

Title 15 - Mississippi State Department of Health

Part III – Office of Health Protection

Subpart 77 – On-site Wastewater

APPENDIX 03 DESIGN STANDARD: AGGREGATE REPLACEMENT

100 Introduction

In a conventional onsite wastewater system treatment begins in the septic tank, under anaerobic conditions. Final treatment and disposal takes place in the soil of the drain field, an aerobic environment. It is necessary for this aerobic condition to exist in the soil of the drain field for proper treatment of the effluent.

101 Definitions

101.01 Chamber System - a system of bottomless molded plastic chambers installed in direct contact with the trench bottom to infiltrate primary treated effluent into the soil for final treatment and disposal.

101.02 Aggregate Replacement Disposal System - any normally gravity-fed subsurface disposal field utilizing an alternate media or technology to act as a replacement for the aggregate media. These system depths range from 36 to 6 inches in depth.

Standard Subsurface Disposal 25 in. to 36 in.

Shallow Subsurface Disposal 13 in. to 24 in.

Ultra-shallow Subsurface Disposal 6 in. to 12 in.

101.03 Large Diameter Aggregate Replacement System - subsurface disposal system that utilizes large diameter pipe covered with a filtering material approved by the Mississippi State Department of Health for use in IOWDS systems.

101.04 Multi-Pipe Aggregate Replacement System - subsurface disposal system that utilizes a multiple arrangement of piping, approved by the Mississippi State Department of Health, to replace the aggregate media of conventional soil absorption systems for use in IOWDS systems.

101.05 Treatment - a process applied to wastewater which causes the resulting effluent to meet or exceed EPA secondary standards for treated wastewater for surface discharge and which does not endanger the public health.

102 Site Evaluation

- 102.01 Information obtained during the soil and site evaluation will determine which type(s) of IOWDS may be utilized for an individual lot.
- 102.02 Prior to completing the Soil and Site Evaluation/System Recommendation, the Environmentalist shall visit the lot and conduct the soil and site evaluation.
- 102.03 The soil determinations will be made based on soil borings to a depth of five feet or to a depth sufficient to reach a restrictive horizon. Restrictive soil or site conditions may preclude the use of any subsurface disposal system.
- 102.04 A soil and site evaluation will be based on the following criteria:
1. Absence of or protection from frequent flooding.
 2. Landscape position with good surface runoff.
 3. Slopes of less than 15%.
 4. Depth to high water table of greater than four feet.
 5. Depth to bedrock, fragipan or plinthite of greater than four feet.
 6. Soil texture and color defined by the Natural Resource Conservation Service as indicating good drainage and suitability for soil absorption, based on a soil boring of five feet.
 7. Available area in which to install an individual onsite wastewater disposal system meeting all requirements of this regulation. The area for repairs and future extensions shall be no less than 50% of the space required for the recommended system. Systems utilizing surface land application discharge are exempt from the 50% additional area requirement.
- 102.05 The non compliance of one or more of the above items may require a design alteration of an underground system.

103 Location of Onsite Wastewater Disposal Systems

- 103.01 All components of the onsite wastewater disposal system shall be located a minimum of:
1. five feet from any dwelling.
 2. ten feet from any property line.
- 103.02 Any vessel holding wastewater shall be located a minimum of 50 feet from any public, private or individual potable water source.

- 103.03 The effluent disposal field shall be located at a lower elevation or in a landscape position that will preclude any surface runoff from flowing in the direction of the well site and a minimum of 100 feet from any public, private or individual potable water source.
- 103.04 Potable water lines shall not pass under or through any part of the sewage disposal system. Where a water supply line must cross a sewer line, the bottom of the water service within ten feet of the point of crossing, shall be at least 12 inches above the top of the sewer line. The sewer line shall be of Schedule 40 pipe with cemented joints at least ten feet on either side of the crossing. Water and sewer lines shall not be laid in the same trench. The water and sewer lines, when laid on the same elevation, shall maintain a minimum separation distance of 10 feet.
- 103.05 The surface of or the surface above the disposal field shall not be used for vehicular traffic or vehicular parking.
- 103.06 No portion of an onsite wastewater disposal system shall be located under dwellings or other permanent structures.
- 103.07 Effluent disposal systems shall not be located in depressed areas where surface water will accumulate. Provision shall be made to minimize the flow of surface water over the effluent disposal field.
- 103.08 ~~Subsurface wastewater disposal fields located on slopes of less than eight percent shall have a minimum setbacks from recreational waters, shellfish waters or other sensitive areas~~ from sensitive waters. [See Table I].
- 103.09 ~~Subsurface wastewater disposal fields located on slopes of greater than eight percent shall be located a minimum of 100 feet from recreational waters, shellfish waters and other sensitive areas.~~
- 103.10 Slopes of greater than 30% shall not be considered for subsurface disposal installation.
- 103.11 Where all or part of the onsite wastewater disposal system is proposed to be installed on property other than the owner's, an easement in perpetuity shall be legally recorded in the proper county. The easement shall be of sufficient area to permit access, construction and maintenance of the onsite sewage disposal system.
- 103.12 No site for an effluent disposal field or expansion area shall be approved which is located wholly within an area which is frequently flooded, swamp, marsh, or wetland. Except that if permits have been issued by the proper regulatory agency authorizing the use of wetlands for building sites, the property shall be evaluated using standard soil and site criteria for IOWDS.

- 103.13 When a proposed lot is located partially within a frequently flooded area, that portion of said lot not within the flood prone area may be considered for approval for the effluent disposal field.
- 103.14 There shall be maintained a minimum of 12 inches of unsaturated soil between the bottom of the subsurface disposal system and a perched or seasonal water table in soils that contain a restrictive horizon (fragipan, chalk, bedrock, clay or silty clay) within five feet of the surface.
- 103.15 There shall be maintained a minimum of 24 inches of unsaturated soil between the bottom of the subsurface disposal system and any perched or seasonal water table in soils that do not contain a restrictive horizon (fragipan, chalk, bedrock, clay or silty clay) within five feet of the surface.
- 103.16 Easements or right-of-way areas for utilities, surface or subsurface drainage, roads, streets, ponds or lakes shall not be used as available space for location of individual onsite sewage disposal systems.
- 104 Underground Absorption
- 104.01 Aggregate replacement systems shall comply with all criteria for subsurface gravel disposal systems except in sections pertaining to the gravel media or as specified in this regulation.
- 104.02 The size of the subsurface sewage disposal system shall be determined by soil texture and estimated wastewater flow.
- 104.03 Soils with excessively rapid permeability rates, gravel and coarse sand, shall be considered unsuitable for subsurface disposal unless the native soil is replaced with a suitably thick (greater than two feet) layer of loamy sand or sand textured soil.
- 104.04 Soils with excessively slow permeability rates, silty clay and clay, shall be considered unsuitable for conventional subsurface disposal.
- 104.05 Subsurface disposal systems shall be placed no deeper than 36 inches below the surface.
- 104.06 Aggregate replacement subsurface disposal systems shall have a minimum 12 inches of soil backfill.
- 104.07 The minimum distance between absorption trench sidewalls shall be six feet.
- 104.08 Trenches shall not be excavated when the soil is wet enough to smear or compact easily.

- 104.09 There shall be a minimum of three feet of undisturbed soil between the excavation for the septic tank or treatment plant and the beginning of the absorption trench, bed or effluent line.
- 104.10 The bottom of the outlet of the septic tank, aerobic treatment plant or vessel supplying effluent to the pipe must be a minimum of one inch above the top of the aggregate replacement system.
- 104.11 Care must be taken when backfilling to prevent the pipe from shifting during the backfilling process.
- 104.12 Soil material excavated from trenches shall be used in backfilling and should be left mounded over the trenches until initial settling has taken place.
- 104.13 Standard manufactured fittings compatible with the pipe shall be used to connect all pipes within the effluent disposal field.
- 105 Alternating Disposal Fields
- 105.01 An alternating effluent disposal field system provides two complete disposal fields, separated by a valving system so that each system could alternately be used and rested. This "resting" has shown to be useful in regenerating the soil's capability for absorbing the effluent.
- 105.02 The size of each field can be from 50 to 100 percent of the required square footage of a single disposal field.
- 105.03 The length of time each field would be used and then rested will be determined on a case-by-case basis.
- 106 Shallow and Ultra-shallow Disposal Fields
- Shallow or ultra-shallow systems can sometimes be used where the depth to the restrictive horizon or water table is less than the minimum required. Placement of the system may be as shallow as 6 inches for large diameter double-six aggregate replacement pipe systems. Ultra-shallow installations shall be restricted to soil textures of loam or lighter. Shallow installations may be placed in any texture shown as suitable in the system specific sizing tables.
- 107 Sizing
- The large diameter aggregate replacement systems shall be sized in accordance with the following tables.
- 108 Construction
- 108.01 Large diameter aggregate replacement absorption trenches shall be a minimum of 24 inches and a maximum of 36 inches in width.

