be circular and shall incorporate a seating gasket. The flange shall incorporate bedding slots and bolt holes.

Manhole bases may be constructed of cast-in-place concrete or pre-cast concrete. Pre-cast reinforced concrete risers (barrel sections) and tops shall comply with ASTM C478.
The top of the manhole vault shall be a minimum of twelve (12) inches and a maximum of eighteen (18) inches below the finished street or ground surface elevation. Concrete extension risers or collars shall be used to bring the manhole ring and cover up to finished street or ground surface elevation. Manholes five (5) feet deep or less shall be constructed as shallow manholes and shall be in accordance with the Detail Drawings. Cones shall be of the eccentric type.

Steps shall have a minimum tensile strength of 38,000 psi, minimum yield strength of 35,000 psi, and an elongation of not less than ten (10) percent in two (2) inches. Steps shall carry a load of one thousand (1,000) pounds when projected six (6) inches from the wall and fifteen hundred (1,500) pounds when projected four (4) inches from the wall without permanent deformation. Steps shall be one-half (1/2) inch diameter steel-reinforcing rods completely encapsulated in Copolymer Polypropylene as manufactured by M.A. Industries, Inc. or an approved equal. Steps shall be spaced in accordance with the Detail Drawings. The minimum distance from the finished ground (street) surface to the first step shall be twenty-four (24) inches, and the maximum shall be thirty (30) inches.

Mortar for manholes shall be mixed in the following proportions by volume: One (1) part Portland cement; one-half (1/2) part hydrated lime; and three (3) parts sand or masonry cement. The cement, lime, and sand shall be thoroughly mixed dry and only enough water added to form a mortar of proper consistency. Mortar shall be used within one (1) hour after mixing with no retempering permitted. Mortar that has taken a partial set is prohibited from use.

532.4 Manhole Bases and Base Beams

The minimum slab thickness shall be six (6) inches. The minimum reinforcement shall be #4 reinforcing steel at twelve (12) inches on center each direction or welded wire fabric, 4x4/W4xW4. The placing, fastening, splicing and supporting of reinforcing steel and wire mesh or bar mat reinforcement shall be in accordance with the approved plans, the Detail Drawings and the latest edition of "CRSI Recommended Practice for Placing Reinforcing Bars." Splicing of the welded wire fabric shall be by lapping one space and securing the wire mesh together. All wire fabric shall conform to the requirements of the "Wire Reinforcement Institute, Inc."

Manhole base beams shall be pre-cast, reinforced concrete. The beams shall be twelve (12) inches wide by nine (9) inches deep by eight (8) feet long.

532.5 Concrete

Concrete shall comply with Section 800.00 CONCRETE MIX DESIGN AND CONSTRUCTION of these CONSTRUCTION STANDARDS & SPECIFICATIONS. Type II Portland cement shall be used, unless otherwise recommended by the Geotechnical Engineer. Concrete encasement of sewer pipe shall comply with Section 516.00 Relation to Waterlines of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

532.6 Cast and Ductile Iron Fittings

All cast iron manhole rings and covers and other iron castings shall comply with ASTM A48. Fittings shall be in accordance with the Detail Drawings. Ductile iron rings and covers shall comply with ISO 1083. All metal bearing surfaces between the ring and cover shall be machined or fabricated to insure good seating. Manhole lids shall be provided with non-slip pattern in surface that lies flush with the elevation of the ring. Lids shall be furnished with the words "SANITARY SEWER" cast on top.

532.7 Bedding Materials

Bedding materials shall comply with Section 353.00 Bedding for Pipelines and Service Lines of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

532.8 In-Place Rehabilitation of Existing Pipelines

In-place rehabilitation of existing pipelines may be by sliplining, pipe bursting or heat activated resin lining in accordance with plans approved by a Colorado licensed Professional Engineer.

Sewer liner pipe and fittings shall be made of a polyethylene pipe compound that meets the requirements for Type III, Grade P34 polyethylene and complies with ASTM D1248 and D3350. Both resin and manufacturing plant shall be approved by the National Sanitation Foundation. Horizontal and vertical alignment tolerances shall be specified by the design engineer.

