

## SECTION 2 - SANITARY SEWER DESIGN CRITERIA

### 2.1. GENERAL

All sanitary sewer lines and manholes (District owned and privately owned), service connections, and related public facilities within the Southgate Sanitation District shall be designed in accordance with these Specifications. Any deviation from these Specifications shall require written permission from the District, prior to design or construction. Design of all sanitary sewer system construction plans shall be performed under the direct supervision of a Professional Engineer, registered in the State of Colorado. The intent is to provide a consistently designed, long-term, reliable system which can be easily located and maintained by the District.

### 2.2. PLAN REQUIREMENTS

Construction plans for sanitary sewer system shall meet the guidelines set forth in the Sanitary Sewer System Plan Requirements Check List and General Notes for Sanitary Sewer System Plans found in APPENDIX A, APPENDIX B, and APPENDIX B. The check list and general notes are guidelines and as such, some items may not be applicable to all projects as determined by the District.

### 2.3. FLOW DEVELOPMENT CRITERIA

Sanitary sewer lines shall be designed to transport average and peak sewage flows in accordance with these Specifications. Average and peak flow development criteria presented below and in Table 2.1 are minimum criteria, and the District reserves the right to modify flow criteria, at any time, for the design of specific projects. Flow development criteria for proposed uses not shown in Table 2.1 shall be determined by the District on a case-by-case basis using generally accepted planning criteria.

The relationship of the peak flow to average flow is given below. Peak flow along with maximum infiltration, shall determine the hydraulic capacity of sewers in all cases

$$\text{Peak Flow} = (\text{Avg. Flow} \times \text{Peaking Factor}) + \text{Infiltration/Inflow} \quad (\text{flow units in cfs})$$

Infiltration/Inflow (I+I) is estimated to be ten percent (10%) of the Average Flow

Peaking Factor (PF) shall be determined using Equation 1 below from the Denver Regional Council of Governments (DRCOG). In no cases shall the Peaking Factor be less than 2.0 or greater than 4.0.

$$\text{Equation 1: } PF = 2.6 * Q_{AVG}^{(-0.16)}$$

Where:

$$Q_{PEAK} = 2.6 * Q_{avg}^{(0.84)}$$

$Q_{AVG}$  = Average Sanitary Sewer Flow in cfs

$Q_{PEAK}$  = Peak Sanitary Sewer Flow in cfs

<b>Table 2.1 – Flow Development Criteria</b>	
<b>Use</b>	<b>Average Daily Sewage Flow</b>
<b><i>Multi-Family</i></b>	
1-Bedroom or less than 900 SF	100 GPD/Unit
2-Bedroom or less than 1400 SF	155 GPD/Unit
3-Bedroom or less than 1800 SF	220 GPD/Unit
1800 SF or greater	255 GPD/Unit
<b><i>Commercial</i></b>	
Office Building	0.1 GPD/SF
Restaurants	25 GPD/Seat
Bars & Lounges	15 GPD/Seat
Hotels & Motels	140 GPD/Room
Neighborhood Stores	0.15 GPD/SF
Department Stores	0.15 GPD/SF
Laundries & Dry Cleaning	400 GPD/Machine
Banks & Financial Buildings	0.1 GPD/SF
Medical Buildings & Clinics	0.3 GPD/SF
Warehouses	0.05 GPD/SF
Meat & Food Processing Plants	2.8 GPD/SF
Car Washes	540 GPD/Bay
Service/Gas Stations	100 GPD/Plumbing Fixture
Auto Dealer, Repair & Service	0.15 GPD/SF
Super Market	0.2 GPD/SF
Trade Businesses (Plumbers, Exterminators, etc.)	0.2 GPD/SF
Places of Assembly (Churches, Libraries, Theaters, etc.)	5.0 GPD/Seat
Schools	15 GPD/Student
Factories (Manufacturing raw products into finished products)	0.8 GPD/SF
Hospitals	450 GPD/Bed
Other, non-identified commercial uses	Determined by the District

2.4. SANITARY SEWER SYSTEM HYDRAULIC DESIGN CRITERIA

2.4.1. GENERAL

The sanitary sewer system shall be designed to transport average and peak sewage flows in accordance with these Specifications, and shall prevent deposition of suspended materials within the system.