- 108.02 The bottom of the trenches or bed and the distribution lines shall have a grade from level to no greater than two inches fall per 100 feet for double six inch large diameter aggregate replacement pipe and one inch fall per 100 feet for eight and ten inch large diameter aggregate replacement pipe.
- 108.03 Overlap filter wrap at coupling joints and seal using factory approved methods.
- 108.04 The 4" pipe from the septic tank, aerobic treatment plant or vessel supplying effluent to the aggregate replacement pipe shall be installed into an offset connector particular to the type and manufacturer of the pipe. These connectors will also be used when crossovers are constructed to change elevations of field system.
- 108.05 Fabric must be pulled over offset connector and sealed using a factory approved method.
- 108.06 The ends of the large diameter aggregate replacement pipe shall be closed with an end cap particular to the type and manufacturer of the pipe.
- 108.07 Care must be taken during backfilling to prevent the aggregate replacement pipe from "crawling" when backfill is applied.
- 109 Distribution of Effluent
- 109.01 Aggregate Replacement Pipe Systems
1. When a change in elevation of the disposal trench is required, a distribution box, connecting lateral or crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the Aggregate replacement pipe in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the aggregate replacement pipe. The distribution box shall be level and supply all lines equally. Field lines must be equal lengths when served by one distribution box.
 2. Distribution boxes may be used to connect the effluent line to the effluent distribution lines. Non-perforated rigid pipe shall exit the distribution box for a minimum of five feet at level grade before the effluent distribution line (perforations) begins.
 3. Crossover lines shall be laid on undisturbed earth. The invert of the crossover must be at least four inches lower than the invert of the septic tank outlet line. Crossovers shall be constructed as shown in Figure 1.

110 Absorption Beds

Absorption beds may be constructed using large diameter aggregate replacement filter wrap pipe.

- 110.01 Absorption beds and trenches should be located a minimum of 10 feet from any trees.
- 110.02 The amount of linear footage required shall be the same as for trench configurations. The bottom of the bed should have a relatively level grade; the grade within the bed shall not exceed the grade allowed for trench installations.
- 110.03 Lines for distributing effluent shall be spaced from 3 to 6 feet apart with the first and last pipe placed next to the sidewall of the bed. The number of lines will depend on the lineal feet of aggregate replacement line (Table II & III) and width of the bed to be constructed.
- 110.04 Care should be taken to prevent heavy machinery from damaging the bed during backfilling.
- 110.05 The effluent must be equally distributed to the bed by means of a distribution box or with a pipe manifold.
- 110.06 When a change in elevation of the disposal trench is required, a connecting lateral or crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the aggregate replacement pipe in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the pipe. Crossover lines shall be laid on undisturbed earth. The invert of the crossover must be at least four inches lower than the invert effluent line of the septic tank, aerobic treatment plant or vessel supplying effluent to the pipe [Figure 1].

111 Multi-Pipe Aggregate Replacement Systems

111.01 General

The multi-pipe aggregate replacement system is a system that utilizing bundles of four inch perforated pipe to provide a void space. The top pipe in one bundle of this system receives the treated effluent for distribution throughout the disposal system. All multi-pipe aggregate replacement systems must be installed by a Certified Installer that is factory-trained and authorized by the manufacturer.

111.02 Sizing

The multi-pipe aggregate replacement systems shall be sized in accordance with the TABLE IV.

111.03 Construction

1. The bottom of the trenches and the distribution lines shall have a grade from level to no greater than two inches fall per 100 feet for multi-pipe aggregate replacement systems.

2. Multi-pipe aggregate replacement system trenches shall be a minimum of 24 and a maximum of 36 inches in width.
3. The multi-pipe aggregate replacement system must be installed with effluent being distributed to each trench distribution pipe by use of a distribution box or a level pipe header.
 - a. When a change in elevation of the disposal trench is required, a distribution box or approved crossover shall be used. The distribution box, if used, shall be level and supply all lines equally.
 - b. Distribution boxes may be used to connect the effluent line to the effluent distribution lines. Non-perforated rigid pipe shall exit the distribution box for a minimum of five feet at level grade before the effluent distribution line (perforations) begins.
4. The system shall be covered with a manufacturer-approved, geotextile cloth before backfilling.
5. The geotextile cloth shall cover the open ends of the void and distribution pipes at their termination at the ends of the trench.

111.04 When a change in elevation of the disposal trench is required, an additional distribution box or connecting lateral/crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the multi-pipe aggregate replacement distribution pipe in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the distribution system. Crossover lines shall be laid on undisturbed earth. The invert of the crossover must be at least four inches lower than the invert effluent line of the septic tank, aerobic treatment plant or vessel supplying effluent to the pipe.

111.05 Absorption Bed [Multi-pipe System]

1. Multi-pipe systems installed in a bed configuration shall have the same lineal foot requirements as indicated for their respective trench configurations. The length and width of the bed to be constructed will be determined by the number of multi-pipe systems wide and the length selected to comply with the lineal footage required under Table IV.
2. The multi-pipe system shall be placed side by side in the bed. Any side by side placement of multi-pipe systems shall constitute a bed.
3. The bottom of the bed should have a relatively level grade, from the end and side to side. The grade within the bed shall not exceed the grade allowed for trench installations.

4. The effluent must be equally distributed to the bed by means of a distribution box or with a pipe manifold.
5. The multi-pipe system may be cut in-order to accommodate setbacks. The multi-pipe system shall be cut to a length which preserves the integrity of the banded void pipes and provides adequate banding of the system a minimum of every 18 inches to a maximum of every 20 inches. Manufactured couplers shall be used to join cut ends of the void pipes.
6. The system shall be covered with a manufacturer-approved geotextile cloth before backfilling.
7. The geotextile cloth shall cover the open ends of the void pipes.
8. Care should be taken to prevent heavy machinery from damaging the bed during backfilling.

112 Expanded Polystyrene (EPS) Aggregate Systems

112.01 General

The EPS Aggregate system utilizes bundles of expanded polystyrene aggregate to replace rock aggregate in a subsurface disposal system. Effluent is distributed via a 4 inch perforated pipe incorporated into the center of one EPS bundle. System configurations of multiple bundles will incorporate one bundle run containing the 4 inch perforated pipe in conjunction with bundles containing only EPS aggregate. This 4 inch perforated pipe receives the treated effluent for distribution throughout the trench. The expanded polystyrene aggregate must be contained in a material that is resistant to the effects of wastewater, will prevent the loss of aggregate from the container and strong enough to retain the shape of the bundles during system installation and backfilling. All EPS Aggregate Systems must be installed by a factory-trained installer that is an authorized representative of the manufacturer.

112.02 Construction

1. The EPS Aggregate System absorption trenches shall be a minimum of 24 inches and a maximum of 36 inches in width.
2. The bottom of the trenches and the distribution lines shall have a grade from level to no greater than two inches fall per 100 feet.
3. The grade shall be measured from the trench bottom and not the effluent distribution line encased in the EPS bundle.
4. The EPS Aggregate system shall be covered with an approved cover material before backfilling. Covering material shall consist of craft paper

or other bio-degradable product approved and/or supplied by the manufacturer.

112.03 Distribution of Effluent [EPS Aggregate System]

1. When a change in elevation of the disposal trench is required, a distribution box, connecting lateral or crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the distribution pipe in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the system [Figure 2]. The invert of the crossover must be at least four inches lower than the invert of the septic tank outlet line.
2. Distribution boxes may be used to connect the effluent line to the effluent distribution lines. The distribution box shall be level and supply all lines equally. Field lines must be equal lengths when served by one distribution box. Non-perforated rigid pipe shall exit the distribution box for a minimum of five feet at level grade before the effluent distribution line (perforations) begins.

112.04 Absorption Beds [EPS Aggregate Systems]

Absorption beds may be constructed using the EPS Aggregate system.

1. Absorption beds and trenches should be located a minimum of 10 feet from any trees.
2. The amount of linear footage required for EPS horizontal systems shall be the same as for trench configurations [Table V]. The bottom of the bed should have a relatively level grade; the grade within the bed shall not exceed the grade allowed for EPS trench installations. EPS triangular systems shall not be used in bed configurations.
3. The EPS bundles shall be placed side by side in the bed. The number of bundles will depend on the lineal footage required and the width of the bed to be constructed.
4. Care should be taken to prevent heavy machinery from damaging the bed during backfilling.
5. The effluent must be equally distributed to the bed by means of a distribution box or with a pipe manifold.

112.05 Sizing

EPS Aggregate systems shall be sized in accordance with the following:

113 Chamber Subsurface Disposal Systems

113.01 General

Chamber systems utilize molded plastic bottomless chambers which are installed in a drain field excavation with the open bottom of the chamber in direct contact with the trench bottom. The chambers are linked together in such a manner as to completely cover the excavation with adjacent chambers in contact with each other. Effluent is introduced into the chambers and is absorbed into the soil for final treatment and disposal. All chamber systems must be installed by a factory trained and authorized installer.