532.9 Steel Casings for Bores

All carrier pipe through casings shall comply with ASTM C900, C905 or C909. Steel casing pipe for bores shall be seamless welded steel tubing having an inside diameter of at least four (4) inches greater than the outside diameter of the bell or joint or mechanical restraint of the carrier pipe or mechanical restraint to be installed therein. The minimum wall thickness of the tubing shall be:

Casing O.D.	Min. Wall Thickness
>24”	3/16”
27”	1/4”
30”- 36”	5/16”
42”	3/8”

All carrier pipe joints shall have mechanical restraint inside the casing. Cathodic protection and casing end seals shall be specified per design engineer recommendations The spacer system shall be designed and fabricated for the specific project and application for which they are furnished. The casing spacer system manufacturer must have a current ISO 9001:2000 Registered Quality Assurance Program.

Steel pipe may be re-used for a casing if it can be certified to meet these CONSTRUCTION STANDARDS & SPECIFICATIONS and is approved by the Road & Bridge Superintendent / Elbert County Engineer.

533.0 Installation

533.1 General

Installation of PVC sewer main shall comply with ASTM D2321.

533.2 Alignment and Grade

Field parties, under the supervision of a Registered Professional Land Surveyor or Professional Engineer licensed to practice in the State of Colorado, shall determine alignment and grade of the pipe and the location of sanitary sewer system appurtenances. The sewer line shall be installed to the required lines and grades with appurtenances at the required locations. Record Documents of sanitary sewer system alignment, verified by a Professional Licensed Surveyor or a Professional Engineer, shall be furnished to the Road & Bridge Superintendent / Elbert County Engineer to comply with Section 200.00 ACCEPTANCE PROCEDURES of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

533.3 Protection of Existing Underground Utilities

The Contractor shall be held responsible for the protection of public improvements as stated in Section 141.00 Protection of Public, Private and Utility Interests of these CONSTRUCTION STANDARDS & SPECIFICATIONS. It shall be the Contractor's responsibility to replace all public improvements damaged at his own expense.

533.4 Sewer Pipe Installation

Proper equipment, tools and facilities shall be provided and used by the Contractor for safe and efficient performance of the work. All pipe and sanitary sewer appurtenances shall be carefully lowered into the trench in such a manner as to prevent damage to pipe materials and to protect coatings and linings. Under no circumstances shall pipe or fittings be dropped or dumped into the trench. Any pipe or fittings that are dropped or dumped shall be removed from the work site and shall not be used.

When buried, all ductile iron pipe fittings and appurtenances shall be protected with polyethylene wrap. Miscellaneous steel or other ferrous pipe shall be similarly protected. Refer to Section 200.00 ACCEPTANCE PROCEDURES of these CONSTRUCTION STANDARDS & SPECIFICATIONS for survey requirements for Record Documents of sanitary sewer lines.

The Elbert County Inspector/Representative shall be notified at least one working day (twenty-four [24] hours) in advance of when pipe is to be installed in any trench. No pipe shall be covered until a Elbert County Inspector/Representative has inspected the installation.

Sewer lines shall be constructed continuously up grade from an existing sanitary sewer except when otherwise approved by the Road & Bridge Superintendent / Elbert County Engineer. Special care shall be taken to lay sewer pipe to exact line and grade with spigot ends pointing in the direction of flow.

Sewer pipe shall be secured in place by installation of bedding material tamped under and along it up to a level of twelve (12) inches over the top of the pipe to comply with Section 353.00 Bedding for Pipelines and Service Lines of these CONSTRUCTION STANDARDS & SPECIFICATIONS. Backfill material shall be installed and compacted to comply with Section 354.00 Backfill for Pipelines and Service Lines of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

All sewers shall be kept thoroughly clean and free of gravel, dirt and debris. Whenever work ceases for any reason, the unfinished end of the pipe shall be securely closed with a temporary tight-fitting plug.