2.4.2. SANITARY SEWER MAIN LINES

No public sanitary sewer line (main) shall be smaller than eight (8) inches in diameter. Sanitary sewer mains shall be designed to provide peak flow velocities between two (2) feet per second (fps) minimum and ten (10) feet per second (fps) maximum using Manning's Formula as follows:

$$V = \frac{1.49}{n} R^{2/3} \sqrt{S}$$

Where: V = Flow Velocity (ft/sec)  
 R = Hydraulic radius (ft), determined by dividing the flow area by the wetted perimeter.  
 S = Slope (ft/ft) of the energy grade line, which is approximately equal to the sanitary sewer line design slope.  
 n = Manning's Pipe Roughness Coefficient = 0.013

A Manning's Coefficient of 0.013 shall be used for all design calculations, regardless of pipe type and diameter.

The maximum design flow depth at peak flow shall not exceed 83% of the internal pipe diameter (i.e. d/D = 0.83, ratio flow depth to internal pipe diameter).

Hydraulic characteristics shall be calculated for each reach of the sanitary sewer system to show conformance with these Specifications and shall be shown on construction plans. Table 2.2 outlines minimum and generally acceptable minimum and maximum slopes for sanitary sewer lines as follows.

Table 2.2 – Generally Accepted Slopes		
Nominal Pipe Diameter (inches)	Minimum Slope (%)	Maximum Slope (d/D = 0.83) (%)
4 (Service)	2.0	12.0
6 (Service)	1.0	10.0
8	0.50	10.0
10	0.35	6.0
12	0.25	4.0
15	0.20	3.0
18	0.20	2.2

Slopes for sewer services (4 and 6-inch) within dedicated easements and right-of-way shall conform to the values shown in Table 2.2. Service lines located outside these areas shall be per the Owner/Owner's Engineer.

Maximum slopes are based on d/D = 0.83. As flow depth decreases, the allowable maximum slope may also increase, as long as velocities do not exceed 10 fps. The minimum slopes indicated are absolute minimums.

All dead end sanitary sewer lines (i.e. cul-de-sacs) shall have a minimum slope of one percent (1%).

Construction plans shall develop and show average flows, peak flows, and other information at all points of connection to the existing sanitary sewer system as follows:

Q<sub>PEAK</sub>                      Peak Sanitary Sewer Flow  
 Q<sub>AVG</sub>                        Average Sanitary Sewer Flow

$V_{PEAK}$	Peak Flow Velocity
$V_{AVG}$	Average Flow Velocity
$d_{PEAK}$	Peak Flow Depth in Line at Point of Connection
$d_{AVG}$	Average Flow Depth in Line at Point of Connection
$d/D_{PEAK}$	Ratio of Peak Flow Depth to Inside Pipe Diameter
S	Slope of sanitary sewer line
n	Manning's "n" = 0.013
PF	Peak Factor per Equation 1
Development	Number and type of total ultimate planned units tributary to the point of connection.

Sanitary sewer system layout shall provide a system of lines which generally increase in diameter from higher to lower areas within the basin. Once a line size is increased at any point in the system, it shall not be reduced in size at any downstream location, regardless of available line slope.

### 2.4.3. MANHOLES

Manholes shall be designed to promote smooth, continuous flow between adjacent reaches of sanitary sewer lines. The minimum inside drop from the lowest pipe invert upstream (in) and the pipe invert downstream (out) shall be 0.2 feet. The maximum inside drop from upstream invert to downstream invert shall be twelve (12) inches.

Where manholes are designed to collect flows from two or more incoming lines, the pipe crowns of the incoming lines shall match in elevation. Thus, larger incoming pipes will have a lower invert elevation than smaller incoming pipes. Minimum and maximum drop through the manhole will be as specified above as compared to the largest incoming pipe invert.

## 2.5. SANITARY SEWER SYSTEM LOCATION AND ALIGNMENT

### 2.5.1. GENERAL ALIGNMENT REQUIREMENTS

Design shall attempt to minimize the numbers of manholes. In no case shall the sewer line be designed closer than five (5) feet to the lip of a cross pan, or gutter, or ten (10) feet to any right-of-way line, or easement boundary. Curvilinear sewer mains are not allowed on a case-by-case basis with written consent by the District Engineer.

