**Section 905.60 Subsurface Seepage System Construction Requirements**

a) Seepage Field Requirements – Gravel, Gravelless and Chamber Systems. Subsurface seepage fields shall be designed and constructed in accordance with Appendix A, Illustrations H, I and J and the following:

1) All subsurface seepage systems using soils information for sizing shall use the soil suitability table in Appendix A, Illustration M to determine the size requirements of the subsurface seepage system. The least permeable soil layer between the top of the gravel or gravelless pipe or chamber system and 2 feet below the bottom of the trench shall be used to determine the size of the subsurface seepage system. For mound or at-grade systems, the least permeable soil layer in the upper 2 feet of the soil shall be used to determine system size.

2) The bottom of the subsurface seepage field, each trench and its distribution line shall be level. Level for this Part shall mean plus or minus ½ inch in any direction over the entire area of the subsurface seepage system.

3) There shall be a minimum of 6 inches and a maximum of 24 inches of earth backfill over the bedding materials, gravelless pipe or chamber system.

4) There shall be a minimum of 5 feet of undisturbed earth between the septic tank and the nearest trench.

5) If precipitation falls onto the excavation and evidence of soil washing into the excavation of the subsurface seepage system exists, the damaged portion of the seepage system shall be reconstructed to comply with this Section.

6) The top of the gravel, gravelless pipe, or chamber system in the subsurface seepage field shall be at least one inch below the invert of the outlet pipe from the septic tank or distribution box in a gravity flow system.

7) Site Evaluation for Subsurface Seepage Systems. Subsurface seepage systems receiving septic tank effluent shall have at least 2 feet of vertical separation distance between the bottom of the subsurface seepage system and the top of the limiting layer. For soils in Design Group I-VI or with a loading rate of greater than 0.62 gallons per day per square foot, there shall be at least a vertical separation distance of 3 feet between the bottom of the subsurface seepage system and the top of the limiting layer. When the limiting layer is the estimated seasonal high water table, artificial drains, which are designed to lower the estimated seasonal high water table, may be installed to achieve the specified vertical separation distances.

8) Sizing of a Seepage System in Fill Soil

A) The least permeable soil layer between the top of the gravel, gravelless pipe or chamber system and 2 feet below the bottom of the trench shall be used to determine the size of the subsurface seepage system.

B) The use of fill for installing subsurface seepage systems shall not be approved for lots platted after March 15, 1996.

C) Fill soils may be used to cover a private sewage disposal system, provided that no part of the system is located in the fill and the fill material is at least equal to or better than the original soil or meets the requirements in subsection (a)(9).

9) Soil Criteria for Use of Fill in Subsurface Seepage Systems

A) Soils to be used for fill shall be identified by a soil classifier or licensed Professional Engineer and a report submitted to the Department or local authority. The report shall contain specific information on the fill soil, including location, depth, permeability, and texture. Soils that can be used as fill are those identified in Appendix A, Illustration M as 2A, 2B, 2K, 3A, 3B, 3C, 3K, 3L, 4B, 4D and 4K (Design Group II, III and IV).

B) In addition to the requirements in subsection (a)(9)(A), fill soil shall not contain extraneous material such as tires, concrete, brick, reinforcing bar, demolition material, etc.

C) All of the following conditions shall be met for a subsurface seepage system to be installed in fill.

i) Satisfactory original soil shall be at least 3 feet above bedrock.

ii) A maximum of 2 feet of fill soil shall be used.

iii) Fill shall not be placed on original soil with a slope greater than 10%.

iv) The fill shall be placed at the site so that a minimum of compaction occurs, and the fill shall be allowed to settle undisturbed for a period of at least 12 months. Soils in Design Group II, when used for fill, shall not be required to settle for a period of at least 12 months.

v) After the fill has been settled, a percolation test shall be conducted in accordance with the procedure outlined in Appendix A, Illustration G and a percolation rate of not greater than 270 minutes/6 inch fall or less than 60 minutes/6 inch fall shall be achieved.