533.5 (Left Blank Intentionally)

533.6 Connections to Existing Manholes

Modifications to existing manholes shall not jeopardize the structural integrity. Sewer pipe connections to existing manholes, where there is no pipe stubbed out, shall be made in accordance with the Detail Drawings. The Contractor shall core drill as small an opening in the existing manhole as necessary to insert the new sewer pipe. The existing concrete flow channel shall be chipped to the cross-section of the new pipe in order to form a smooth continuous flow channel similar

to what would be formed in a new concrete base. Non-shrink grout shall be used to finish the new channel and invert and to seal the new sewer line so the junction is watertight.

533.7 Construction of Manholes and Clean-outs

Manholes shall be constructed in accordance with the Detail Drawings. Concrete bases shall extend at least eight (8) inches below the bottom of the pipe and at least two (2) inches over the top of the pipe. The concrete manhole bench shall slope upward at least two (2) inches per foot from the top of the pipe.

Pipes connecting to cast-in-place manhole bases shall have a water stop in accordance with the Detail Drawings. A water stop gasket shall also be used for new connections to existing manholes.

The manhole flow channel shall be made of concrete and shall conform exactly to the lower half of the pipe it connects. Changes in flow direction shall be constructed with as large a radius of curvature as possible. Flow channels shall be finished with cement mortar and left smooth and clean.

Pre-cast barrel sections shall not be placed on the base until after it has reached sufficient strength to provide support without damage. Asphaltic mastic (Ram-Neck) shall be applied between each pre-cast section bearing seat. All lifting holes and other imperfections in the interior manhole wall shall be filled with cement mortar. Manhole barrel joints shall be sealed with a double bead of asphaltic mastic and joint tape on the outside. Adjustment rings shall be sealed with non-shrink grout.

All sewer clean-outs that are not contained in manholes shall be provided with a valve box and a “sewer” lid.

533.8 In-Place Rehabilitation of Existing Pipelines

Refer to Section 532.08 In-Place Rehabilitation of Existing Pipelines of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

533.9 Steel Casing and Carrier Pipe Installation

Tunneling and boring operation methods shall be approved by the Road & Bridge Superintendent / Elbert County Engineer. Excavation and casing installation shall be performed simultaneously. At no time shall the advancing edge of the casing trail the excavation by more that twelve (12) inches.

The casing pipe shall be installed by boring or jacking upgrade from the outlet end. When excavation exceeds the advancing edge of the casing by more than twelve (12) inches or sloughing of the hanging wall occurs such that voids are

created along or above the casing, external grouting of the casing shall be required. Grouting shall be accomplished by pumping at between five (5) and ten (10) psi equal parts of Portland Cement and mortar sand mixed with sufficient water to provide a slump of less than two (2) inches through grout holes in the casing until all voids are filled. Grout holes, one (1) inch to two (2) inches in diameter, shall be provided or drilled in the casing on four (4) foot centers along the pipe arch and at eight foot (8') centers along each spring line. As grouting advances each of the completed grout holes shall be plugged to a watertight condition.

Following installation of forcemain carrier pipe in casing pipe, tracer wire shall be taped to the forcemain and welded to each end of the casing. Uninterrupted continuity shall be tested in accordance with the requirements of Section 432.19 Tracer Wire and Warning Tape of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

533.10 Wyes for Service Connections

Wyes shall be angled upwards so that the flowline of a forty-five (45) degree bend connected to the fitting shall have an elevation equal to or higher than the inside crown of the sewer main. Watertight plugs shall be installed in each service connection stub. Record Document measurements shall be made to reference the wye to the nearest downstream manhole before backfill. Record Documents shall comply with Section 200.00 Acceptance Procedures of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

534.0 Testing and Inspection

Refer to Section 154.00 Inspections of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

Adequate inspections assure compliance to Elbert County requirements and are the basis for Elbert County's recommendation that said improvements be accepted for maintenance and for release of performance guarantees. It is the responsibility of the Contractor to contact the Road & Bridge Superintendent / Elbert County Engineer a minimum of one (1) full working day (twenty-four [24] hours) in advance of the required inspections. Required inspections shall include:

A. Stockpiled Materials – Verify that materials meet CONSTRUCTION STANDARDS & SPECIFICATIONS and approved submittals, including but not limited to: bedding material, pipe, fittings, valves, valve boxes, and fire hydrants.
B. Community Development Excavation – Verify proper trench depths, shoring, spoil pile location, dewatering, and location and protection of existing utilities.