113.02 Chamber Class Designation

1. Each model of chamber will be assigned a class designation based on the bottom square footage of the chamber section. This square footage will be derived by a multiple of the outside width and the useable length of the chamber section.
2. Chamber models will be assigned a class designation according to Table VII.

113.03 Construction

1. The chamber system absorption trenches shall be a minimum of 18 inches and a maximum of 36 inches in width.
2. The bottom of the trenches shall have a grade from level to no greater than two (2) inches fall per 100 feet.
3. The grade shall be measured from the trench bottom and not the chamber top.
4. The chamber system shall be covered as per the manufacturer's specifications. In all cases there shall be a minimum of 12 inches of soil cover over the chamber system.
5. The minimum height of a chamber, at its centerline, shall be eleven (11) inches.
6. The last chamber in each "run" shall be terminated with an end plate.

113.04 Distribution of Effluent [Chamber Systems]

1. When a change in elevation of the chamber system is required, a distribution box, connecting lateral or crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the endplate inlet or the inlet in the top of the chamber in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the system. The invert of the

crossover must be at least four inches lower than the invert of the septic tank outlet line.

2. Distribution boxes may be used to connect the effluent line to the effluent distribution lines. The distribution box shall be level and supply all lines equally. Field lines (chambers) must be equal lengths when served by one distribution box. Non-perforated rigid pipe shall exit the distribution box for a minimum of five feet at level grade before the effluent distribution line begins.

113.05 Sizing of the Chamber System

1. Chamber systems installed in a trench configuration shall be sized in accordance with Table VIII.
2. Chamber systems installed in a bed configuration shall have the same number of chamber sections as indicated for a trench system. The length and width of the bed to be constructed will depend on the number of chamber sections to be installed as indicated by Table VIII. Any side-by-side placement of chambers shall constitute a bed.
 - a. Absorption beds and trenches should be located a minimum of 10 feet from any trees.
 - b. The bottom of the bed should have a relatively level grade; the grade within the bed shall not exceed the grade allowed for trench installations.
 - c. The chambers shall be placed side by side in a bed with separation between each chamber row per individual manufacturer's requirements.
 - d. Care should be taken to prevent heavy machinery from damaging the bed during backfilling.
 - e. The effluent must be equally distributed to the bed by means of a distribution box or with a pipe manifold.

114 ~~Addendum to Section 111 Multi-Pipe Aggregate Replacement Systems~~

~~Section 111.05 Absorption Bed [Multi-pipe System] will read as follows:~~

1. ~~Multi-pipe systems installed in a bed configuration shall have the same lineal-foot requirements as indicated for their respective trench configurations. The length and width of the bed to be constructed will be determined by the number of multi-pipe systems wide and the length selected to comply with the lineal footage required under Table IV.~~

2. ~~The multi-pipe system shall be placed side by side in the bed. Any side by side placement of multi-pipe systems shall constitute a bed.~~
3. ~~The bottom of the bed should have a relatively level grade, from the end and side to side. The grade within the bed shall not exceed the grade allowed for trench installations.~~
4. ~~The effluent must be equally distributed to the bed by means of a distribution box or with a pipe manifold.~~
5. ~~The multi-pipe system may be cut in order to accommodate setbacks. The multi-pipe system shall be cut to a length which preserves the integrity of the banded void pipes and provides adequate banding of the system a minimum of every 18 inches to a maximum of every 20 inches. Manufactured couplers shall be used to join cut ends of the void pipes.~~
6. ~~The system shall be covered with a manufacturer-approved geotextile cloth before backfilling.~~
7. ~~The geotextile cloth shall cover the open ends of the void pipes.~~
8. ~~Care should be taken to prevent heavy machinery from damaging the bed during backfilling.~~

Table I

SETBACK REQUIREMENTS FROM SENSITIVE WATER

Minimum Distance from the Water Edge

Soil Textural Class	Slope of Less Than 8 Percent	Slope of More Than 8 Percent
Gravel	NOT APPLICABLE	
Coarse Sand	400-feet <u>50 feet</u>	400-feet <u>50 feet</u>
Medium Sand	400-feet <u>50 feet</u>	400-feet <u>50 feet</u>
Fine Sand	400-feet <u>50 feet</u>	400-feet <u>50 feet</u>
Loamy Sand	400-feet <u>50 feet</u>	400-feet <u>50 feet</u>
Sandy Loam	400-feet <u>50 feet</u>	400-feet <u>50 feet</u>
Light Loam	50 feet	400-feet <u>50 feet</u>
Heavy Loam	50 feet	400-feet <u>50 feet</u>
Silt Loam	50 feet	400-feet <u>50 feet</u>
Sandy Clay Loam	50 feet	400-feet <u>50 feet</u>
Light Clay Loam	50 feet	400-feet <u>50 feet</u>
Heavy Clay Loam	50 feet	400-feet <u>50 feet</u>
Light Silty Clay Loam	50 feet	400-feet <u>50 feet</u>
Heavy Silty Clay Loam	50 feet	400-feet <u>50 feet</u>
Sandy Clay	400-feet <u>50 feet</u>	400-feet <u>50 feet</u>
Silty Clay	400-feet <u>50 feet</u>	400-feet <u>50 feet</u>
Clay	400-feet <u>50 feet</u>	400-feet <u>50 feet</u>

The effluent disposal setback is based on the soil texture of the horizon in which the absorption trench or bed is to be placed. These setbacks are to be used on all individual on-site wastewater disposal systems except **Spray Irrigation and Overland Discharge**.

Table II

TEN INCH LARGE DIAMETER PIPE

Results of Soil Evaluation

Soil Textural Class	Ribbon Lengths (Inches)	EPA Manual Application Rate GPD/ Ft ²	Absorption Area Per Bedroom**		Additional Absorption Area Over 2 Persons Per Bedroom**	
			Ft ²	*Lf	Ft ²	*Lf
Gravel	-	-	NOT SUITABLE			
Coarse Sand	-	1.2	125	43	60	20
Medium Sand	-	1.2	125	43	60	20
Fine Sand	-	0.8	190	63	95	32
Loamy Sand	-	0.8	190	63	95	32
Sandy Loam	<5	0.6	250	83	125	41
Light Loam	<5	0.6	250	83	125	41
Heavy Loam	.5 - 1	0.45	335	115	165	55
Silt Loam	<1	0.45	335	112	165	55
Sandy Clay Loam	1 - 2	0.45	335	112	165	55
Light Clay Loam	1 - 1.5	0.30	500	167	250	83
Heavy Clay Loam	1.5 - 2.0	0.20	750	250	375	125
Light Silty Clay Loam	1 - 1.5	0.30	500	167	250	83
Heavy Silty Clay Loam	1.5 - 2.0	0.20	750	250	375	125
Sandy Clay	>2.0	-	NOT SUITABLE			
Silty Clay	>2.0	-	NOT SUITABLE			
Clay	>2.0	-	NOT SUITABLE			

Minimum and maximum trench widths are 24 and 36 inches, respectively.

** Bedrooms are equivalent to 150 gallons per day.

Table III

DOUBLE SIX LARGE DIAMETER PIPE

Results of Soil Evaluation

Soil Textural Class	Ribbon Lengths (Inches)	EPA Manual Application Rate GPD/ Ft ²	Absorption Area Per Bedroom**		Additional Absorption Area Over 2 Persons Per Bedroom**	
			Ft ²	*Lf	Ft ²	*Lf
Gravel	-	-	NOT SUITABLE			
Coarse Sand	-	1.2	189	63	96	32
Medium Sand	-	1.2	189	63	96	32
Fine Sand	-	0.8	285	95	144	48
Loamy Sand	-	0.8	285	95	144	48
Sandy Loam	<.5	0.6	375	125	189	63
Light Loam	<.5	0.6	375	125	189	63
Heavy Loam	.5 - 1	0.45	504	168	252	84
Silt Loam	<1	0.45	504	168	252	84
Sandy Clay Loam	1 - 2	0.45	504	168	252	84
Light Clay Loam	1 - 1.5	0.30	750	250	375	125
Heavy Clay Loam	1.5 - 2.0	0.20	1125	375	564	188
Light Silty Clay Loam	1 - 1.5	0.30	750	250	375	125
Heavy Silty Clay Loam	1.5 - 2.0	0.20	1125	375	564	188
Sandy Clay	>2.0	-	NOT SUITABLE			
Silty Clay	>2.0	-	NOT SUITABLE			
Clay	>2.0	-	NOT SUITABLE			

Minimum and maximum trench widths are 24 and 36 inches, respectively.