10) Site Preparation for Use of Fill Soil

A) Excess vegetation shall be cut and removed. The site shall be plowed with a mold board plow 7 to 8 inches deep with the plowing done perpendicular to the slope. It shall not be done with the furrow running up and down the slope. Chisel plowing may be used in place of mold board. Roto-tilling is prohibited.

B) Once the site is plowed, all traffic shall be kept off the site. The fill material can be deposited on the top with a backhoe or pushed on from the side, preferably the upslope side, using a track type tractor, keeping 6 inches of fill beneath the tracks. At no time shall ruts be made in the plowed area. The fill shall be placed immediately after site preparation to avoid the possibility of precipitation falling on the plowed area.

C) Traffic on the downslope side of the fill area shall be minimal to reduce compaction. All work shall be performed from the ends and upslope side. Compaction of the natural soil downslope will reduce the lateral movement of the effluent.

D) The fill shall not be placed on frozen ground or when the soil is wet. Moisture content of the soil is very important when filling. Site preparation shall not take place when the soil is too wet. To check moisture content, a soil sample may be taken from the plow layer (7 to 8 inches) and rolled between the palms of the hands. If the soil rolls into a ribbon, it is too wet to prepare. If the soil crumbles, site preparation can then proceed.

b) Gravel Seepage Field Requirements

1) Bedding Material. The bedding material shall be clean gravel or clean stone that is free of mud, silt, or clay, with particle size ranging from ¾ inch minimum to 4 inches maximum. The bedding material shall extend the full width of the trench and to a depth of at least 6 inches below the bottom of the distribution line. The bedding material shall extend at least 2 inches above the top of the distribution line.

2) Distribution Lines. Distribution lines shall be constructed of materials as approved in Section 905.20(f). The lines shall be perforated or open-joint tile. Where open joint tile is used, the tile sections shall be spaced not less than ¼ inch or more than ½ inch apart. Perforated piping with the exception of 8-inch or 10-inch gravelless seepage beds shall have ½- to ¾- inch diameter openings on 3- to 5-inch centers with a minimum of 2 rows. The openings in the pipe shall be placed downward.

3) Separation Material. Bedding materials shall be covered by straw, newspaper, untreated building paper, geotextile fabric or other permeable or biodegradable material to support the backfill as the laying of the distribution line proceeds. Tar paper, plastic, or other impervious material shall not be used between the bedding material and the earth backfill.

4) The ends of a gravel seepage field shall be looped except in serial distribution systems.

c) Gravelless Seepage Field Requirements. In addition to Section 905.20(f), 8-inch or 10-inch gravelless seepage systems shall comply with the following specifications:

1) 8-inch and 10-inch inside diameter (I.D.) corrugated polyethylene tubing shall meet the requirements of ASTM F667-06, Standard Specification for Large Diameter Corrugated Polyethylene Tubing with the following exceptions:

A) Perforations shall be uniformly spaced along the length of the tubing as follows: 2 rows of holes ⅜ inch in diameter for 8-inch tubing and ½ inch in diameter for 10-inch tubing, located 120° to 140° apart along the bottom half of the tubing, each row 60° to 70° up from the bottom center line. The perforations shall be staggered so that there is at least one hole in each corrugation.

B) The pipe shall be marked to indicate the top of the pipe.

2) All gravelless drainfield pipe shall be encased at the point of manufacture with a filter wrap having the following characteristics:

|  |  |
| --- | --- |
| Physical Properties | Minimum Value |
|  |  |
| Grab Strength, lbs. (ASTM D4632) |  |
| Machine Direction  | 19 |
| Traverse Direction | 11 |
| Burst strength, psi (ASTM D3786-09) | 26 |
| Air Permeability, cfm per sq. ft. (ASTM D737-08) | 500 |
|  |  |
| Particle Size Distribution (ASTM F662-86) Polyethylene particles in water and alcoholsolution, coulter counter analysis, single pass: |  |

|  |  |
| --- | --- |
|  |  |
| Particle Size (Microns) | % Retained |
|  |  |
| 70 | 80 |
| 60 | 68 |
| 50 | 56 |
| 40 | 40 |
| 30 | 22 |
| 20 | 5 |