C. Installation – Verify proper bedding depth, alignment and grade, clean pipe and lubricants. Verify "slicing in" of bedding at haunches.

D. Backfill and Compaction – Verify proper methods of backfill and compaction, depths of lifts, moisture control, backfill material free of large rock and organic or frozen material, and proper compaction effort and passing tests. Verify that sewer forcemain has warning tape. Verify that tracer wire has been installed on all carrier pipe contained in a casing and that it has a passing continuity test.

E. Testing – Verify that testing methods comply with these CONSTRUCTION STANDARDS & SPECIFICATIONS. Verify that Elbert County has witnessed all low pressure air tests of pipe, vacuum testing of manholes and any other testing requirements such as deflection testing. Mandrel testing for flexible pipe with depths of cover equal to 20 feet or more must be witnessed by Elbert County. Mandrel testing shall be performed by a certified third party.

Prior to Construction Acceptance, the Contractor shall conduct tests for water-tightness. Tests shall be completed under the observation of the Elbert County Inspector/Representative. Low pressure air testing of the sewer lines (including services) and vacuum testing of all manholes shall be required by the Road & Bridge Superintendent / Elbert County Engineer. The Contractor shall provide all equipment and personnel necessary to perform the required tests. The Elbert County Inspector/Representative shall record times and pressure and vacuum readings during the test period. A test section shall not be any longer than the length of pipe between adjacent manholes.

The Road & Bridge Superintendent / Elbert County Engineer may require that the first two (2) manholes, including the main between them, of all sewer projects be tested before further construction to permit initial observation of the quality of construction workmanship. The Road & Bridge Superintendent / Elbert County Engineer may require additional testing during the course of construction if infiltration appears to be excessive or the quality of workmanship is questionable.

F. Construction Acceptance – Refer to Section 200 ACCEPTANCE PROCEDURES of these CONSTRUCTION STANDARDS & SPECIFICATIONS. General items include:

1. All temporary structures, debris, mud and waste materials shall be removed from public property.
2. All relative testing certifications and documentation shall be submitted to Elbert County, including all compaction tests. Copies of originals are acceptable.

3. All sanitary sewer service locations shall be marked by saw cutting an "X" or "S" (or an "X" or "S" to indicate an underdrain system is present) into the face of the curb where the service extends into the property.
4. All sanitary sewer manholes are at construction grade, clean, and grouted with ladders straight. Verify that underdrain clean-outs are clear and capped and that all sanitary sewerlines have been jetted.

Prior to requesting a Construction Acceptance inspection, the Contractor shall clean sanitary sewer mains and shall have the lines inspected with TV video equipment. A copy of the videotape and written report shall be submitted to Elbert County for review. Video shall also include an audio description of pipe and manhole deficiencies, and camera location during the inspection. Any sections that contain debris or obstructions shall be cleaned and re-videotaped. Video shall be continuous from manhole to manhole, and all notations shall correspond to the approved construction plans. If, after visual inspection of the sanitary sewer lines the Road & Bridge Superintendent / Elbert County Engineer suspects that there is a problem, alignment, and/or deflection tests may be required at the Contractor's expense.

G. Final Acceptance – Refer to Section 200 ACCEPTANCE PROCEDURES of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

1. Verify that all temporary structures, debris, mud, and waste materials are removed from public property.
2. Verify that all sanitary sewer manholes are clean.

Prior to Construction Acceptance, the Contractor shall jet rod the sewer lines, and a video inspection and written log shall be performed, recorded and submitted to Elbert County. The Elbert County Inspector/Representative shall review the recorded video and log for inadequacies in the system. If inadequacies are noted, the Contractor shall make repairs deemed necessary by the Elbert County Inspector/Representative.