The District will not permit construction of a project until all plats, easements, and rights-of-way to be dedicated that are related to the project are fully signed and recorded by the appropriate County.

### 2.5.2. GENERAL LOCATION IN STREETS

Where sanitary sewers are located in the street right-of-way, of which shall be a minimum of 30-feet, they shall be designed to the following guidelines.

1. In streets running generally north and south, the sewer line shall be placed ten (10) feet west of the street centerline.
2. In streets running generally east and west, the sewer line shall be placed ten (10) feet south of the street centerline.

3. In streets which "meander" in each direction, the sewer line will conform to the above Specifications as near as is practical, but shall not "zig-zag" across the street centerline. A location shall be selected and shall be followed within the street. The final location shall be as determined by the District during plan review.

### 2.5.3. GENERAL LOCATION IN EASEMENTS

Where sanitary sewer lines are proposed in easements, they shall be designed within the easement boundary to the following minimum requirements.

1. Sanitary sewer easements shall be a minimum of thirty (30) feet wide with a surfaced roadway or a minimum of fifty (50) wide in undeveloped areas and shall have legal descriptions and drawings prepared in accordance with these Specifications. Easement widths are subject to review by the District.
2. In no case shall the sewer line be designed closer than ten (10) feet to any easement boundary.
3. When selecting the location of utility lines within an easement, consideration shall be given to excavation, maintenance, and repair requirements.
4. Easements shall provide easy access to manholes by a tandem wheeled maintenance (jet) truck. Where easements straddle property lines, the sanitary sewer alignment shall be a minimum of ten (10) feet from one edge of the easement and a minimum of ten (10) feet from the property line.
5. Sewer lines in unpaved easements shall be Polyvinyl Chloride (PVC) minimum DR-18 meeting AWWA C900/905 requirements, and shall be green in color.

A copy of the Grading Plan and Landscaping Plan showing the proposed conditions at the easements shall be submitted for review by the District. The maximum longitudinal grade along the easement shall be 8%. The maximum cross slope within easement boundaries shall be 4%. Decorative landscaping such as trees, bushes, rock gardens, etc. are prohibited in the sanitary sewer easement. Landscaping shall be sod, gravel, or paved surface. Gravel surface is preferred. Fences parallel or askew within the easement are not permitted. Fences perpendicular to the easement should be avoided. Installation of fences perpendicular to easements require District approval and shall be installed with a 12-foot removal section or gate for access by District. Gate may be single or double-door, but when opened must provide an obstruction-free 12-foot minimum opening. The opening must be centered over the sewer main within the easement.

### 2.5.4. EASEMENT LEGAL DESCRIPTIONS AND EXHIBITS

Easement legal descriptions and exhibits (drawings) shall be prepared under the direct supervision of a Professional Land Surveyor, Registered in the State of Colorado. Easement documents must adhere to the Denver Water easement standards and CAD standards at a minimum. Refer to the easement requirements in Chapter 4 of the latest edition of the Denver Water Engineering Standards.

Legal descriptions and exhibits shall be prepared on legal sized (8-1/2" x 11") paper, and shall be referenced to the nearest Section corner. The legal description shall be a "metes and bounds" description, accurately describing to a hundredth of a foot, the point of beginning, each easement line bearing and distance, and the total area contained in acres. Easement traverse shall close within 1/10,000. Surveyor shall provide polygon easement closure calculations

verifying this requirement.

Easement exhibits shall be presented at a scale sufficient to clearly show all easement boundaries. The drawing shall show the north arrow, referenced section corner, all bearings and distances, total acres, adjacent property identification, street names, and date of preparation.

Easement legal descriptions and exhibits shall bear a professional land surveyor (State of Colorado) seal and signature. The easement legal and drawing shall be included with the District's Standard Easement Deed. A sample copy of the Standard Deed is included in APPENDIX C. The District reserves the right to modify the conditions of the Easement Deed, at any time, for specific projects.

