TABLE 5

CHART FOR INCREASED GRAVEL DEPTH UNDER LATERAL PIPES

Depth of Gravel (below lateral)	For 24" Trench		For 36" Trench	
	Decreased Length	Increased Area	Decreased Length	Increased Area
12	0.80	1.20	0.83	1.17
18	0.66	1.33	0.71	1.29
24	0.57	1.43	0.62	1.38
30	0.50	1.50	0.55	1.45
36	0.44	1.56	0.50	1.50
42	0.40	1.60	0.45	1.55

Note: 1) Standard trenches require 6" of gravel under the lateral pipe.
2) This table is derived from the following formula:

$$L = \frac{(W + 2)}{(W + 1 + 2d)}$$

Where: W is the width (in feet)
d is the depth (in feet)

Using this Table: Whenever increased gravel depths are used, this table can be used to calculate the decrease in length of the trench or the increase in absorption area. To use the Table, simply find the depth of the gravel below the lateral and multiply the value under trench length by that number to find the decrease in required trench length or use the area increase column to find the increase as a result of increasing the depth below the lateral.

Examples:

Absorption Area Design:

(A) = 570 square feet using a standard trench.
24" wide trench requires 285 feet of lateral lines.
36" wide trench requires 190 feet of lateral lines.

Decreasing the length:

24" Trench -- Increased to 18" of gravel below the lateral will decrease the length of trench to 66% of original design length. To find the decreased length, simply multiply **285 x 0.66 = 188 ft.**

Increasing the Absorption Area:

36" Trench -- Increased to 18" of gravel below the lateral will increase the absorption area of trench by 29% of original design area. To find the increased absorption area, simply multiply **570 x 1.29 = 735 sq. ft.**

TABLE 6
DESIGN CRITERIA BY SOIL TYPE FOR ABSORPTION FIELDS

Soil Types	Design & Notes	Counties
Clay----------Perc Test Req'd.----------		
Badland (Bd,Bl)	>120 a	LG,TR,SC
Bogue (Bg)	>100 a	TR
Lismas Clay (Lm)	>100 a	LG
Midway (Mh,Rm)	45->100 a,b	CN,WA
Ness (Nc,Ne)	45->100 a	LE,NS
Promise (Pr,Ps,Pt)	>100 a	LG
Randall (Ra)	>120 a,d	LG,SC
Razor (Rm,Rc)	35->100 a,b,c	CN,WA
Clay Loam----------Design 45 min/in----------		
Mansic (Ma,Mb,Me,Mg)		WH
Manvel (Ma,Mb)	b,d	GO,TR
Penden (Pd,Pe,Pf, Ph,Pk,Pm,Po,Px) DC,GO,GH,LE,NS,NT,SD,TR	b	
Sweetwater (Se)	d	WA
Fine Sandy Loam----------Design 20 min/in----------		
Bayard (Bl)		WH,SC
Glenberg (Gb)	d	CN,WA
Linclon (Lf)	b	LG,WH
Manter (Mc,Mh,Mn,Ms)		CN,GL,LG,WA
Otero (Ot,Of,Oh)	e	CN,GO,GL,LE,LG,SC,WA
Gravel----------Design 5 min/in----------		
Gravel (Gr)	e	LE,LG,SH
Gravelly Loam----------Design 5 min/in----------		
Brownell (Br)	b,e	TR
Heizer (Hw,Hg)	b,e	NS,TR
Gravelly Sand Loam----------Design 30 min/in----------		
Schamber (Sc)		TH
Potter (Po)	b,c,e	GL,LG,SC
Loam----------Design 35 min/in----------		
Alluvial (Ab,Ad,An)	d	LE,LG,SC,SH,WH
Armo (As,Ap,Ar,)		GH,TR
Campus (Cc,Cd)	b,c	GO,GH,LE,NS,NT,RA,TR
Canlon (Cc,Ph) GO,GH,LE,NS,NT,RA,SD,TR	b	
Canyon (Ca,Cd)	c	CN,LG,WA,WH
Dalhart (Dr)		SC
Humbarger(Hu,Hw)	d	GH,TR,WH
Kim (Km,Kr,Ko,Kp)		CN,GO,LE,WA
Las (Lb)		LG
Mansker (Px)	b	GL,LG
Satanta (Sb,Sc)		CN,WA
Wet Alluvial (Mw,Wa)	d	CN,SC