534.1 Air Testing Pipeline

Air testing shall comply with UNI-BELL UNI-B-6. The portion of the line being tested shall be termed "acceptable" if the time required in minutes for the pressure to decrease from 3.5 to 3.0 psig (greater than the average back pressure of any groundwater that may be over the pipe) shall not be less than the time shown for the given diameters in the following table:

SPECIFICATION TIME REQUIRED FOR A 0.5 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE

1 Pipe Diameter (in.)	2 Minimum Time (min:sec)	3 Length for Minimum Time (ft)	4 Time for Longer Length (sec)	Specified Minimum for Length (L) Shown (min:sec)							
				100ft	150ft	200ft	250ft	300ft	350ft	400ft	450ft
4	1:53	597	.190L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427L	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12
8	3:47	298	.760L	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42
10	4:43	239	1.187L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54
12	5:40	199	1.709L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50
15	7:05	159	2.671L	7:05	7:05	8:54	11:08	13:21	15:35	17:48	20:02
18	8:30	133	3.846L	8:30	9:37	12:49	16:01	19:14	22:26	25:38	28:51
21	9:55	114	5.235L	9:55	13:05	17:27	21:49	26:11	30:32	34:54	39:16
24	11:20	99	6.837L	11:24	17:57	22:48	28:30	34:11	39:53	45:35	51:17
27	12:45	88	8.653L	14:25	21:38	28:51	36:04	43:16	50:30	57:42	64:54
30	14:10	80	10.683L	17:48	26:43	35:37	44:31	53:25	62:19	71:13	80:07
33	15:35	72	12.926L	21:33	32:19	43:56	53:52	64:38	75:24	86:10	96:57
36	17:00	66	15.384L	25:39	38:28	51:17	64:06	76:55	89:44	102:34	115:23
42	19:74	57	20.942L	34:54	52:21	69:49	87:15	104:42	122:10	139:37	157:04
48	22:67	50	27.352L	45:35	68:23	91:11	113:58	136:46	159:33	182:21	205:09

If groundwater is higher than the top of the pipe, the test pressure is to be increased. An air pressure adjustment shall be added to the normal test starting pressure when groundwater is present. The height of groundwater in feet shall be divided by all readings. (For example, if the height of water is eleven (11) and one half (1/2) feet, then the added pressure shall be 5 psig. This increases the 3.5 psig to 8.5 psig, and the 2.5 psig to 7.5 psig. The allowable drop of one pound and the timing remain the same. ***In no case however, should the starting test pressure exceed 9.0 psig.***

Sections of pipe that fail the air test shall have the defects repaired and the pipe retested until the testing requirements are met.

534.2 Vacuum Testing Manholes

Manholes shall be tested before the ring and cover and grade adjustment rings have been installed. All pipes entering the manhole shall be plugged and braced and a vacuum of ten (10) inches of mercury shall be drawn. The vacuum pump shall be turned off and the time monitored as the vacuum drops one (1) inch. The vacuum shall not drop more than one (1) inch for the duration of the time indicated in the following table:

SPECIFIED TEST DURATION FOR DIAMETER OF MANHOLE (DURATION INDICATED IN MIN:SEC)

MANHOLE DIAMETER (INCHES)

48”	60”	72”
1	1.15	1.45

Manholes that fail the vacuum test shall have the defects repaired and the manholes retested until the testing requirements are met.

534.3 Deflection Testing Pipe

When required, all flexible material sewer pipelines shall be tested for vertical deflection after placement and compaction of backfill if deemed necessary by the Elbert County Inspector/Representative. Method of testing shall be by deflectometer of the rigid GO/No-GO type device or an alternative method permitted by the Road & Bridge Superintendent / Elbert County Engineer. Maximum allowable deflection shall be five (5) percent of the pipe diameter. Any and all pipe with vertical deflection greater than the allowable shall be excavated, removed from the pipeline, replaced, backfilled and compacted and retested until the testing requirements are met.