** Bedrooms are equivalent to 150 gallons per day.

Table IV

EIGHT INCH LARGE DIAMETER PIPE

Results of Soil Evaluation

Soil Textural Class	Ribbon Lengths (Inches)	EPA Manual Application Rate GPD/ Ft ²	Absorption Area Per Bedroom**		Additional Absorption Area Over 2 Persons Per Bedroom**	
			Ft ²	Lf	Ft ²	Lf
Gravel	-	-	NOT SUITABLE			
Course Sand	-	1.2	189	63	96	32
Medium Sand	-	1.2	189	63	96	32
Fine Sand	-	0.8	285	95	144	48
Loamy Sand	-	0.8	285	95	144	48
Sandy Loam	<.5	0.6	375	125	189	63
Light Loam	<.5	0.6	375	125	189	63
Heavy Loam	.5 - 1	0.45	504	168	252	84
Silt Loam	<1	0.45	504	168	252	84
Sandy Clay Loam	1 - 2	0.45	504	168	252	84
Light Clay Loam	1 - 1.5	0.30	750	250	375	125
Heavy Clay Loam	1.5 - 2.0	0.20	1125	375	564	188
Light Silty Clay Loam	1 - 1.5	0.30	750	250	375	125
Heavy Silty Clay Loam	1.5 - 2.0	0.20	1125	375	564	188
Sandy Clay	>2.0	-	NOT SUITABLE			
Silty Clay	>2.0	-	NOT SUITABLE			
Clay	>2.0	-	NOT SUITABLE			

Minimum and maximum trench widths are 24 and 36 inches, respectively.

** Bedrooms are equivalent to 150 gallons per day.

Table V

MULTI-PIPE SYSTEM

Results of Soil Evaluation

Soil Textural Class	Ribbon Lengths (Inches)	EPA Manual Application Rate GPD/Ft ²	Absorption Area Per Bedroom**																																		
			14 Pipe				13 Pipe				11 Pipe				9 Pipe				14 Pipe				13 Pipe				11 Pipe				9 Pipe						
			Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf					
Gravel	-	-	NOT SUITABLE																																		
Coarse Sand	-	1.2	125	42	96	32	111	37	132	44	63	21	48	16	57	19	66	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22			
Medium Sand	-	1.2	125	42	96	32	111	37	132	44	63	21	48	16	57	19	66	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22			
Fine Sand	-	0.8	190	63	144	48	168	56	201	67	98	32	72	24	84	28	102	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34			
Loamy Sand	-	0.8	190	63	144	48	168	56	201	67	98	32	72	24	84	28	102	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34	34		
Sandy Loam	<.5	0.6	250	83	189	63	222	74	264	88	125	42	96	32	111	37	132	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44		
Light Loam	<.5	0.6	250	83	189	63	222	74	264	88	125	42	96	32	111	37	132	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	44	
Heavy Loam	.5 - 1	0.45	335	112	255	85	297	99	354	118	168	56	129	43	150	50	177	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	
Silt Loam	<1	0.45	335	112	255	85	297	99	354	118	168	56	129	43	150	50	177	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	
Sandy Clay Loam	1 - 2	0.45	335	112	255	85	297	99	354	118	168	56	129	43	150	50	177	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	59	
Light Clay Loam	1 - 1.5	0.30	500	167	381	127	444	148	591	177	250	84	192	64	222	74	267	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	
Heavy Clay Loam	1.5 - 2.0	0.20	750	250	570	190	669	223	795	265	375	125	285	95	336	112	399	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	
Light Silty Clay Loam	1 - 1.5	0.30	500	167	381	127	444	148	591	177	250	84	192	64	222	74	267	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89	89
Heavy Silty Clay Loam	1.5 - 2.0	0.20	750	250	570	190	669	223	795	265	375	125	285	95	336	112	399	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133	133
Sandy Clay	>2.0	-	NOT SUITABLE																																		
Silty Clay	>2.0	-	NOT SUITABLE																																		
Clay	>2.0	-	NOT SUITABLE																																		

Minimum and maximum trench widths are 24 and 36 inches, respectively.

** Bedrooms are equivalent to 150 gallons per day.

Table VI
**EXPANDED POLYSTYRENE SYSTEM (EPS) “HORIZONTAL”
 CONFIGURATION**
 Results of Soil Evaluation

Soil Textural Class	Ribbon Lengths (Inches)	EPA Manual Application Rate GPD/ Ft ²	Absorption Area Per Bedroom**						Additional Absorption Over 2 Person Per Bedroom**									
			3-10 Inch		1-12 Inch		2-12 Inch		3-12 Inch		3-10 Inch		1-12 Inch		2-12 Inch		3-12 Inch	
			Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf
Gravel	-	-	NOT SUITABLE															
Coarse Sand	-	1.2	88	35	162	86	86	43	87	29	43	17	82	41	42	21	42	14
Medium Sand	-	1.2	88	35	162	86	86	43	87	29	43	17	82	41	42	21	42	14
Fine Sand	-	0.8	133	53	262	131	132	66	132	44	65	26	132	66	66	33	66	22
Loamy Sand	-	0.8	133	53	262	131	132	66	132	44	65	26	132	66	66	33	66	22
Sandy Loam	<.5	0.6	173	69	346	173	174	87	174	58	88	35	172	86	86	43	87	29
Light Loam	<.5	0.6	173	69	346	173	174	87	174	58	88	35	172	86	86	43	87	29
Heavy Loam	.5-1	0.45	233	93	462	231	232	116	231	77	115	46	228	114	114	57	114	38
Silt Loam	<1	0.45	233	93	462	231	232	116	231	77	115	46	228	114	114	57	114	38
Sandy Clay Loam	1-2	0.45	233	93	462	231	232	116	231	77	115	46	228	114	114	57	114	38
Light Clay Loam	1-1.5	0.30	345	138	690	345	246	173	345	115	173	69	346	173	174	87	174	58
Heavy Clay Loam	1.5-2.0	0.20	520	208	1036	518	520	260	231	173	260	104	518	259	260	130	258	86
Light Silty Clay Loam	1-1.5	0.30	345	138	690	345	246	173	345	115	173	69	346	173	174	87	174	58
Heavy Silty Clay Loam	1.5-2.0	0.20	520	208	1036	518	520	260	231	173	260	104	518	259	260	130	258	86
Sandy Clay	>2.0	-	NOT SUITABLE															
Silty Clay	>2.0	-	NOT SUITABLE															
Clay	>2.0	-	NOT SUITABLE															

Minimum and maximum trench widths are 24 and 36 inches, respectively.

** Bedrooms are equivalent to 150 gallons per day.

Table VII
**EXPANDED POLYSTYRENE SYSTEM (EPS) “TRIANGULAR”
 CONFIGURATION**

Results of Soil Evaluation

Soil Textural Class	Ribbon Lengths (Inches)	EPA Manual Application Rate GPD/ Ft ²	Absorption Area Per Bedroom**		Additional Absorption Over 2 Person Per Bedroom**	
			3-10 Inch		3-10 Inch	
			Ft2	Lf	Ft2	Lf
Gravel	-	-	NOT SUITABLE			
Coarse Sand	-	1.2	62	31	30	15
Medium Sand	-	1.2	62	31	30	15
Fine Sand	-	0.8	96	48	48	24
Loamy Sand	-	0.8	96	48	48	24
Sandy Loam	<.5	0.6	126	63	64	32
Light Loam	<.5	0.6	126	63	64	32
Heavy Loam	.5-1	0.45	168	84	84	42
Silt Loam	<1	0.45	168	84	84	42
Sandy Clay Loam	1-2	0.45	168	84	84	42
Light Clay Loam	1-1.5	0.30	250	125	126	63
Heavy Clay Loam	1.5-2.0	0.20	376	188	188	94
Light Silty Clay Loam	1-1.5	0.30	250	125	126	63
Heavy Silty Clay Loam	1.5-2.0	0.20	376	188	188	94
Sandy Clay	>2.0	-	NOT SUITABLE			
Silty Clay	>2.0	-	NOT SUITABLE			
Clay	>2.0	-	NOT SUITABLE			

Minimum and maximum trench widths are 24 and 36 inches, respectively.

The **Triangular Configuration** can only be installed in a trench.