3) 8-inch or 10-inch gravelless seepage trenches shall comply with the following Illustrations in Appendix A unless otherwise stated in this Part:

A) Illustration D

B) Illustration H, Exhibit B

C) Illustration I, Exhibit C

D) Illustration I, Exhibit D

E) Illustration J, Exhibit C

F) Illustration J, Exhibit D

G) Illustration K, Exhibits E through H

H) Illustration M, Exhibit A

4) Bedding Material. 8-inch and 10-inch gravelless seepage systems or chamber systems may be bedded with material excavated to construct the system. The backfill material shall not contain large clods of earth, demolition material or other extraneous material.

5) Separation Material. No straw, newspaper or untreated building paper shall be placed between the gravelless seepage system or chamber system and the earth backfill.

6) Bending. 8-inch and 10-inch gravelless pipe shall not be bent around corners on a radius of less than 5 feet. If a sharper radius is required, a tee shall be used.

7) Gravelless seepage systems or chamber systems are not required to be looped. Gravelless seepage systems or chamber systems that are not looped shall be capped on the end.

d) Serial Distribution. Serial distribution shall be used in areas where the slope of the terrain prohibits the installation of conventional subsurface seepage systems. The following criteria shall be used in the design and construction of a serial distribution system (see Appendix A, Illustration K):

1) The bottom of each trench and its distribution line shall be level.

2) There shall be a minimum of 6 inches of earth backfill over the bedding material or chamber system or the gravelless pipe in the trenches.

3) The trench shall follow the ground surface contours so that variation in trench depth will be minimized.

4) There shall be a minimum of 5 feet of undisturbed earth between the septic tank and the nearest trench.

5) Adjacent trenches shall be connected with a relief line or a drop box arranged so that each trench is completely filled to the full depth of the gravel or gravelless pipe or chamber system before effluent flows to the succeeding trench.

6) The relief lines connecting the trenches shall have watertight joints and direct connections to the distribution lines in adjacent trenches. Tight joint T's and 45° ells, or a drop box arrangement shall be used to connect adjacent trenches.

7) Where the relief pipe trench connects with the higher trench, it shall not be deeper than the top of the gravel or gravelless pipe or chamber system in the higher trench. Relief lines shall rest on undisturbed earth and the backfill shall be carefully tamped.

8) The invert of the first relief line shall be at least one inch lower than the invert of the septic tank or aerobic treatment plant outlet. (See Appendix A, Illustration K.)

9) All other construction features of the serial distribution field shall comply with subsections (a) through (d).

e) Seepage Beds. The total bottom area of the seepage bed shall be 1½ times the area specified in Appendix A, Illustration H, Exhibit A or Illustration M, Exhibit A. Construction features shall conform to subsections (a) and (b). Distribution lines shall be spaced no farther than 6 feet center to center and shall be equally spaced. Lines adjacent to the bed sidewalls shall be 18 inches from the bed sidewall. (See Appendix A, Illustration L.) Seepage beds shall be constructed so that construction equipment does not drive over the bottom of the bed.

f) Chamber Systems. Chamber systems shall be sized and installed in accordance with the following:

1) Center-to-center spacing for chamber systems shall be in compliance with Appendix A, Illustration I, Exhibit D.

2) Chamber systems shall be sized in accordance with Appendix A, Illustration I, Exhibit E.

3) Chamber systems shall be designed to support all weight of earth backfill without collapsing.

4) Chamber systems shall be designed to prevent earth backfill from restricting flow within the chamber.

g) Subsurface Drip Irrigation Systems. Subsurface drip irrigation systems shall be designed, installed and maintained in accordance with the following:

1) The drip irrigation system shall be designed, installed and operated as a subsurface seepage system, and no portion of the drip irrigation system shall have a surface discharge.

