

CHAPTER 15: SEWAGE DISPOSAL - PUBLIC - SEWERS - CONSTRUCTION

**Flagg Creek Water Reclamation District - Sewage Disposal - Public -
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' 15-1.01 ADOPTION OF STANDARD SPECIFICATIONS.

(A) The District hereby adopts, as its standard specifications, those specifications found in the document entitled *Standard Specifications for Sanitary Sewer and Water Main Construction* (most recent edition) as amended, from time to time.

(B) To the extent such specifications may be incomplete, the District supplements said standards by the additional standards and procedures set forth below; however, in the event of conflict, the aforesaid standards shall govern.

(Prior Code, ' 15-1.01)

' 15-1.02 PLANS - SANITARY SEWER REQUIRED - APPROVAL.

No sanitary sewer or portion thereof which is designed and is to be constructed so as to constitute an integral part of the system of sanitary sewers discharging, directly or indirectly, into any sewer tributary to the works of the system shall be constructed until and unless the District has been furnished with two complete sets of plans and specifications prepared and sealed by a state registered professional engineer and such plans and specification meet the approval of the District.

(Prior Code, ' 15-1.02)

' 15-1.03 PLANS - STORM SEWER REQUIRED - APPROVAL.

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No storm sewer, which is designed and is to be constructed within the jurisdiction of the District, shall be constructed until and unless the District has been furnished with two complete sets of plans and specifications, prepared and sealed by a state registered professional engineer and such plans and specifications meet the approval of the applicable municipality or public governing body having jurisdiction thereof.

(Prior Code, ' 15-1.03)

' 15-1.04 SPECIAL CRITERIA.

The following criteria shall be adhered to in the design of all sanitary sewers and in the writing of specifications for all sanitary sewers.

(A) Plans and specifications for new sewers or extensions of old sewers shall not be approved by the District unless the new sewers are designed as sanitary sewers only, from which storm waters from roofs, streets and other areas, and ground water from foundation drains and any other subsurface drains are by design and construction to be excluded.

(B) Sewer systems or constituent parts thereof shall be designed for the estimated ultimate tributary population, except that for parts of the system having limited immediate use and that can be readily increased in capacity, such as lift station impellers and motors, may with District approval be sized for less than ultimate loadings. All such plans shall address serving the maximum anticipated populations of institutions existing or pending.

(C) In determining the required capacities of sanitary sewers, the following factors shall be considered:

- (1) Maximum hourly quantity of sewage;
- (2) Additional maximum sewage or waste from industrial plants;
- (3) Ground water infiltration;

(4) Per capita flow, sewer systems constructed after the effective date of this Ordinance shall be designed on the basis of an average daily per capita flow of sewage of not less than 100 gallons per day. This figure is assumed to cover normal infiltrations, but an additional allowance shall be made at District direction where the ground water or soil conditions are deemed unfavorable and the aforesaid capacity inadequate. Sewers shall be designed to carry, when running full, not less than the following daily per capita contributions of sewage, exclusive of sewage or other waste from industrial plants:

- (a) Laterals and sub-main sewers - 400 gallons; and
- (b) Main, trunk and outfall sewers - 250 gallons.

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(5) When deviations from the foregoing per capita rates are demonstrated, a brief description of the procedure used for making the calculations for the sewer design shall be included with the plans and specifications;

(6) No public sewer line or building service line serving more than one structure shall be less than eight inches in diameter;

(7) In general, where terrain characteristics permit, sewers shall be designed deep enough to drain basements and to prevent freezing;

(8) (a) 1. All sewers shall be so designed and constructed as to give mean velocities, when flowing full, of not less than two feet per second, based on Kutter's formula using an $An@$ value of 0.013. Use of other practical $An@$ values may be permitted by the District if deemed justifiable on the basis of research or field data presented.

2. The following are the minimum slopes which shall be provided; however, slopes greater than these are desirable:

<i>Sewer Size</i>	<i>Minimum Slope in Feet per 100 Feet</i>
8 inches	0.40
10 inches	0.28
12 inches	0.22
14 inches	0.17
16 inches	0.14
18 inches	0.12
21 inches	0.10
24 inches	0.08

(b) Under special conditions, if full and justifiable reasons are given, slopes slightly less than those required for the two feet per second velocity when flowing full may be permitted upon special approval of the District. Such decreased slopes will only be considered where the depth of flow will be 0.3 of the diameter or greater for design average flow. Whenever such decreased slopes are selected, the engineer shall furnish his or her computations of the depths of flow in such pipes at minimum, average and peak rates of flow. It is recognized that such decreased slopes may cause additional sewer maintenance expense and an additional charge may be made at the time of issuance of the construction permit. Sewers shall be laid with uniform slope between manholes.