** Bedrooms are equivalent to 150 gallons per day.

Table VIII

CHAMBER SYSTEM
Results of Soil Evaluation

CLASS	SQUARE FEET/CHAMBER SECTION
I	7.51 – 9.50
II	9.51 – 11.50
III	11.51 – 13.50
IV	13.51 – 15.50
V	15.51 – 17.50
VI	17.51 – 19.50
VII	19.51 – 21.50
VIII	21.51 – 23.50

Table IX

CHAMBER SYSTEM

Results of Soil Evaluation

Soil Textural Class	Ribbon Lengths (Inches)	EPA Manual Application Rate GPD/ Ft ²	Absorption Area in Ft ² Per Bedroom**	Absorption Area in Chambers Per Bedroom**								Additional Absorption Area Over 2 Persons Per Bedroom**												
				I	II	III	IV	V	VI	VII	VIII	I	II	III	IV	V	VI	VII	VIII					
Gravel	-	-		NOT SUITABLE																				
Coarse Sand	-	1.2	88	10	8	7	6	5	5	4	4	4	4	5	4	3	3	3	3	3	3	2	2	2
Medium Sand	-	1.2	88	10	8	7	6	5	5	4	4	4	4	5	4	3	3	3	3	3	3	2	2	2
Fine Sand	-	0.8	133	15	13	11	9	8	7	6	6	6	6	7	6	5	5	4	4	4	4	3	3	3
Loamy Sand	-	0.8	133	15	13	11	9	8	7	6	6	6	6	7	6	5	5	4	4	4	4	3	3	3
Sandy Loam	<.5	0.6	175	20	17	14	12	11	10	9	8	8	8	10	8	7	6	5	5	5	4	4	4	4
Light Loam	<.5	0.6	175	20	17	14	12	11	10	9	8	8	8	10	8	7	6	5	5	5	4	4	4	4
Heavy Loam	.5 - 1	0.45	235	26	22	19	16	14	13	11	10	10	10	13	11	9	8	7	6	6	6	5	5	5
Silt Loam	<1	0.45	235	26	22	19	16	14	13	11	10	10	10	13	11	9	8	7	6	6	6	5	5	5
Sandy Clay Loam	1 - 2	0.45	235	26	22	19	16	14	13	11	10	10	10	13	11	9	8	7	6	6	6	5	5	5
Light Clay Loam	1 - 1.5	0.30	350	39	33	28	28	21	19	17	16	16	16	19	17	14	12	11	9	9	9	8	8	8
Heavy Clay Loam	1.5 - 2.0	0.20	525	58	50	40	35	32	28	26	23	23	29	25	20	17	16	14	13	12	12	12	12	12
Light Silty Clay Loam	1 - 1.5	0.30	350	39	33	28	24	21	19	17	16	16	16	19	17	14	12	11	9	9	9	8	8	8
Heavy Silty Clay Loam	1.5 - 2.0	0.20	525	58	50	40	35	32	28	26	23	23	29	25	20	17	16	14	13	12	12	12	12	12
Sandy Clay	>2.0	-		NOT SUITABLE																				
Silty Clay	>2.0	-		NOT SUITABLE																				
Clay	>2.0	-		NOT SUITABLE																				

Minimum and maximum trench widths are 18 and 36 inches, respectively.

** Bedrooms are equivalent to 150 gallons per day.

All chamber sections shall be full length. The use of cut chamber sections is prohibited.

Title 15 - Mississippi State Department of Health

Part III – Office of Health Protection

Subpart 77 – On-site Wastewater

APPENDIX 03 DESIGN STANDARD: AGGREGATE REPLACEMENT

100 Introduction

In a conventional onsite wastewater system treatment begins in the septic tank, under anaerobic conditions. Final treatment and disposal takes place in the soil of the drain field, an aerobic environment. It is necessary for this aerobic condition to exist in the soil of the drain field for proper treatment of the effluent.

101 Definitions

101.01 Chamber System - a system of bottomless molded plastic chambers installed in direct contact with the trench bottom to infiltrate primary treated effluent into the soil for final treatment and disposal.

101.02 Aggregate Replacement Disposal System - any normally gravity-fed subsurface disposal field utilizing an alternate media or technology to act as a replacement for the aggregate media. These system depths range from 36 to 6 inches in depth.

Standard Subsurface Disposal	25 in. to 36 in.
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Shallow Subsurface Disposal	13 in. to 24 in.
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Ultra-shallow Subsurface Disposal	6 in. to 12 in.
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101.03 Large Diameter Aggregate Replacement System - subsurface disposal system that utilizes large diameter pipe covered with a filtering material approved by the Mississippi State Department of Health for use in IOWDS systems.

101.04 Multi-Pipe Aggregate Replacement System - subsurface disposal system that utilizes a multiple arrangement of piping, approved by the Mississippi State Department of Health, to replace the aggregate media of conventional soil absorption systems for use in IOWDS systems.

101.05 Treatment - a process applied to wastewater which causes the resulting effluent to meet or exceed EPA secondary standards for treated wastewater for surface discharge and which does not endanger the public health.

102 Site Evaluation

- 102.01 Information obtained during the soil and site evaluation will determine which type(s) of IOWDS may be utilized for an individual lot.
- 102.02 Prior to completing the Soil and Site Evaluation/System Recommendation, the Environmentalist shall visit the lot and conduct the soil and site evaluation.
- 102.03 The soil determinations will be made based on soil borings to a depth of five feet or to a depth sufficient to reach a restrictive horizon. Restrictive soil or site conditions may preclude the use of any subsurface disposal system.
- 102.04 A soil and site evaluation will be based on the following criteria:
1. Absence of or protection from frequent flooding.
 2. Landscape position with good surface runoff.
 3. Slopes of less than 15%.
 4. Depth to high water table of greater than four feet.
 5. Depth to bedrock, fragipan or plinthite of greater than four feet.
 6. Soil texture and color defined by the Natural Resource Conservation Service as indicating good drainage and suitability for soil absorption, based on a soil boring of five feet.
 7. Available area in which to install an individual onsite wastewater disposal system meeting all requirements of this regulation. The area for repairs and future extensions shall be no less than 50% of the space required for the recommended system. Systems utilizing surface land application discharge are exempt from the 50% additional area requirement.
- 102.05 The non compliance of one or more of the above items may require a design alteration of an underground system.

103 Location of Onsite Wastewater Disposal Systems

- 103.01 All components of the onsite wastewater disposal system shall be located a minimum of:
1. five feet from any dwelling.
 2. ten feet from any property line.
- 103.02 Any vessel holding wastewater shall be located a minimum of 50 feet from any public, private or individual potable water source.

- 103.03 The effluent disposal field shall be located at a lower elevation or in a landscape position that will preclude any surface runoff from flowing in the direction of the well site and a minimum of 100 feet from any public, private or individual potable water source.
- 103.04 Potable water lines shall not pass under or through any part of the sewage disposal system. Where a water supply line must cross a sewer line, the bottom of the water service within ten feet of the point of crossing, shall be at least 12 inches above the top of the sewer line. The sewer line shall be of Schedule 40 pipe with cemented joints at least ten feet on either side of the crossing. Water and sewer lines shall not be laid in the same trench. The water and sewer lines, when laid on the same elevation, shall maintain a minimum separation distance of 10 feet.
- 103.05 The surface of or the surface above the disposal field shall not be used for vehicular traffic or vehicular parking.
- 103.06 No portion of an onsite wastewater disposal system shall be located under dwellings or other permanent structures.
- 103.07 Effluent disposal systems shall not be located in depressed areas where surface water will accumulate. Provision shall be made to minimize the flow of surface water over the effluent disposal field.
- 103.08 Subsurface wastewater disposal field setbacks from sensitive waters. [See Table I].
- 103.09 Slopes of greater than 30% shall not be considered for subsurface disposal installation.
- 103.10 Where all or part of the onsite wastewater disposal system is proposed to be installed on property other than the owner's, an easement in perpetuity shall be legally recorded in the proper county. The easement shall be of sufficient area to permit access, construction and maintenance of the onsite sewage disposal system.
- 103.11 No site for an effluent disposal field or expansion area shall be approved which is located wholly within an area which is frequently flooded, swamp, marsh, or wetland. Except that if permits have been issued by the proper regulatory agency authorizing the use of wetlands for building sites, the property shall be evaluated using standard soil and site criteria for IOWDS.
- 103.12 When a proposed lot is located partially within a frequently flooded area, that portion of said lot not within the flood prone area may be considered for approval for the effluent disposal field.
- 103.13 There shall be maintained a minimum of 12 inches of unsaturated soil between the bottom of the subsurface disposal system and a perched or seasonal water

table in soils that contain a restrictive horizon (fragipan, chalk, bedrock, clay or silty clay) within five feet of the surface.

- 103.14 There shall be maintained a minimum of 24 inches of unsaturated soil between the bottom of the subsurface disposal system and any perched or seasonal water table in soils that do not contain a restrictive horizon (fragipan, chalk, bedrock, clay or silty clay) within five feet of the surface.
- 103.15 Easements or right-of-way areas for utilities, surface or subsurface drainage, roads, streets, ponds or lakes shall not be used as available space for location of individual onsite sewage disposal systems.