A) Pre-treatment

i) The drip irrigation system shall be preceded by a pre-treatment process designed to reduce the CBOD5 (carbonaceous 5-day biochemical oxygen demand) to a maximum concentration of 25 mg/L and total suspended solids to a maximum concentration of 30 mg/L. Drip irrigation systems shall not be installed following a septic tank without any pre-treatment process capable of meeting this Part's requirements.

ii) The total flow from the property plus the backwash water from the drip irrigation system shall not exceed the treatment capacity of the pre-treatment device.

iii) The installation contractor, designer or homeowner, in consultation with the manufacturer or the manufacturer's representative, shall assure that the pre-treatment process meets the requirements of this Part.

B) Dosing Tank

i) A minimum liquid capacity of 1,000 gallons shall be provided below the inlet in the dosing tank for a residential or non-residential site.

ii) For homes larger than three bedrooms and non-residential systems with a daily design flow greater than 667 gallons/day, a dosing tank with a minimum capacity of 1.5 days design flow shall be provided.

C) Dosing Pump

i) A high head/low volume pump shall be used.

ii) The pump shall be sized based upon the design flow rate of the drip irrigation field, which shall be based on the number of emitters times the flow rate of each emitter in gallons per minute.

iii) The minimum head requirement of the pump shall be based upon the pressure requirements for the operation and flushing of the drip field plus the total static and friction head requirements of the supply lines and manifolds.

iv) Pump specifications used for drip irrigation systems shall be provided by the pump manufacturer.

v) The installation contractor, designer or homeowner, in consultation with the manufacturer or the manufacturer's representative, shall assure that the pump used is in compliance with this Part.

D) Time Dosing

i) Drip irrigation systems shall be provided with a timer to activate the dosing pump equally throughout a 24-hour period.

ii) Systems shall be dosed a minimum of 6 equal doses over a 24-hour period and shall be capable of delivering the maximum daily design flow to the drip irrigation system in a 24-hour period. More frequent doses of 8 to 24 equal doses over a 24-hour period are recommended and shall be required in soils that have a loading rate of less than 0.5 gallons/square foot/day.

iii) The dosing frequency shall be such that the soil surrounding the drip irrigation system does not become saturated.

iv) The dosing specifications shall be provided by the drip irrigation manufacturer or the manufacturer's representative in accordance with this Part.

E) Effluent Filtration

i) Wastewater effluent shall be filtered to the drip tubing manufacturer's specifications to ensure proper operation of the distribution system.

ii) The effluent filtration device shall be easily accessible for maintenance and inspection.

F) Drip Distribution System

i) The drip distribution tubing manufacturer or the manufacturer's representative shall provide written specifications for all components used in conjunction with the drip irrigation system.

ii) The manufacturer or the manufacturer's representative shall assure that all manufacturer specifications for the drip irrigation system are in compliance with this Part.

iii) The manufacturer shall incorporate measures to prevent root intrusion into the emitters.

G) Drip Emitters and Flow Rates

i) The manufacturer of the drip tubing shall specify the number of drip emitters per lineal foot and the flow rates through each emitter for different pressures.

ii) The installation contractor or homeowner, in consultation with the manufacturer or the manufacturer's representative, shall assure that the number of emitters to be used in a drip irrigation system and the types of emitters used, flows and flow rates into the soil comply with all of the manufacturer's specifications and requirements and with this Part.

H) Absorption Field Sizing

i) A soil investigation shall be conducted in accordance with Section 905.55(a).

ii) The soil loading rate (gallons/square foot/day) shall be based upon the least permeable soil condition encountered within 24 inches below the proposed depth of the drip irrigation tubing.

iii) The system size shall be based upon Appendix A, Illustration M, Exhibits A and B.

I) Drip Tubing Installation and Configuration

i) The drip tubing shall be installed in the natural soil using installation equipment and procedures specified by the manufacturer.

ii) Drip irrigation tubing shall be installed at a depth of 6 inches to 12 inches below the final graded surface.

iii) Drip irrigation tubing shall be installed on a minimum of 2-foot centers.

iv) When the drip irrigation piping is installed on slopes exceeding 20%, the spacing between the drip irrigation piping shall be 3 feet or greater.

v) The drip irrigation system shall be configured so that the length of the area of the drip irrigation tubing system is at least two times its width. If this is not possible, the drip irrigation tubing trench separation distance shall be doubled.

vi) The length of individual drip distribution tubing shall not exceed the manufacturer's specifications and shall be installed at a uniform depth that follows the contour of the site.

vii) The drip irrigation tubing shall be installed a minimum of 12 inches above a limiting layer.