Legal descriptions and drawings should be submitted to the District for review along with a current Title Insurance Commitment covering the subject right-of-way. A copy of each document listed in the Title Commitment must be included. Title Commitment must be prepared within the last 30 days of date of submittal to District. All expenses incurred in obtaining Title Insurance shall be paid by the Applicant.

The District will not permit construction of a project until all easements related to the project are fully signed and recorded by the appropriate County.

#### 2.5.5. RELATION TO OTHER UTILITIES

Sanitary sewer lines in streets and easements shall be designed to provide a minimum separation of ten (10) horizontal feet measured between the centerline of any water line or appurtenance and the centerline of the sanitary sewer. Horizontal edge-to-edge separation with utilities other than water lines shall be five (5) horizontal feet minimum, and shall in all cases allow for future excavation of the sewer line without causing damage to the adjacent utility.

Where sanitary sewer lines are proposed to cross water lines or other utility lines, they shall be designed to cross at an angle close to ninety degrees (90°). Minimum vertical clearance between the edge of sanitary sewer line and edge of the water line or other utility shall be eighteen (18) inches, minimum. See Section 2.14.3 for additional requirements related to water line crossings.

#### 2.5.6. DEPTH

Minimum depth of sanitary sewer lines shall be six (6) feet measured from the top of pipe to finished grade. Lines proposed to be constructed with less than six (6) feet minimum cover shall require written special permission by the District. Maximum depth of sanitary sewer lines shall be reviewed by the District on a case-by-case basis, but in all cases, the maximum depth shall not exceed the depth where future excavation of the installed sewer line cannot be reasonably accomplished.

### 2.6. SANITARY SEWER SYSTEM LAYOUT AT CREEK CROSSINGS

Where sanitary sewer lines are proposed to cross creeks or drainage ways, they shall be designed to cross perpendicular to the creek or drainage way centerline. A specific geotechnical investigation shall be performed by the owner for each proposed crossing to evaluate potential 100 Year Flood scour depths of the creek or drainage way at ultimate development of the drainage

basin. After the investigation has been reviewed by the District, minimum depth of the sanitary sewer lines will be established, as well as any erosion protection requirements. Review by the County and the Urban Drainage and Flood Control District may be required.

All sanitary sewer mains that cross a creek or drainage way shall be protected by a steel casing pipe. Limits of casing pipe shall extend at minimum of ten (10) feet each way into the normal creek banks. Additional protection such as concrete encasement around the casing pipe, downstream drop structures, or channel bottom stabilization may also be required by the District.

2.7. MANHOLES

2.7.1. GENERAL

Manholes shall be provided at all pipeline changes in grade, changes in alignment, dead-end lines, and at junctions with other sanitary sewer mains. Manholes shall be installed on straight sections of line at distances not greater than four hundred (400) feet.

Sanitary sewer lines shall be designed so the angle between any upstream line and the downstream line is 90°, minimum.

2.7.2. MANHOLE SIZE

All manholes shall have a minimum inside diameter of four (4) feet, or two (2) feet greater than the outside diameter of the largest pipe entering or leaving the manhole. The following Table 2.3 should be used as a guideline.

**TABLE 2.3 - MANHOLE SIZING**

<b>Two-Way Manholes</b>	
<b>Max. Nominal Pipe Sizes</b>	<b>Min. Manhole Inside Diameter</b>
15" or smaller	4'-0"
18" to 36"	5'-0"
42" and up	Sizing by District

<b>Three and Four-Way Manholes</b>	
<b>Max. Nominal Pipe Sizes</b>	<b>Min. Manhole Inside Diameter</b>
3-Way 8"	4'-0"
4-Way 8"	4'-0"
3-Way 12"	4'-0"
4-Way 12"	5'-0"
3-Way 18"	5'-0"
4-Way 18"	6'-0"

Three and Four way manholes/vaults having a pipe larger than 18" will require a special design by the Owner's Engineer. Such design shall be reviewed and approved by the District.

2.7.3. MANHOLE HYDRAULIC DESIGN

(See Section 2.4.3)

#### 2.7.4. MANHOLE DEPTH

Minimum manhole depth shall be as required to provide six (6) feet of cover over the top of the upstream pipe. Maximum depth shall be reviewed and determined by the District on a case-by-case basis. For manholes with a depth greater than 20-feet of cover over the top of the upstream pipe, the manhole diameter shall be increased by one (1) foot.