104 Underground Absorption

- 104.01 Aggregate replacement systems shall comply with all criteria for subsurface gravel disposal systems except in sections pertaining to the gravel media or as specified in this regulation.
- 104.02 The size of the subsurface sewage disposal system shall be determined by soil texture and estimated wastewater flow.
- 104.03 Soils with excessively rapid permeability rates, gravel and coarse sand, shall be considered unsuitable for subsurface disposal unless the native soil is replaced with a suitably thick (greater than two feet) layer of loamy sand or sand textured soil.
- 104.04 Soils with excessively slow permeability rates, silty clay and clay, shall be considered unsuitable for conventional subsurface disposal.
- 104.05 Subsurface disposal systems shall be placed no deeper than 36 inches below the surface.
- 104.06 Aggregate replacement subsurface disposal systems shall have a minimum 12 inches of soil backfill.
- 104.07 The minimum distance between absorption trench sidewalls shall be six feet.
- 104.08 Trenches shall not be excavated when the soil is wet enough to smear or compact easily.
- 104.09 There shall be a minimum of three feet of undisturbed soil between the excavation for the septic tank or treatment plant and the beginning of the absorption trench, bed or effluent line.
- 104.10 The bottom of the outlet of the septic tank, aerobic treatment plant or vessel supplying effluent to the pipe must be a minimum of one inch above the top of the aggregate replacement system.

- 104.11 Care must be taken when backfilling to prevent the pipe from shifting during the backfilling process.
- 104.12 Soil material excavated from trenches shall be used in backfilling and should be left mounded over the trenches until initial settling has taken place.
- 104.13 Standard manufactured fittings compatible with the pipe shall be used to connect all pipes within the effluent disposal field.

105 Alternating Disposal Fields

- 105.01 An alternating effluent disposal field system provides two complete disposal fields, separated by a valving system so that each system could alternately be used and rested. This "resting" has shown to be useful in regenerating the soil's capability for absorbing the effluent.
- 105.02 The size of each field can be from 50 to 100 percent of the required square footage of a single disposal field.
- 105.03 The length of time each field would be used and then rested will be determined on a case-by-case basis.

106 Shallow and Ultra-shallow Disposal Fields

Shallow or ultra-shallow systems can sometimes be used where the depth to the restrictive horizon or water table is less than the minimum required. Placement of the system may be as shallow as 6 inches for large diameter double-six aggregate replacement pipe systems. Ultra-shallow installations shall be restricted to soil textures of loam or lighter. Shallow installations may be placed in any texture shown as suitable in the system specific sizing tables.

107 Sizing

The large diameter aggregate replacement systems shall be sized in accordance with the following tables.

108 Construction

- 108.01 Large diameter aggregate replacement absorption trenches shall be a minimum of 24 inches and a maximum of 36 inches in width.
- 108.02 The bottom of the trenches or bed and the distribution lines shall have a grade from level to no greater than two inches fall per 100 feet for double six inch large diameter aggregate replacement pipe and one inch fall per 100 feet for eight and ten inch large diameter aggregate replacement pipe.
- 108.03 Overlap filter wrap at coupling joints and seal using factory approved methods.

- 108.04 The 4" pipe from the septic tank, aerobic treatment plant or vessel supplying effluent to the aggregate replacement pipe shall be installed into an offset connector particular to the type and manufacturer of the pipe. These connectors will also be used when crossovers are constructed to change elevations of field system.
- 108.05 Fabric must be pulled over offset connector and sealed using a factory approved method.
- 108.06 The ends of the large diameter aggregate replacement pipe shall be closed with an end cap particular to the type and manufacturer of the pipe.
- 108.07 Care must be taken during backfilling to prevent the aggregate replacement pipe from "crawling" when backfill is applied.

109 Distribution of Effluent

109.01 Aggregate Replacement Pipe Systems

1. When a change in elevation of the disposal trench is required, a distribution box, connecting lateral or crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the Aggregate replacement pipe in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the aggregate replacement pipe. The distribution box shall be level and supply all lines equally. Field lines must be equal lengths when served by one distribution box.
2. Distribution boxes may be used to connect the effluent line to the effluent distribution lines. Non-perforated rigid pipe shall exit the distribution box for a minimum of five feet at level grade before the effluent distribution line (perforations) begins.
3. Crossover lines shall be laid on undisturbed earth. The invert of the crossover must be at least four inches lower than the invert of the septic tank outlet line. Crossovers shall be constructed as shown in Figure 1.

110 Absorption Beds

Absorption beds may be constructed using large diameter aggregate replacement filter wrap pipe.

- 110.01 Absorption beds and trenches should be located a minimum of 10 feet from any trees.
- 110.02 The amount of linear footage required shall be the same as for trench configurations. The bottom of the bed should have a relatively level grade; the grade within the bed shall not exceed the grade allowed for trench installations.

- 110.03 Lines for distributing effluent shall be spaced from 3 to 6 feet apart with the first and last pipe placed next to the sidewall of the bed. The number of lines will depend on the lineal feet of aggregate replacement line (Table II & III) and width of the bed to be constructed.
- 110.04 Care should be taken to prevent heavy machinery from damaging the bed during backfilling.
- 110.05 The effluent must be equally distributed to the bed by means of a distribution box or with a pipe manifold.
- 110.06 When a change in elevation of the disposal trench is required, a connecting lateral or crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the aggregate replacement pipe in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the pipe. Crossover lines shall be laid on undisturbed earth. The invert of the crossover must be at least four inches lower than the invert effluent line of the septic tank, aerobic treatment plant or vessel supplying effluent to the pipe [Figure 1].

111 Multi-Pipe Aggregate Replacement Systems

111.01 General

The multi-pipe aggregate replacement system is a system that utilizing bundles of four inch perforated pipe to provide a void space. The top pipe in one bundle of this system receives the treated effluent for distribution throughout the disposal system. All multi-pipe aggregate replacement systems must be installed by a Certified Installer that is factory-trained and authorized by the manufacturer.

111.02 Sizing

The multi-pipe aggregate replacement systems shall be sized in accordance with the TABLE IV.

111.03 Construction

1. The bottom of the trenches and the distribution lines shall have a grade from level to no greater than two inches fall per 100 feet for multi-pipe aggregate replacement systems.
2. Multi-pipe aggregate replacement system trenches shall be a minimum of 24 and a maximum of 36 inches in width.
3. The multi-pipe aggregate replacement system must be installed with effluent being distributed to each trench distribution pipe by use of a distribution box or a level pipe header.

- a. When a change in elevation of the disposal trench is required, a distribution box or approved crossover shall be used. The distribution box, if used, shall be level and supply all lines equally.
 - b. Distribution boxes may be used to connect the effluent line to the effluent distribution lines. Non-perforated rigid pipe shall exit the distribution box for a minimum of five feet at level grade before the effluent distribution line (perforations) begins.
4. The system shall be covered with a manufacturer-approved, geotextile cloth before backfilling.
 5. The geotextile cloth shall cover the open ends of the void and distribution pipes at their termination at the ends of the trench.
- 111.04 When a change in elevation of the disposal trench is required, an additional distribution box or connecting lateral/crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the multi-pipe aggregate replacement distribution pipe in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the distribution system. Crossover lines shall be laid on undisturbed earth. The invert of the crossover must be at least four inches lower than the invert effluent line of the septic tank, aerobic treatment plant or vessel supplying effluent to the pipe.
- 111.05 Absorption Bed [Multi-pipe System]
1. Multi-pipe systems installed in a bed configuration shall have the same lineal foot requirements as indicated for their respective trench configurations. The length and width of the bed to be constructed will be determined by the number of multi-pipe systems wide and the length selected to comply with the lineal footage required under Table IV.
 2. The multi-pipe system shall be placed side by side in the bed. Any side by side placement of multi-pipe systems shall constitute a bed.
 3. The bottom of the bed should have a relatively level grade, from the end and side to side. The grade within the bed shall not exceed the grade allowed for trench installations.
 4. The effluent must be equally distributed to the bed by means of a distribution box or with a pipe manifold.
 5. The multi-pipe system may be cut in-order to accommodate setbacks. The multi-pipe system shall be cut to a length which preserves the integrity of the banded void pipes and provides adequate banding of the system a minimum of every 18 inches to a maximum of every 20 inches. Manufactured couplers shall be used to join cut ends of the void pipes.

6. The system shall be covered with a manufacturer-approved geotextile cloth before backfilling.
7. The geotextile cloth shall cover the open ends of the void pipes.
8. Care should be taken to prevent heavy machinery from damaging the bed during backfilling.

112 Expanded Polystyrene (EPS) Aggregate Systems

112.01 General

The EPS Aggregate system utilizes bundles of expanded polystyrene aggregate to replace rock aggregate in a subsurface disposal system. Effluent is distributed via a 4 inch perforated pipe incorporated into the center of one EPS bundle. System configurations of multiple bundles will incorporate one bundle run containing the 4 inch perforated pipe in conjunction with bundles containing only EPS aggregate. This 4 inch perforated pipe receives the treated effluent for distribution throughout the trench. The expanded polystyrene aggregate must be contained in a material that is resistant to the effects of wastewater, will prevent the loss of aggregate from the container and strong enough to retain the shape of the bundles during system installation and backfilling. All EPS Aggregate Systems must be installed by a factory-trained installer that is an authorized representative of the manufacturer.