534.4 Infiltration and Exfiltration Testing

When required, infiltration and exfiltration tests shall be conducted to comply with UNI-BELL standards. Whenever the rate of infiltration or exfiltration is found to exceed the prescribed amount, the Contractor shall stop all construction. The Contractor shall make appropriate repairs by methods acceptable to the Road & Bridge Superintendent / Elbert County Engineer and shall continue to test the conduit until it is proven satisfactory.

535.00 Connection to Elbert County’s Sewer System

Flow of any kind into the existing sewer system shall not be allowed until the sewer has been satisfactorily completed and approved for use by the Road & Bridge Superintendent / Elbert County Engineer.

540.00 SANITARY SEWER SERVICE LINE CONSTRUCTION

541.00 Trenching, Backfilling and Compacting

Trenching, backfilling and compacting shall be completed and shall comply with Section 350.00 TRENCHING, BACKFILLING AND COMPACTING of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

542.0 Materials

542.1 Polyvinyl Chloride (PVC)

Pipe and fittings shall comply with ASTM D3034. All joints shall be factory prepared compression type (elastomeric gasket joint), providing a watertight seal. A compression stop, as recommended by the pipe joint manufacturer, shall be provided to seal the end joint of dead-end stubs.

543.0 Installation

543.1 General

Installation of PVC sanitary sewer services shall comply with ASTM D2321 and to the pipe manufacturer's installation instructions.

543.2 Location and Alignment of Service

The sanitary sewer service may be constructed with one or more horizontal forty-five (45) degree bends between the house plumbing and the sanitary sewer main with the written approval of the Road & Bridge Superintendent / Elbert County Engineer. Clean-outs shall be installed to comply with the International Residential Code (IRC), the International Plumbing Code (IPC) and as described herein. Unless specific approval is obtained in writing from the Road & Bridge Superintendent / Elbert County Engineer, all sanitary sewer service lines shall have a minimum depth of three (3) feet.

At no time shall the service line be closer than three (3) feet to a side property line, and no service line may be constructed through or in front of an adjoining property. Sewer service lines shall be typically located a minimum of ten (10) feet to the low side of the water service or as shown on the approved plans. Generally, services shall not be located under driveways.

543.3 Crossing Sidewalk or Curb (Existing or Proposed)

In no instance shall a trench extend beneath an existing sidewalk or curb. The pipe shall be bored, jacked or tunneled through the earth under the sidewalk or curb. If the service line is installed prior to the placement of the sidewalk or curb, the trench shall be backfilled in accordance with Section 354.00 Backfill for Pipelines and Service Lines of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

543.4 Service Stub-ins to Property Line

Sanitary sewer service line locations shall be marked on the curb with an "X". All service stub-ins shall be stubbed into the lots, ten (10) feet minimum beyond the

R.O.W. or utility easement. All service stub-ins shall be plugged and marked in accordance with Section 532.02 Plugs of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

543.5 Tapping the Main

Where wyes have not been installed in the sewer main, sanitary sewer tapping saddles shall be used. Sewer tapping saddles shall be double strapped saddles with rubber gasket pipe sealant.

A manhole shall be installed instead of a service tap when a six (6) inch connection is to be made to an eight (8) inch or smaller main. **SERVICE TAPS DIRECTLY INTO A MANHOLE SHALL NOT BE ALLOWED WITHOUT THE WRITTEN APPROVAL OF THE ROAD & BRIDGE SUPERINTENDENT / ELBERT COUNTY ENGINEER.**

543.6 Pipe Installation

In cases where the sewer service cannot be installed a minimum of ten (10) feet horizontally from a water service, concrete encasement of the sewer line shall be required. Installation of sanitary sewer lines shall comply with Section 533.00 Installation of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

In cases where the water and sewer service lines shall cross one another, installation shall comply with Section 516.00 Relation to Waterlines of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

543.7 Industrial

All buildings (warehouses, etc.) constructed as a shell, with the intention of only being used for subdivided suites for commercial purposes, shall be required to install service connections extending a minimum of six (6) feet outside of the building with a clean-out for each set of proposed bathrooms or suites. All commercial and industrial facilities shall have a clean out on the outside of the building, located a minimum of three (3) feet from the building, on the service connection.