#### 2.7.5. GRADE ADJUSTMENT

Manholes shall be designed and constructed to permit grade adjustments (either up or down) by use of precast concrete adjusting collars. A maximum of 12-inch grade adjustment and a maximum of three (3) adjusting collars are permitted. In paved areas, rims shall be set to the requirements of the jurisdiction (City or County) which is generally slightly lower than the finished pavement section. In open space areas, manhole rims shall be set a minimum of four (4) inches, and a maximum of ten (10) inches above finished grade to prevent infiltration from surface runoff.

#### 2.7.6. DROP MANHOLES

Drop manholes shall not be constructed where the sanitary sewer line design can be modified to provide the maximum inside drop of twelve (12) inches. Generally, drop manholes are not to be designed or constructed within the District. When this is not possible, and by special request and approval of the District, drop manholes may be designed and constructed.

The design of drop manholes shall be in accordance with the "Drop Manhole" construction details found in the Standard Details (SS-11 and SS-12). All drop manholes are to be interior lined per Section 4.5.10. Maximum permitted outside drop shall be reviewed and approved by the District on a case-by-case basis.

### 2.8. SANITARY SEWER SERVICE CONNECTIONS

#### 2.8.1. GENERAL REQUIREMENTS

Each home, business or wastewater producing facility shall convey wastewater to the District's mains by way of a service line. Each structure shall have a minimum of one service line.

Sanitary sewer services shall be designed to transport the peak sewage flow from any residential or non-residential use to the sanitary sewer system. Services shall be sized by the Owner's Architect or Engineer using the Uniform Plumbing Code (UPC) method, and shall be a minimum of four (4) inches in diameter. Service sizing calculations shall be submitted to the District for review whenever a new service line is proposed and whenever an existing service changes ownership or intended use. Service lines shall have a minimum slope of 2% and maximum slope of 12% for 4-inch and a minimum of 1% and maximum of 10% for 6-inch within right-of-way or District easement. Service slopes outside of the right-of-way or District easements shall be designed by the Owner/Owner's Engineer. The District is not responsible for the sizing or adequacy of the service line to perform its intended use and assumes no responsibility for the service lines maintenance or operation.

Service wye locations, including size, manhole reach, lot or building number, stationing from

nearest downstream manhole, right or left side connection (looking upstream), and the invert of the sewer main at wyes and plugs shall be shown in tabular form on the plans. Sanitary sewer services shall be located a minimum of ten (10) feet from water services, typically on the downhill side of the water service.

#### 2.8.2. SERVICE CONNECTIONS TO MANHOLES

Service connections 6-inches and smaller are not permitted to directly connect to an in-line manhole. All service connections 8-inches and larger shall connect to a manhole. Installation of a service connection 6-inch and smaller directly to a dead-end manhole shall be approved by the District on a case-by-case basis and may not follow an alignment "behind" a dead-end manhole.

#### 2.9. CLEANOUTS

Cleanouts are not permitted on Southgate Sanitation District mains (lines 8-inches in diameter or greater). Cleanouts are recommended on all private service lines at the following locations: any change in direction requiring horizontal or vertical bends, every 100 feet of installed service line, and at other locations as necessary for the property owner to clean the entire service line. The designer shall be responsible for providing cleanouts at a frequency and at locations required by the appropriate building code.

#### 2.10. FATS, OILS, AND GREASE (FOG) GRAVITY INTERCEPTORS

##### 2.10.1. GENERAL

All restaurants, cafeterias, supermarkets, bakeries, food processing, or other food preparation facilities shall have a gravity grease interceptor (GGI) installed on the sewer service line. Construction, ownership, and maintenance of the GGI shall be the Owner's responsibility. Bypasses are not permitted around GGIs. Generally, policies relating to placement, sizing, plumbing routing, and maintenance, can be found in the Fats, Oils, and Grease (FOG) Policy of the South Platte Renew Wastewater Treatment Plant, Industrial Pretreatment Division. Any design that is unable to comply with this policy will be reviewed by the District on a case by case basis.