Loamy Fine Sand----------Design 10 min/in----------		
Bankard (Bc,Bb)	d,e	CN,WA
Dwyer (Dw)	e	CN,LGLikes (Lk)
a,e	LG	
Loamy Sand----------Design 5 min/in----------		
Simeon (Sm)	e	SD
Valentine (Va)	e	GH
Tivoli (Ts)	e	LE,SC
Sand----------Design 5 min/in----------		
Active Dunes (Ad)	No Design	LG
Dix (Dx)	e	GO
Inavale (If,Ih,In,Im)	d,e	GO,GH,SD,TR
Sandy Loam----------Design 25 min/in----------		
Anselmo (An,Ad)		GH,LG,SH,WH
Dorrance (Do)	b	TR
Las Animas (Lh,Ld)	d	CN,LG
Munjor (Md,Mu)	d	DC,GO,GH,NT,SD,TR
Silt Loam----------Design 40 min/in----------		
Angelus (An)		GO
Bridgeport (Ba,Bd,Be,Bf, Bg,Bh,Bo,Br,Bs,Bw)	d	All except GL,NT,TR,WH
Carlson (Cd,Cf)		GO,TR
Colby (Cc,Cd,Co*,Cp, DC,GO,GH,LE, Cs*,Cu,Cy*)	c*	All except: NS,NT,TR
Coly (Cu,Cd,Cn,Co)		GH,DC,NS,NT,TR,WH
Cozad (Cs*,Cu,Cz)	d*	NT
Elkader (Ea,Eb,Ec,Ed,Ek)	b,c	GO,LE,LG,WA
Eltree (Et)	e	GH
Goshen (Gn,Go) CN,GL,TH,SC,SH,WA,WH	d	
Grigston (Gs)	d	LE
Harney (Ha,Hb, Hc,He,Hr,Hu,Hv)	a	GO,LE,NS,TR
Hobbs (Hb)	d	NT
Holdrege (Ha,He,Hf, Hg,Hm,Ho,Hp,Hr,Hs,Ht)		DC,GH,NT,TR
Hord (Ha,Ho,Hz)	d	GH,NS,NT,SD,TH,TR
Keith (Ke,Ka,Kb,Kh,Ku) DC,GH,GL,NT,TR		All except
Kuma (Ku)		CN,RA,SD,WA
Lubbock (Lu)		LG,SC
Mansker (Mm)	b	SC,WH
McCook (Mc)	d	DC,TR
Mento (He)		TR
Minnequa (Mb,Mn,Mp)	b	LE,LG
Nibson (Nw)	b	GH,NS,NT,TR
Penrose (Mp)	b	LG
Richfield(Rc,Rf,Rm,Rn,Ro,Rp)		GL,LE,LG,SC,SH,TH,WH

Roxbury (Ra,Rb, Rf,Ro,Rs,Rx) GO,LE,NS,NT,SD,SH,TH,TR	d	
Uly (Ua,Ub,Uc*, Ud,Ue*,Up*,Ux,Uy)	c*	DC,GH,NS,NT,TR
Ulysses (Ua,Ub,Uc,Ud, Ue,Uk,Ul,Um,Un,Us)		All except TR
Volin (Vi,Vs)	c	LG
Wakeen (Wa,Wb,Wc, Wn,Wp,Ws)	b	GH,LG,NS,NT,TR
Silty Clay Loam----------Perc Test Req'd.----------		
Arvada (Ba)	35->100 a	WA
Caruso (Ca,Cd, Cf,Ch,Cr) CN,DC,GO,RA,SD,SH,WA	20-35 d	
Church (Ch)	>100 b	LE,SC
Detroit (De,Dt)	35->100 a,d	NS,NT
Drummond (Dc)	35->100 a,d	LE
Limon (Lm)	>100 a	WA
Lofton (Lo)	>100 a	LG,WH
Pleasant (Ps,Pt,Po) CN,DC,GO,RA,SD,SH,TH,WA	20->100 a,d	
Volin-Slickspots (Vs)	20-35 d	SH
Voda (Vo)	20-35 d	TR