543.8 Other Requirements

Rainwater leaders, roof drains, surface drains or groundwater drains shall not be connected to the sanitary sewer system. Each sanitary sewer service system shall be separate from the drainage system. Grease, oil and grit traps shall be designed and installed where required by the provisions of the IRC.

550.00 FLOW METERING AND SAMPLING STATION CONSTRUCTION

551.00 General

Except as otherwise specifically noted on approved plans, or specified herein, all materials and installation for flow measurement and sampling stations shall comply with Section 500.00 SANITARY SEWER FACILITIES of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

552.00 Equipment Compatibility

The Contractor shall, prior to procuring and installing any equipment, consult with Elbert County to ensure that the equipment purchased and installed is compatible in all respects to the existing sampling and flow measurement equipment owned and operated by Elbert County. Volumetric weir installation is subject to approval by Elbert County.

553.00 Sampling Station Manholes

Manholes shall be constructed, complete with covers, fittings, and other appurtenances, in accordance with the Detail Drawings.

554.00 Grating

All grating and grating treads shall be either structural fiberglass or aluminum. The design engineer shall submit design calculations and details appropriate for the application to be approved by the Road & Bridge Superintendent / Elbert County Engineer.

All grating shall lie flat with no tendency to rock when installed. Poorly fitted or damaged grating shall be rejected and shall be replaced by the Contractor. Steel frames cast in concrete to support grating shall be hot-dip galvanized after fabrication.

555.00 Weir Plates and Grooves

Weir plates and guide grooves shall be fabricated from aluminum or fiberglass with edges accurately finished. Plates shall be provided with U-shaped lifting handles. Each groove opening shall be at least one-quarter (¼) inch wider than the thickness of the plate installed therein. Grooves shall have all interior surfaces smooth.

Weir plate grooves shall be installed plumb and straight within a tolerance of three thirty-seconds (3/32) inch and with the opposite sides and bottom aligned in a single plane to prevent binding of the weir plate. If necessary to meet this requirement, a space shall be boxed out for guides and the guides grouted in place later.

Weirs shall be v-notch weirs for flows ranging up to 0.15 MGD, and shall be an eighteen (18) inch wide Cippoletti weir with flows ranging from 0.15 to 0.5 MGD.

Weir design shall be reviewed by the Road & Bridge Superintendent / Elbert County Engineer to insure adequate flow measurement. A staff gauge shall be read in inches. Once the weir is in place, no flow bypass around the weir shall be allowed. Volumetric weir installation shall be approved by the Road & Bridge Superintendent / Elbert County Engineer.

556.00 Station Location

The location of the flow measurement and sampling station shall be such that it is easily accessible at all times by Elbert County personnel. The Road & Bridge Superintendent / Elbert County Engineer shall approve the location of the station.

557.00 Operation of Existing Facilities

The operation of the existing sanitary sewer system shall not be interrupted or degraded by the sample station construction.

558.00 Drawings and Data

Complete data and detailed drawings including all structural and miscellaneous metal items shall be prepared by a Registered Professional Engineer licensed to practice in Colorado and submitted to the Road & Bridge Superintendent / Elbert County Engineer for review and approval prior to fabrication. The Developer shall provide Elbert County with a set of Record Documents that complies with Section 200.00 ACCEPTANCE PROCEDURES of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

560.00 SEWAGE LIFT STATIONS

561.00 General

The sewage lift station, as determined by the Road & Bridge Superintendent / Elbert County Engineer, may be either a temporary or a permanent facility. The Developer shall provide the Road & Bridge Superintendent / Elbert County Engineer with a complete set of design calculations and design drawings that comply with Section 160.00 PLANS AND SPECIFICATIONS of these CONSTRUCTION STANDARDS & SPECIFICATIONS for review and approval of the Road & Bridge Superintendent / Elbert County Engineer.