In all cases, grease interceptors shall be located on the service line outside the building served, upstream of the location where human waste enters the service, and so installed and connected as to be easily accessible for inspection and cleaning. If the interceptor must be installed within the building due to space limitations, prior written authorization must be obtained from the District.

The District will determine whether a GGI is required whenever a new service line is proposed, and whenever an existing service line changes ownership or intended use. If the District determines that an existing facility needs to have a GGI installed, the Owner shall be required to provide the interceptor at the Owner's expense, even if the interceptor was not originally required on the service line. GGIs shall conform to the "Commercial Grease Interceptor Detail," Drawing SS-27.

##### 2.10.2. ENGINEERING REVIEW

Two (2) sets of plans and specifications, including complete mechanical and plumbing sections

with interceptor detail and calculations shall be submitted to the District for review and approval prior to construction. This submittal will be accompanied by a narrative explanation of the operation or process from which the interceptor will be receiving drainage.

Drawings shall be submitted to the District indicating, but not limited to the following:

- 1) Building use and size, site layout, proposed service locations, size, alignment, grades and tie-in locations.
- 2) Service sizing calculations.
- 3) Proposed interceptor location with respect to the building, street improvements and landscaping.
- 4) Interceptor sizing and by-product rate of generation calculations.
- 5) Interceptor shop drawings.
- 6) Process description of system generating fats, oil and/or grease.
- 7) The proposed maintenance schedule.

The District will review the above information in order to verify that an interceptor will be installed that is generally in conformance with accepted practices. The District is not responsible for the sizing or adequacy of the interceptor to perform its intended use, and assumes no responsibility regarding the interceptors' maintenance or operation. Maintenance logs shall be available on-site for review at all times.

Review may also be required by the South Platte Renew Wastewater Treatment Plant, Industrial Pretreatment Division policies regarding Fats, Oils, and Grease (FOG).

#### 2.10.3. SIZING CRITERIA

Sizing shall be per the South Platte Renew Wastewater Treatment Plant, Industrial Pretreatment Division Fats, Oils, and Grease (FOG) Policy.

In no case, shall the interceptor be smaller than 750 gallons.

#### 2.10.4. CONNECTIONS

Connections shall be per the South Platte Renew Wastewater Treatment Plant, Industrial Pretreatment Division's Fats, Oils, and Grease (FOG) Policy.

Generally, all fixtures associated with kitchen and food prep areas should be routed through the grease interceptor.

#### 2.10.5. MAINTENANCE

Maintenance of the grease interceptor shall be per the South Platte Renew Wastewater Treatment Plant, Industrial Pretreatment Division's Fats, Oils, and Grease (FOG) Policy. As stated in this policy, no biological, enzymatic, emulsification, or chemical treatment is permitted for use in GGIs. In addition to these additives, no mechanical type equipment (i.e. mixers, agitators, etc.) shall be used.

The District does retain the right as allowed by Colorado State Statute, to review all interceptors during regular business hours, on an unscheduled basis, to determine if the unit is operating satisfactorily and being maintained on a regular basis.

## 2.11. PETROLEUM OIL, GREASE, AND SAND (POGS) INTERCEPTORS

### 2.11.1. GENERAL

Facilities which discharge any quantities of petroleum oil, grease, and sand or other inert debris into the sanitary sewer service shall have a sand/oil interceptor (SOI) installed on the sewer service line. Examples of such facilities include, but are not limited to: automobile service stations, mechanical repair shops, car washes, garden nurseries, warehouses, and parking garages with floor drains. Bypasses are not permitted around sand and oil interceptors. Generally, policies relating to placement, sizing, plumbing routing, and maintenance, can be found in the Petroleum Oil, Grease, and Sand (POGS) Policy of the South Platte Renew Wastewater Treatment Plant, Industrial Pretreatment Division. Any design that is unable to comply with this policy will be reviewed by the District on a case by case basis.

In all cases, grease interceptors shall be located on the service line outside the building served, upstream of the location where human waste enters the service, and so installed and connected as to be easily accessible for inspection and cleaning. If the interceptor must be installed within the building due to space limitations, prior written authorization must be obtained from the District.