NOTES: Asterisks(*) denote the soil symbol to which it is applicable.

a) Variable; watch for clay.
b) Shallow bedrock or water table; watch depth requirements.
c) Steep slopes possible.
d) Subject to Flooding.
e) Sand; may require the addition of loam, silt, or clay soils to slow to Design Percolation Rate.

This table was complied from the Soil Surveys from the following Northwest Kansas counties; Cheyenne, Decatur, Gove, Greeley, Lane, Logan, Ness, Norton, Rawlins, Scott, Sheridan, Sherman, Thomas, Trego, Wallace, and Wichita. It is designed to be a general guide for sizing soil absorption fields for On-Site Wastewater Disposal Systems.

HOW TO USE THIS TABLE

Any person designing the soil absorption field using this table should follow this procedure:

1. Locate the absorption field on the maps in the County Soil Survey.
2. Determine the soil type from the map.
3. Using Table 6 find your soil type e.g. (Hm).
4. Determine the Design Percolation Rate on the general soil classification line (all in Bold) find the **Design 40 min/in**.
5. Check the county column to make sure you are in the right county.
6. Use the Design Percolation Rate to size the field using Table 4.
7. If the soil classification line has Perc Test Req'd. in the design column, this indicates the soil is too variable to set a design percolation rate.
8. If an asterisk is located behind a soil type, then it is the only soil type applicable to the note in the Design column.

The Design Percolation Rates in this table are not necessarily applicable or adequate in every case. It is a general maximum design which does not include all conditions which may be encountered in these soils. **THIS TABLE IS ONLY AN ESTIMATE, SOIL CONDITIONS WILL VARY GREATLY.** Soil Percolation Tests will give a closer indication of the soils ability to absorb wastewater from a private system.

TABLE 7
WASTE STABILIZATION POND REQUIREMENTS

WASTEWATER STABILIZATION POND SIZES & CAPACITIES

Pond	Dimensions "A" "B" "X"			Storage Capacity (cu. ft.)		Storage Capacity (gallons)	
Type			(Depth)	1.5'	5.0'	1.5'	5.0'
M-40	10'	52'	3.0	295	2,375	2,210	17,770
M-45	10'	59'	3.5	321	2,760	2,400	20,650
M-50	15'	64'	3.5	588	3,577	4,400	31,870
M-55	20'	69'	3.5	929	4,577	6,950	44,970
M-60	25'	74'	3.5	1,345	8,010	10,060	59,930

Note: See the Construction section for general specifications of dike construction. Diagram 5 shows the general layout of a wastewater stabilization pond in plan and section views.

WASTEWATER STABILIZATION POND MINIMUM DISTANCES

Area	**Minimum Separation**
House it serves	100 ft.
Other residential structures	250 ft.
Any private water supply well	100 ft.
* Property lines, including right-of-way	100 ft.
Public water supply well	100 ft.
Public water transmission lines	25 ft.

*** Note:** Placing the pond too close to a property line might limit the options of where an adjoining owner could locate a well. The neighboring property owner may sign a waiver which would allow the placement of the facility as close a 50 feet to the property line. Public roadways (total right-of-way) may be considered part of the separation if necessary. However, neither the pond nor the dikes may be placed on any public access or utility easement.

DEWATERING & IRRIGATION DISTANCE REQUIREMENTS

(See section on Proper Septage Disposal)

Private dwellings, municipal boundaries, public and private water supplies, any surface water or streams	1000 ft.
Public roads and ditches, intermittent streams, water ways, or property lines	250 ft.