112.02 Construction

1. The EPS Aggregate System absorption trenches shall be a minimum of 24 inches and a maximum of 36 inches in width.
2. The bottom of the trenches and the distribution lines shall have a grade from level to no greater than two inches fall per 100 feet.
3. The grade shall be measured from the trench bottom and not the effluent distribution line encased in the EPS bundle.
4. The EPS Aggregate system shall be covered with an approved cover material before backfilling. Covering material shall consist of craft paper or other bio-degradable product approved and/or supplied by the manufacturer.

112.03 Distribution of Effluent [EPS Aggregate System]

1. When a change in elevation of the disposal trench is required, a distribution box, connecting lateral or crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the distribution pipe in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of

the system [Figure 2]. The invert of the crossover must be at least four inches lower than the invert of the septic tank outlet line.

2. Distribution boxes may be used to connect the effluent line to the effluent distribution lines. The distribution box shall be level and supply all lines equally. Field lines must be equal lengths when served by one distribution box. Non-perforated rigid pipe shall exit the distribution box for a minimum of five feet at level grade before the effluent distribution line (perforations) begins.

112.04 Absorption Beds [EPS Aggregate Systems]

Absorption beds may be constructed using the EPS Aggregate system.

1. Absorption beds and trenches should be located a minimum of 10 feet from any trees.
2. The amount of linear footage required for EPS horizontal systems shall be the same as for trench configurations [Table V]. The bottom of the bed should have a relatively level grade; the grade within the bed shall not exceed the grade allowed for EPS trench installations. EPS triangular systems shall not be used in bed configurations.
3. The EPS bundles shall be placed side by side in the bed. The number of bundles will depend on the lineal footage required and the width of the bed to be constructed.
4. Care should be taken to prevent heavy machinery from damaging the bed during backfilling.
5. The effluent must be equally distributed to the bed by means of a distribution box or with a pipe manifold.

112.05 Sizing

EPS Aggregate systems shall be sized in accordance with the following:

113 Chamber Subsurface Disposal Systems

113.01 General

Chamber systems utilize molded plastic bottomless chambers which are installed in a drain field excavation with the open bottom of the chamber in direct contact with the trench bottom. The chambers are linked together in such a manner as to completely cover the excavation with adjacent chambers in contact with each other. Effluent is introduced into the chambers and is absorbed into the soil for final treatment and disposal. All chamber systems must be installed by a factory trained and authorized installer.

113.02 Chamber Class Designation

1. Each model of chamber will be assigned a class designation based on the bottom square footage of the chamber section. This square footage will be derived by a multiple of the outside width and the useable length of the chamber section.
2. Chamber models will be assigned a class designation according to Table VII.

113.03 Construction

1. The chamber system absorption trenches shall be a minimum of 18 inches and a maximum of 36 inches in width.
2. The bottom of the trenches shall have a grade from level to no greater than two (2) inches fall per 100 feet.
3. The grade shall be measured from the trench bottom and not the chamber top.
4. The chamber system shall be covered as per the manufacturer's specifications. In all cases there shall be a minimum of 12 inches of soil cover over the chamber system.
5. The minimum height of a chamber, at its centerline, shall be eleven (11) inches.
6. The last chamber in each "run" shall be terminated with an end plate.

113.04 Distribution of Effluent [Chamber Systems]

1. When a change in elevation of the chamber system is required, a distribution box, connecting lateral or crossover must be used. At the point where a crossover line leaves a lateral, the trench for the crossover line shall be dug no deeper than the top of the endplate inlet or the inlet in the top of the chamber in the preceding trench so that an undisturbed block of earth will remain in place for the full depth of the system. The invert of the crossover must be at least four inches lower than the invert of the septic tank outlet line.
2. Distribution boxes may be used to connect the effluent line to the effluent distribution lines. The distribution box shall be level and supply all lines equally. Field lines (chambers) must be equal lengths when served by one distribution box. Non-perforated rigid pipe shall exit the distribution box for a minimum of five feet at level grade before the effluent distribution line begins.

113.05 Sizing of the Chamber System

1. Chamber systems installed in a trench configuration shall be sized in accordance with Table VIII.
2. Chamber systems installed in a bed configuration shall have the same number of chamber sections as indicated for a trench system. The length and width of the bed to be constructed will depend on the number of chamber sections to be installed as indicated by Table VIII. Any side-by-side placement of chambers shall constitute a bed.
 - a. Absorption beds and trenches should be located a minimum of 10 feet from any trees.
 - b. The bottom of the bed should have a relatively level grade; the grade within the bed shall not exceed the grade allowed for trench installations.
 - c. The chambers shall be placed side by side in a bed with separation between each chamber row per individual manufacturer's requirements.
 - d. Care should be taken to prevent heavy machinery from damaging the bed during backfilling.
 - e. The effluent must be equally distributed to the bed by means of a distribution box or with a pipe manifold.

Table I

SETBACK REQUIREMENTS FROM SENSITIVE WATER

Minimum Distance from the Water Edge

Soil Textural Class	Slope of Less Than 8 Percent	Slope of More Than 8 Percent
Gravel	NOT APPLICABLE	
Coarse Sand	50 feet	50 feet
Medium Sand	50 feet	50 feet
Fine Sand	50 feet	50 feet
Loamy Sand	50 feet	50 feet
Sandy Loam	50 feet	50 feet
Light Loam	50 feet	50 feet
Heavy Loam	50 feet	50 feet
Silt Loam	50 feet	50 feet
Sandy Clay Loam	50 feet	50 feet
Light Clay Loam	50 feet	50 feet
Heavy Clay Loam	50 feet	50 feet
Light Silty Clay Loam	50 feet	50 feet
Heavy Silty Clay Loam	50 feet	50 feet
Sandy Clay	50 feet	50 feet
Silty Clay	50 feet	50 feet
Clay	50 feet	50 feet

The effluent disposal setback is based on the soil texture of the horizon in which the absorption trench or bed is to be placed. These setbacks are to be used on all individual on-site wastewater disposal systems except **Spray Irrigation and Overland Discharge**.

Table II

TEN INCH LARGE DIAMETER PIPE

Results of Soil Evaluation

Soil Textural Class	Ribbon Lengths (Inches)	EPA Manual Application Rate GPD/ Ft ²	Absorption Area Per Bedroom**		Additional Absorption Area Over 2 Persons Per Bedroom**
			Ft ²	*Lf	
Gravel	-	-	NOT SUITABLE		
Coarse Sand	-	1.2	125	43	60
Medium Sand	-	1.2	125	43	60
Fine Sand	-	0.8	190	63	95
Loamy Sand	-	0.8	190	63	95
Sandy Loam	<.5	0.6	250	83	125
Light Loam	<.5	0.6	250	83	125
Heavy Loam	.5-1	0.45	335	115	165
Silt Loam	<1	0.45	335	112	165
Sandy Clay Loam	1-2	0.45	335	112	165
Light Clay Loam	1-1.5	0.30	500	167	250
Heavy Clay Loam	1.5-2.0	0.20	750	250	375
Light Silty Clay Loam	1-1.5	0.30	500	167	250
Heavy Silty Clay Loam	1.5-2.0	0.20	750	250	375
Sandy Clay	>2.0	-	NOT SUITABLE		
Silty Clay	>2.0	-	NOT SUITABLE		
Clay	>2.0	-	NOT SUITABLE		

Minimum and maximum trench widths are 24 and 36 inches, respectively.

** Bedrooms are equivalent to 150 gallons per day.

Table III

DOUBLE SIX LARGE DIAMETER PIPE

Results of Soil Evaluation

Soil Textural Class	Ribbon Lengths (Inches)	EPA Manual Application Rate GPD/ Ft ²	Absorption Area Per Bedroom**		Additional Absorption Area Over 2 Persons Per Bedroom**	
			Ft ²	*Lf	Ft ²	*Lf
Gravel	-	-	NOT SUITABLE			
Coarse Sand	-	1.2	189	63	96	32
Medium Sand	-	1.2	189	63	96	32
Fine Sand	-	0.8	285	95	144	48
Loamy Sand	-	0.8	285	95	144	48
Sandy Loam	<.5	0.6	375	125	189	63
Light Loam	<.5	0.6	375	125	189	63
Heavy Loam	.5 - 1	0.45	504	168	252	84
Silt Loam	<1	0.45	504	168	252	84
Sandy Clay Loam	1 - 2	0.45	504	168	252	84
Light Clay Loam	1 - 1.5	0.30	750	250	375	125
Heavy Clay Loam	1.5 - 2.0	0.20	1125	375	564	188
Light Silty Clay Loam	1 - 1.5	0.30	750	250	375	125
Heavy Silty Clay Loam	1.5 - 2.0	0.20	1125	375	564	188
Sandy Clay	>2.0	-	NOT SUITABLE			
Silty Clay	>2.0	-	NOT SUITABLE			
Clay	>2.0	-	NOT SUITABLE			

Minimum and maximum trench widths are 24 and 36 inches, respectively.