The District will determine whether a SOI is required whenever a new service line is proposed, and whenever an existing service line changes ownership or intended use. If the District determines that an existing facility needs to have a SOI installed, the Owner shall be required to provide the interceptor at Owner's expense, even if the interceptor was not originally required on the service line. SOIs shall conform to the "Oil and Sand Trap Interceptor Detail," Drawing SS-28.

### 2.11.2. ENGINEERING REVIEW

Two (2) sets of plans and specifications, including complete mechanical and plumbing sections with interceptor detail and calculation shall be submitted to the District for review prior to construction. This submittal will be accompanied by a narrative explanation of the operation or process from which the interceptor will be receiving drainage.

Drawings shall be submitted to the District indicating, but not limited to the following:

- 1) Building use and size, site layout, proposed service locations, size, alignment, grades and tie-in locations.
- 2) Service sizing calculations.
- 3) Proposed interceptor location with respect to the building, street improvements and landscaping.
- 4) Interceptor sizing and by-product rate of generation calculations.
- 5) Interceptor shop drawings.
- 6) Process description of system generating petroleum oil, grease and/or sand.
- 7) The proposed maintenance schedule.

The District will review the above information in order to verify that an interceptor will be installed that is generally in conformance with accepted practices. The District is not responsible for the sizing or adequacy of the interceptor to perform its intended use, and assumes no responsibility regarding the interceptors' maintenance or operation.

The installation uses a two (2) stage precast vault located outside the building, in accordance with the Oil & Sand Interceptor and Commercial Grease Interceptor details found in Section 5 of these Specifications.

#### 2.11.3. SIZING CRITERIA

Sizing shall be per the South Platte Renew Wastewater Treatment Plant, Industrial Pretreatment Division Petroleum Oil, Grease, and Sand (POGS) Policy.

In no case, shall the interceptor be smaller than 500 gallons

#### 2.11.4. CONNECTIONS

Connections shall be per the South Platte Renew Wastewater Treatment Plant, Industrial Pretreatment Division's Petroleum Oil, Grease, and Sand (POGS) Policy.

#### 2.11.5. MAINTENANCE

Maintenance of the grease interceptor shall be per the South Platte Renew Wastewater Treatment Plant, Industrial Pretreatment Division's Petroleum Oil, Grease, and Sand (POGS) Policy. As stated in this policy, no biological, enzymatic, emulsification, or chemical treatment is permitted for use in SOIs. In addition to these additives, no mechanical type equipment (i.e. mixers, agitators, etc.) shall be used.

The District does retain the right as allowed by Colorado State Statute, to review all interceptors during regular business hours, on an unscheduled basis, to determine if the unit is operating satisfactorily and being maintained on a regular basis.

### 2.12. INDUSTRIAL PRETREATMENT

Any development which generates industrial wastewater will be required to install a pretreatment process prior to the sewage effluent entering the public sanitary sewer system. Facilities may include (but are not limited to):

- Food Service Establishments
- Brewing Beer or Distilling Spirits
- Automotive Garages
- Coating (Painting) Facilities
- Medical, Dental, and Veterinary Facilities
- X-Ray and Medical Imaging Facilities
- Photo Processing Facilities
- Printing and Publishing Businesses
- Power Washing, Carpet Cleaning, and similar mobile washing facilities

It is the industrial Property Owner's responsibility to be in compliance with the South Platte Renew Wastewater Treatment Plant, Industrial Pretreatment Division.

The Owner is required to contact the Littleton/Englewood Wastewater Treatment Plant (303-762-2600) to determine the type and degree of pre-treatment required.

### 2.13. UNDERDRAINS

For the purposes of this Section 2.13, Underdrains are defined as facilities and systems designed to collect and convey groundwater which may accumulate around building foundations.

Underdrains shall not be installed within any sanitary sewer trench, public or private, without the express written consent of the District, and then only upon the terms and conditions stated herein.

Underdrain systems are not part of the District system. The regulations, specifications and other requirements stated herein are solely to define the terms and conditions upon which underdrain systems may be allowed in public or private sanitary sewer trenches in the District, and any District plan review, plan acceptance, or construction observation relating to underdrains shall be for the sole purpose of ensuring the compliance of such underdrains with the conditions of any authorization for the same to be installed in sanitary sewer trenches.