Note: These distances apply to dewatering and irrigation practices for lagoons as well as septage from septic tanks, cesspools, or any other sewage disposal systems. For application procedures and conditions that must be followed, see the section on Proper Septage Disposal.

TABLE 8
SEPTAGE DISPOSAL REQUIREMENTS

A. GOAL - To adequately treat and dispose of Domestic Septage in a manner which reduces the potential for contamination of water systems and prevents the spread of human diseases caused by contaminants in the septage.

B. DEFINITION - Domestic Septage is the liquid or solid material removed from a septic tank, cesspool, portable toilet, type III marine sanitation device or a similar system that receives only household, non-commercial, non-industrial sewage.

C. SEPTAGE DISPOSAL METHODS

1. Disposal at a municipal wastewater plant
2. Land disposal - by any of the following (3) options.
   - **a.** Applied without treatment by injection into soil OR
   - **b.** Applied to land surface and incorporated within six (6) hours OR
   - **c.** Applied to land surface by raising the pH above 12 for 30 minutes using the following procedure.

Raising pH with Hydrated Lime

1. Agitate septic tank contents with tank vacuum hose or stirring device.
2. Withdraw approximately 1/3 of the septic tank (300 of a 1,000 gallon tank).
3. Add 50 pounds of hydrated lime to the septage through the vacuum hose. The dry lime (available at hardware stores and lumber yards) can be emptied into five gallon buckets or can be vacuumed directly from the original paper bag.
4. Vacuum the balance of the septage into the vacuum tank.
5. Agitate septage and lime mixture for 15 minutes by frequent opening and closing vacuum hose valve. The air bubbling through the tank and sloshing during transport to disposal site should adequately mix the lime and septage.
6. Thirty (30) minute contact time is required to raise the pH to 12 or higher before you land apply to the soil. Do not allow septage to pond!

NOTES: This procedure illustrates a 1,000 gallon mix. If you have a 500 gallon vacuum tank use 25 pounds of lime per load. Similarly, a 1,500 gallon septic tank will require 75 pounds of dry lime. Follow all labeled safety instructions printed on the lime package i.e. wear rubber boots, gloves and eye protection. Lime is caustic!

D. EPA RULE 503 REQUIREMENTS

1. Disposal in accordance with one of the above listed METHODS.
2. Rule 503 requires records to be kept for all septage disposal. The NWLEPG recommends all licensed NWLEPG Tank Cleaners maintain records to stay in compliance with Rule 503. You may develop your own forms or use the forms in the Land Application handbook from KDHE (available from the NWLEPG).

E. NWLEPG REQUIREMENTS

1. All persons engaged in the pumping and disposal of septage within the NWLEPG coded counties must hold a valid license issued by the NWLEPG.
2. All licenses are renewed each year by annual inspection for leaks of the vacuum tank.
3. All licensed tank cleaners shall report which options were used for septage disposal.
4. The NWLEPG also reserves the option to inspect any records held for EPA Rule 503.
5. Each licensed Tank Cleaner must report the number of systems pumped for septage disposal to the NWLEPG for general informational purposes.

1. Kansas Department of Health and Environment, March 1984, Bulletin 4-2, "A Manual of Recommended Standards for Locating, Constructing and Operating Septic Tank Systems for Rural Homes"

2. Kansas Department of Health and Environment, November 22, 1989 Draft "Recommended Standards for Construction, Operation of Single Family Waste Stabilization Ponds"

3. Environmental Protection Agency Design Manual, October 1980, "Onsite Wastewater Treatment and Disposal Systems", EPA 625/1-80-012.

4. USPHS No.526, 1972, "Manual of Septic-Tank Practice"

5. Colorado Environmental Health Association, 1985, "Sanitarians Field Handbook", second edition

6. Kansas Association of Sanitarians, 1990 draft, "The Kansas Sanitarians Handbook"

7. Environmental Protection Agency Handbook, October 1984, "Septage Treatment and Disposal"

8. United States Dept. of Agriculture, Soil Conservation Service, Soil Surveys of all counties in NWLEPG area