J) Considerations to Prevent Freezing

i) The distribution and return manifolds shall be installed to drain back to the pre-treatment tank after the field has been dosed.

ii) If the elevations of the pre-treatment tank and dosing tank do not allow gravity flow to the pre-treatment tank, the lines shall be installed to drain back to the dosing tank.

iii) All piping and components shall be installed to allow water to drain back to the pre-treatment tank or dosing tank.

iv) To allow for drain back, a check valve shall not be installed in the supply and return lines.

K) Fill Soils

Fill soils may be used in accordance with subsection (a), except that the soil surface shall not be plowed.

L) Pressure Requirements

i) The manufacturer of the drip tubing shall specify the operating pressure requirements of the drip irrigation system and provide the specifications of any pressure regulator that may be required with the drip irrigation system.

ii) A pressure gauge shall be provided or a method of connecting a pressure gauge shall be provided on the distal end of the drip irrigation system to ensure that field pressure can be checked during inspection, evaluation and maintenance. The installation contractor or manufacturer shall ensure that the irrigation system is operating at the required specifications.

M) Flush Valves

i) An automatic or manual flush valve shall be provided on the filter and drip distribution system to allow for periodic flushing of both the drip distribution system and the filter.

ii) The drip distribution system manufacturer shall provide the specifications for the flush valves that are acceptable to use with the system. The manufacturer shall also provide specifications on the number of flush valves to be used and their location, with specifications about how this is to be determined and the backwash velocity required to clean the drip tubing piping.

iii) A chemical injection port shall be installed to facilitate cleaning and flushing the drip distribution system.

iv) Backwash water shall be directed into the building sewer at the inlet end of the pre-treatment system.

N) Air Relief

i) The manufacturer of the drip tubing shall specify the air relief requirements of the drip distribution system and provide the specifications of any air relief devices that may be required with the drip irrigation system to ensure that the distribution piping can drain back to the dosing chamber when the system is not pressurized.

ii) The air relief device shall be installed at the highest point of the feed and return manifolds.

O) Alarm

i) An audible and visual alarm shall be provided to warn of a high water condition in the dosing tank.

ii) The alarm shall be on a separate dedicated circuit.

iii) The alarm control device shall be a sealed float or diaphragm switch and shall be located to activate 2 to 3 inches above the pump turn-on level or siphon activation level.

iv) The alarm shall be located outside of the structure served by the system and shall be provided with an electrical disconnect that is located within sight of and not more than 50 feet away from the device.

v) If an alarm is being used by another component within the private sewage disposal system, is compliant with subsections (g)(1)(O)(i) through (iv), and is able to connect additional devices, it may be used without the need for an additional alarm.

P) Access

i) Access openings to the pre-treatment system, effluent filtration system, and dosing tanks shall have a minimum inside dimension of 18 inches, shall be watertight and shall extend to 3 inches or more above the ground surface.

ii) Access openings to all other system components shall be large enough to allow easy access from the ground surface.

Q) Maintenance

i) The manufacturer shall provide specifications for the maintenance of all components within the drip irrigation system.

ii) The manufacturer shall provide a maintenance plan to ensure that maintenance is conducted as required to achieve the proper function of the system.

2) The installation contractor or manufacturer shall provide the following information to the owner of the system:

A) An operation manual;

B) The maintenance plan for the drip irrigation system;

C) The manufacturer of the components and a description of the function of the components;

D) The service contract information;

E) A troubleshooting repair guide;

F) A list of safety concerns;

G) Manufacturer's cut sheets for all electrical and mechanical components; and

H) An as-built drawing of the system.

(Source: Amended at 37 Ill. Reg. 14994, effective August 28, 2013)