Any Property Owner seeking District authorization to install an underdrain in a sanitary sewer trench in the District shall submit a written request therefore accompanied by an executed form of Underdrain Agreement found in the APPENDIX F. The District shall have sole, exclusive and unfettered discretion to deny or permit any proposed underdrain system to be constructed beneath sanitary sewer facilities. Allowing any such underdrain is an accommodation to the Property Owner.

- The underdrain shall be designed by the Owner's consulting engineer and shall observe the following guidelines to protect sanitary sewer facilities from adverse impacts from the under drain.
- The underdrain system shall be designed and constructed as a groundwater conveying system that is independent of the sanitary sewer foundation and bedding material.
- Sanitary sewer bedding shall not be used in the underdrain systems. An 8 mil polyethylene barrier shall be placed beneath of the sanitary sewer system and above the proposed underdrain systems. No allowance shall be taken for the porosity of the sewer system bedding material in calculating the under drain capacity.
- All pipes proposed to be installed beneath the sanitary sewer system shall have a pipe class equal to or greater than the sanitary sewer pipe.
- Underdrain systems shall have adequate daylight points as underdrain systems are not permitted below the District's outfall sanitary sewer lines. Clay cut-off walls shall be installed with solid wall pipe downstream of the cut-off wall where the underdrain system alignment daylights away from the sanitary sewer system.
- Underdrain systems shall not pass beneath any manhole or structure, but shall be routed around the manhole or structure using solid wall pipe.
- Underdrain cleanouts shall not be permitted to be installed in sanitary sewer manholes.
- Construction details for construction around manholes and cut-off walls shall be submitted to the District for review.
- The locations of the underdrain system and daylight points shall be referenced on the Construction Plans.
- Roof drains and other surface water collection systems shall not discharge into an underdrain system.

The following note must be placed on all sanitary sewer system construction plans for developments with underdrain systems:

"Underdrain systems composed of gravel, solid pipe, and/or perforated pipe are not a part of the District's sanitary sewer system and are not designed, owned, or maintained by the District."

## 2.14. PROTECTION OF WATER SUPPLIES

### 2.14.1. WATER SUPPLY INTER-CONNECTIONS

There shall be no physical connection between a public or private potable water supply system and a sanitary sewer, or appurtenance thereto which would permit the passage of any sanitary sewage or non-potable water into the potable water supply.

### 2.14.2. RELATIONSHIP TO WATER SUPPLY SOURCES

While no general statement can be made to cover all conditions, it is generally recognized that sanitary sewers must be kept remote from public water supply wells or other water supply sources and structures in accordance with the applicable Colorado State and/or County Health Department Standards.

### 2.14.3. RELATIONSHIP TO WATER LINES

Sewers shall be located a minimum of ten (10) feet horizontally from existing or proposed water lines (centerline distance). Where sewer lines cross water mains, the sewer pipe shall be a minimum of 18" clear distance vertical separation from the water line. If this clear distance is not feasible, the crossing must be designated and constructed so as to protect the water line. Minimum protection shall consist of the installation of an impervious and structural sewer. All such cases must be brought to the District's attention and a sound engineering solution shall be determined on a case by case basis.

In all cases, suitable backfill or other structural protection shall be provided to preclude settling and/or failure of any pipe.

## 2.15. ENCASEMENTS AND CASINGS

### 2.15.1. CONCRETE OR CLSM ENCASEMENTS

Concrete or CLSM encasements may be required by the District, under the following conditions:

- Where sewer lines are at a depth too shallow to sustain traffic loads or any other load to which they are, or will be subjected.
- At locations where horizontal or vertical movement or loading of the sewer line may be experienced.
- At any other location designated by the District.

Encasements shall be of a length to completely span the condition encountered. The concrete encasement detail is generally acceptable for most conditions but the District may require a special, site specific concrete encasement on a case-by-case basis.

2.15.2. PIPE CASINGS

Pipe casing shall be used where pipe crosses under another utility 36-inch diameter and greater or protective installations (e.g. creek crossings) are required by the District. All pipe casings shall be constructed to conform to Section 4 and the "Pipe Casing" Detail, found in Section 5, of these Specifications.