The sewage lift station shall satisfy all of the requirements of the Colorado Department of Public Health and the Environment (CDPHE) and these CONSTRUCTION STANDARDS & SPECIFICATIONS. The Developer's engineer shall prepare the “Application for Site Approval” for submittal to the Colorado Department of Health and to prepare a set of Record Document drawings of the sewage lift station that complies with Section 200.00 ACCEPTANCE PROCEDURES of these CONSTRUCTION STANDARDS & SPECIFICATIONS. Upon completion

of the lift station, the Contractor shall also provide Elbert County with two (2) copies of an "Operation and Maintenance Manual" for the lift station.

Whenever a lift station is required, a discussion with the Elbert County Road & Bridge Department shall be required..

A security system is required for all lift stations, and it shall be approved by Elbert County prior to installation.

562.0 Design Criteria

562.1 Odor and Corrosion Control

The potential for odor generation shall be evaluated, and if recommended shall be provided at the lift station. The method of odor control shall be as determined by the Road & Bridge Superintendent / Elbert County Engineer.

The potential for corrosion shall be evaluated, and if recommended shall be provided at the lift station. The method of corrosion protection shall be as determined by the Road & Bridge Superintendent / Elbert County Engineer.

The manhole receiving the discharge from a forcemain shall be corrosion protected. The downstream sewer system shall be evaluated for the need for odor control and corrosion protection, and, if recommended, facilities shall be included for odor control and corrosion protection.

562.2 Wet Well Construction

The wet well shall consist of a cast-in-place reinforced concrete structure divided into two (2) compartments. The two (2) compartments shall be interconnected with a valve or gate. The dual compartments shall allow the draining of one compartment for cleaning or maintenance without affecting the operation of the station. A division box shall be provided upstream of the wet well to allow the sewage lift station flows to be directed into either or both of the wet well compartments. A removable screen, or heavy-duty grinder, as determined by the Road & Bridge Superintendent / Elbert County Engineer, shall be provided in the inflow into each wet well compartment to collect debris.

562.3 Pumps and Pump Station

Pumps shall be installed in a dry well adjacent to the wet well, and be of a type and design acceptable to Elbert County.

The pump station shall be designed utilizing a minimum of three (2) pumps. Each pump shall be capable of pumping the peak design flow. One pump shall be

located in the primary wet well. The second pump shall be located in the second overflow/maintenance wet well.

All pump equipment shall be manufactured and supplied by the same company. The pump station shall be an above ground structure sized to accommodate all of the pumps, electrical equipment and controls required to operate the facility. The station shall be lighted, heated and well ventilated, and shall be designed for easy expansion if required by the Road & Bridge Superintendent / Elbert County Engineer.

The architectural finish of the station shall blend with that of the surrounding architecture as much as possible.

A STANDBY GENERATOR, CAPABLE OF OPERATING THE ENTIRE STATION FOR A MINIMUM OF FOUR HOURS, SHALL BE PROVIDED AND LOCATED OUTSIDE THE BUILDING IN AN ALL WEATHER ENCLOSURE.

562.4 Controls and Supervisory Control and Data Acquisition (SCADA)

Pump operation shall feature automatic sequencing of the pump operation to balance pump wear. Pumps shall be controlled by pre-determined wet well levels measured by mercury float switches.

562.5 Site Security and Improvements

Site security shall be provided based on site assessment and shall comply with Elbert County requirements.

A six (6) foot high chain link fence with barbless wire, or other approved material, shall be installed around the perimeter of the sewage lift station site. Upon completion of the lift station construction, all disturbed areas within the site shall be fertilized, seeded and mulched to comply with Section 1030.00 Seeding Specifications of these CONSTRUCTION STANDARDS & SPECIFICATIONS.

Depending on site location, landscaping improvements may be required by the Road & Bridge Superintendent / Elbert County Engineer.

570.00 RESTORATION AND CLEANUP

Restoration and cleanup shall be completed and shall comply with Section 370.00 RESTORATION AND CLEANUP of these CONSTRUCTION STANDARDS & SPECIFICATIONS.