(9) Sewers 24 inches or less shall be laid with straight alignment between manholes;

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(10) When a sewer joins a larger one, the invert of the larger sewer shall be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevations;

(11) In general, velocities shall be maintained below ten feet per second, unless upon written application, specific permission is granted for velocities greater than ten feet per second. Where velocities greater than 15 feet per second are permitted, special provisions shall be made to protect against displacement by erosion and shock;

(12) (a) Any generally accepted material for sewers will be given consideration but the material selected shall be adapted to local conditions, such as character of industrial wastes, possibility of septicity, soil characteristics, exceptionally heavy external loadings, abrasion and similar problems.

(b) All sewers shall be designed to prevent damage from superimposed loads. Proper allowances for loads on the sewer shall be made because of the width and depth of the trench. When standard strength sewer pipe is not sufficient, the additional strength needed may be obtained by using extra strength pipe or by special construction.

(13) The method of making joints and the materials used shall be included in the specifications. The leakage outward or the infiltration shall not exceed 200 gallons per inch of pipe diameter per mile, per day for any section of the system and may be less, if so directed by the Board of Trustees for special situations;

(14) (a) Manholes shall be installed at the end of each line; at all changes in grade, size or alignments; at all intersections; and at distances not greater than 400 feet for sewers 15 inches or less, and 500 feet for sewers 18 inches to 30 inches. Greater spacing may be permitted in larger sewers and in those carrying a settled effluent. Manholes may be used for special conditions only and shall not be substituted for manholes. Manholes on existing sewers may be required by the District prior to making certain connections thereto; and, if required by the District, shall forthwith be constructed by the person or persons served by any such sewer upon written notice to such person or persons of such requirements from the District.

(b) Manhole requirements are as follows.

1. A drop pipe shall be provided for a sewer entering a manhole at an elevation of 24 inches or more above the manhole invert. Where the difference in elevation between the incoming sewer and manhole is less than 24 inches, the invert shall be filleted to prevent solids deposition.

2. The minimum diameter of manholes shall be 48 inches.

3. The flow channel through manholes shall be made to conform in shape and slope to that of the sewers.

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4. Manholes shall be of the precast concrete sectional type with eccentric cones.

5. Cast iron frames and closed, bolt-down, water-tight lids (lock tight or equivalent) shall conform to the standards applicable to the usage. All manholes shall be built up such that when the cover is in place, it will be at the required grade. All manhole grades shall require approval by the District.

(15) Inverted siphons shall have not less than two barrels with a minimum pipe size of six inches and shall be provided with necessary appurtenances for convenient flushing and maintenance; the manholes shall have adequate clearance for rodding; and, in general, sufficient head shall be provided and pipe sizes selected to secure velocities of at least three feet per second for average flows. The inlet and outlet details shall be arranged so that the normal flow can be diverted into one barrel, and so that either barrel may be cut out of service for cleaning.

(a) There shall be no physical connection between a public or private potable water supply system and a sewer, or appurtenance thereto, which could permit the passage of any sewage or polluted water into the potable supply.

(b) In general, sanitary sewers shall be kept remote from public water supply wells or other supply sources and structures.

(c) Whenever possible, sewers shall be laid at least ten feet, horizontally from an existing or proposed water main. Should local conditions prevent a lateral separation of ten feet, a sewer may be laid closer than ten feet to a water main:

1. If it is laid in a separate trench; or

2. If it is laid in the same trench with the water main located at one side on a bench of undisturbed earth; and

3. If, in either case, the elevation of the top (crown) of the sewer is at least 18 inches below the bottom (invert) of the water main.

(16) Whenever sewers must cross under water mains, the sewer shall be laid at such an elevation that the top of the sewer is at least 18 inches below the bottom of the water main. When the elevation of the sewer cannot be varied to meet the above requirements, the water main shall be relocated to provide this or reconstructed with mechanical joint pipe for a distance of ten feet on each side of the sewer. One full length of water main shall be centered over the sewer so that both joints will be as far from the sewer as possible; and

(17) When it is impossible to obtain proper horizontal and vertical separation as stipulated above, both the water main and sewer shall be constructed of mechanical joint cast iron pipe and shall be pressure tested to assure water-tightness.

(Prior Code, ' 15-1.04)

' 15-1.05 STANDARD SPECIFICATIONS FOR LIFT STATIONS.

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(A) The District hereby adopts, as its standard specifications for lift stations, those specifications and requirements contained in its document entitled *Flagg Creek Water Reclamation District Standard Specifications for Lift Stations*. Said *Standard Specifications*, as amended from time to time, are hereby incorporated as if fully set forth herein.

(B) (1) *Lift stations.*

(a) All below grade walls, floors, slabs and the like shall be constructed of properly designed reinforced concrete.