** Bedrooms are equivalent to 150 gallons per day.

Table IV

EIGHT INCH LARGE DIAMETER PIPE

Results of Soil Evaluation

Soil Textural Class	Ribbon Lengths (Inches)	EPA Manual Application Rate GPD/ Ft ²	Absorption Area Per Bedroom**		Additional Absorption Area Over 2 Persons Per Bedroom**	
			Ft ²	*Lf	Ft ²	*Lf
Gravel	-	-	NOT SUITABLE			
Coarse Sand	-	1.2	189	63	96	32
Medium Sand	-	1.2	189	63	96	32
Fine Sand	-	0.8	285	95	144	48
Loamy Sand	-	0.8	285	95	144	48
Sandy Loam	<.5	0.6	375	125	189	63
Light Loam	<.5	0.6	375	125	189	63
Heavy Loam	.5 - 1	0.45	504	168	252	84
Silt Loam	<1	0.45	504	168	252	84
Sandy Clay Loam	1 - 2	0.45	504	168	252	84
Light Clay Loam	1 - 1.5	0.30	750	250	375	125
Heavy Clay Loam	1.5 - 2.0	0.20	1125	375	564	188
Light Silty Clay Loam	1 - 1.5	0.30	750	250	375	125
Heavy Silty Clay Loam	1.5 - 2.0	0.20	1125	375	564	188
Sandy Clay	>2.0	-	NOT SUITABLE			
Silty Clay	>2.0	-	NOT SUITABLE			
Clay	>2.0	-	NOT SUITABLE			

Minimum and maximum trench widths are 24 and 36 inches, respectively.

** Bedrooms are equivalent to 150 gallons per day.

Table V

MULTI-PIPE SYSTEM

Results of Soil Evaluation

Soil Textural Class	Ribbon Lengths (Inches)	EPA Manual Application Rate GPD/ Ft ²	Absorption Area Per Bedroom**												Additional Absorption Over 2 Person Per Bedroom**					
			14 Pipe		13 Pipe		11 Pipe		9 Pipe		14 Pipe		13 Pipe		11 Pipe		9 Pipe			
			Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf		
Gravel	-	-	NOT SUITABLE																	
Coarse Sand	-	1.2	125	42	96	32	111	37	132	44	63	21	48	16	57	19	66	22		
Medium Sand	-	1.2	125	42	96	32	111	37	132	44	63	21	48	16	57	19	66	22		
Fine Sand	-	0.8	190	63	144	48	168	56	201	67	98	32	72	24	84	28	102	34		
Loamy Sand	-	0.8	190	63	144	48	168	56	201	67	98	32	72	24	84	28	102	34		
Sandy Loam	<.5	0.6	250	83	189	63	222	74	264	88	125	42	96	32	111	37	132	44		
Light Loam	<.5	0.6	250	83	189	63	222	74	264	88	125	42	96	32	111	37	132	44		
Heavy Loam	.5 - 1	0.45	335	112	255	85	297	99	354	118	168	56	129	43	150	50	177	59		
Silt Loam	<1	0.45	335	112	255	85	297	99	354	118	168	56	129	43	150	50	177	59		
Sandy Clay Loam	1 - 2	0.45	335	112	255	85	297	99	354	118	168	56	129	43	150	50	177	59		
Light Clay Loam	1 - 1.5	0.30	500	167	381	127	444	148	591	177	250	84	192	64	222	74	267	89		
Heavy Clay Loam	1.5 - 2.0	0.20	750	250	570	190	669	223	795	265	375	125	285	95	336	112	399	133		
Light Silty Clay Loam	1 - 1.5	0.30	500	167	381	127	444	148	591	177	250	84	192	64	222	74	267	89		
Heavy Silty Clay Loam	1.5 - 2.0	0.20	750	250	570	190	669	223	795	265	375	125	285	95	336	112	399	133		
Sandy Clay	>2.0	-	NOT SUITABLE																	
Silty Clay	>2.0	-	NOT SUITABLE																	
Clay	>2.0	-	NOT SUITABLE																	

Minimum and maximum trench widths are 24 and 36 inches, respectively.

** Bedrooms are equivalent to 150 gallons per day.

Table VI
EXPANDED POLYSTYRENE SYSTEM (EPS) “HORIZONTAL”
CONFIGURATION
 Results of Soil Evaluation

Soil Textural Class	Ribbon Lengths (Inches)	EPA Manual Application Rate GPD/ Ft ²	Absorption Area Per Bedroom**												Additional Absorption Over 2 Person Per Bedroom**					
			3-10 Inch		1-12 Inch		2-12 Inch		3-12 Inch		3-10 Inch		1-12 Inch		2-12 Inch		3-12 Inch			
			Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf	Ft ²	Lf		
Gravel	-	-	NOT SUITABLE																	
Coarse Sand	-	1.2	88	35	162	86	86	43	87	29	43	17	82	41	42	21	42	14		
Medium Sand	-	1.2	88	35	162	86	86	43	87	29	43	17	82	41	42	21	42	14		
Fine Sand	-	0.8	133	53	262	131	132	66	132	44	65	26	132	66	66	33	66	22		
Loamy Sand	-	0.8	133	53	262	131	132	66	132	44	65	26	132	66	66	33	66	22		
Sandy Loam	<.5	0.6	173	69	346	173	174	87	174	58	88	35	172	86	86	43	87	29		
Light Loam	<.5	0.6	173	69	346	173	174	87	174	58	88	35	172	86	86	43	87	29		
Heavy Loam	.5-1	0.45	233	93	462	231	232	116	231	77	115	46	228	114	114	57	114	38		
Silt Loam	<1	0.45	233	93	462	231	232	116	231	77	115	46	228	114	114	57	114	38		
Sandy Clay Loam	1-2	0.45	233	93	462	231	232	116	231	77	115	46	228	114	114	57	114	38		
Light Clay Loam	1-1.5	0.30	345	138	690	345	246	173	345	115	173	69	346	173	174	87	174	58		
Heavy Clay Loam	1.5-2.0	0.20	520	208	1036	518	520	260	231	173	260	104	518	259	260	130	258	86		
Light Silty Clay Loam	1-1.5	0.30	345	138	690	345	246	173	345	115	173	69	346	173	174	87	174	58		
Heavy Silty Clay Loam	1.5-2.0	0.20	520	208	1036	518	520	260	231	173	260	104	518	259	260	130	258	86		
Sandy Clay	>2.0	-	NOT SUITABLE																	
Silty Clay	>2.0	-	NOT SUITABLE																	
Clay	>2.0	-	NOT SUITABLE																	

Minimum and maximum trench widths are 24 and 36 inches, respectively.

** Bedrooms are equivalent to 150 gallons per day.

Table VII
**EXPANDED POLYSTYRENE SYSTEM (EPS) “TRIANGULAR”
 CONFIGURATION**
 Results of Soil Evaluation

Soil Textural Class	Ribbon Lengths (Inches)	EPA Manual Application Rate GPD/ Ft ²	Absorption Area Per Bedroom**		Additional Absorption Over 2 Person Per Bedroom**	
			3-10 Inch		3-10 Inch	
			Ft2	Lf	Ft2	Lf
Gravel	-	-	NOT SUITABLE			
Coarse Sand	-	1.2	62	31	30	15
Medium Sand	-	1.2	62	31	30	15
Fine Sand	-	0.8	96	48	48	24
Loamy Sand	-	0.8	96	48	48	24
Sandy Loam	<.5	0.6	126	63	64	32
Light Loam	<.5	0.6	126	63	64	32
Heavy Loam	.5-1	0.45	168	84	84	42
Silt Loam	<1	0.45	168	84	84	42
Sandy Clay Loam	1-2	0.45	168	84	84	42
Light Clay Loam	1-1.5	0.30	250	125	126	63
Heavy Clay Loam	1.5-2.0	0.20	376	188	188	94
Light Silty Clay Loam	1-1.5	0.30	250	125	126	63
Heavy Silty Clay Loam	1.5-2.0	0.20	376	188	188	94
Sandy Clay	>2.0	-	NOT SUITABLE			
Silty Clay	>2.0	-	NOT SUITABLE			
Clay	>2.0	-	NOT SUITABLE			

Minimum and maximum trench widths are 24 and 36 inches, respectively.

The **Triangular Configuration** can only be installed in a trench.

** Bedrooms are equivalent to 150 gallons per day.

Table VIII

CHAMBER SYSTEM

Results of Soil Evaluation

CLASS	SQUARE FEET/CHAMBER SECTION
I	7.51 – 9.50
II	9.51 – 11.50
III	11.51 – 13.50
IV	13.51 – 15.50
V	15.51 – 17.50
VI	17.51 – 19.50
VII	19.51 – 21.50
VIII	21.51 – 23.50