(b) Valves shall be housed in a valve vault.

(c) A properly designed cathodic protection system will be provided to protect metal structures, as required.

(d) The wet well will be sized for no more than six cycles per hour.

(e) Redundant pumping capacity will be provided. Pumps will be installed on a Arail system@.

(f) A properly sized, back-up natural gas generator with a sound abatement enclosure shall be installed.

(g) A remote alarm/telemetry system compatible with FCWRD=s system shall be provided with alarms for power failure, high water level in wet well/dry well and pump failure included.

(h) The PLC controller shall be provided with a battery back-up.

(i) MOV surge protection shall be provided for the inline current.

(j) The level control for the pumps shall be by means of a transducer with a mechanical float back-up system.

(k) All electrical enclosures shall be made of type 314 stainless steel with an appropriate NEMA rating.

(l) A minimum of two weatherproof lighting fixtures shall be included with manual off/on switch.

(m) A paved area shall be provided around the entire facility with enough room for a service truck, equipment and workers to work safely.

(n) The entire paved area shall be fenced in with an eight-foot high chain link fence with vinyl slats.

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(o) A double gate shall be provided to permit service truck entry.

(p) A minimum 18 inches by 24 inches sign with emergency contact information shall be provided.

(2) *Forcemain related items.*

(a) *Forcemain pipe and fittings.*

1. Pipe and fittings for forcemain shall meet the requirements of ' 40 of the SSWSMCI and the following. Pipe and fittings shall be installed in accordance with the requirements of ' 41 of the SSWSMCI. Excavation and foundation shall be according to Article 550.04 of the *IDOT Standard Specifications for Road and Bridge Construction*, adopted January 1, 2007. Backfilling shall be according to Article 550.07 of the IDOT Standard Specifications.

2. Pipe for forcemain shall be PVC pipe meeting the requirements of AWWA C-900 of the size shown on the plans. Fittings shall be the Certa-Lok C900/RJ restrained joint system as manufactured by CertainTeed. Pipe bends shall be Certa-Lok C900/RJ Restrained Joint PVC Pipe Sweeps. The pipe shall be watermain quality pipe suitable for an operating pressure of 100 psi. Thrust blocks shall not be used. One-inch corporation taps shall be provided for air release at the locations shown on the plans. Any connections between PVC and ductile iron pipes shall make use of Class 52 ductile iron pipe fittings and megalug retainer connection.

(b) *Steel casing (augered).*

1. In the event steel casing pipe is required, the casing pipe shall conform to ASTM A139, Grade B (60,000 psi, tensile strength) with minimum wall thickness as indicated in the following table per the inside diameter as indicated in the plan documents.

<i>Outside Diameter (Inches)</i>	<i>Wall Thickness (Inches)</i>
26 or less	0.250
27 - 42	0.375
43 - 48	0.500

2. Joints in steel casing pipe shall be welded in accordance with AWWA C206.

3. The carrier pipe inside the casing pipe shall be PVC pipe as specified elsewhere in these special provisions. The carrier pipe shall be supported inside the casing pipe by stainless steel casing spacers.

4. The entire length of casing should be completely installed before any carrier pipe is placed therein. The annular space between the casing and carrier pipe shall be blown full of dry sand

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and the ends of the casing pipe shall be sealed with bricks and mortar or a Cascade model CCESS end seal with stainless steel bands or approved equal.

(c) *Pressure test of forcemain.* Pressure testing of the forcemain shall comply with the requirement of ' 41-2.13 of the *Standard Specifications for Water and Sewer Main Construction in Illinois*, May 1996, 5th Edition (SSWSMCI) and the following.

1. The hydrostatic test pressure shall be 100 psi and maintained for two hours.
2. A recovery test shall be conducted if the test pressure was not maintained for the duration of the test period, to determine the quantity of water lost by leakage under the specified test pressure. The allowable leakage in gallons per hour per 1,000 feet of forcemain shall be 0.81 for 12-inch PVC forcemain per ' 41-2.13C of SSWSMCI.
3. The pressure test shall be completed on the force main installed prior to the final connection to the existing force main.
(Prior Code, ' 15-1.05) (Ord. 820, passed 4-24-2008)

' 15-1.06 PLANS - REQUIRED APPROVAL.

No lift station, which is designed and is to be constructed so as to constitute an integral part of the system of sanitary sewers discharging, directly or indirectly, into any sewer tributary to the works of the system, shall be constructed until and unless the District has been furnished with two complete sets of plans and specifications prepared and sealed by a state registered professional engineer and such plans and specifications meet the approval of the District.
(Prior Code, ' 15-1.06) (Ord. 820, passed 4-24-2008)