TERRACE DESIGN PROCEDURE

The material presented in this field Notice is a simplified method for design of terraces. Terraces can be designed using this procedure or other procedures presented in the Engineering Field Manual.

Part 1 - Page IL 8-105 Gradient Terraces

Determine the required terrace spacing, design depths, channel slopes and management for a 1,200 ft. long gradient terrace system in Montgomery, County, Illinois. The soil is Harrison Silt Loam. The land slope is 4%.

Part 2 - Page IL 8-111 Storage Type Terraces

Determine the total required storage and the capacity of the underground outlet for the terrace designed in Part 1, assuming the terrace is a storage type terrace, and the duration of flooding is 24 hours.

PART 1 - GRADIENT TERRACES

STEP 1 - DETERMINE THE TERRACE HORIZONTAL INTERVAL - (H.I.)

a) Select the Horizontal Interval (H.I.) for broadbase or grass backslope terraces. (See Table 8 IL-1 or Table 8 IL-2; page IL 8-112 or 8-113).

Example:

a) Select horizontal interval:

Existing Field Slope = 4%
Broadbase Terrace - H.I. = 120 ft.; Ave. Constr. Slope = 5.5%
Grassback Slope Terrace - H.I. = 160 ft.; Ave. Constr. Slope = 3.2%

STEP 2 - DETERMINE FARMING WIDTHS TO FIT FARM EQUIPMENT

a) Determine present and future equipment row widths and number of rows (conference with operator).

b) Determine farming width between terraces (see page IL 8-114; Table 8 IL-3).

Note: Broadbase Terraces - The farming width is from the top of the ridge of the upper terrace to

the top of the ridge of the lower terrace.

Grass Backslope Terraces - The farming width is from the toe of the backslope of the upper terrace to the top of the ridge of the lower terrace.

c) Determine the width of the terrace front slope.

Note: The width of the terrace front slope should be equal to 1 or 2 passes of future farming equipment.

Example:

a) Equipment width (conference with owner and operator)

1. Existing equipment - 4 rows, 30" wide
2. Future Equipment - 8 rows, 30" wide

b) Farming Widths (See table 8 IL-3)

Number of Trips	Present Equipment 4 rows, 30" width	Future Equipment 8 rows, 30" width
1	10 Feet	20 Feet
2	20 Feet	40 Feet

c) Farming Width - 20', 120' and 160' fits present and future equipment. Front slope = 20'.

Note: The H.I. can be increased or decreased up to 10% to fit future farm machinery.

STEP 3 - DETERMINE TERRACE SPACING

a) Determine terrace spacing for broadbase terraces (See page IL 8-115).

Note: Terrace spacing is equal to the width of the Horizontal Interval plus the width of the terrace front slope.

b) Determine terrace spacing for grass backslope terraces (See page IL 8-116).

Note: Terrace spacing is equal to the width of the Horizontal Interval plus the width of the front slope plus the width of the backslope.

Example:

a) Broadbase Terraces:

HI from Steps 1 and 2	=	120 ft.
Front slope from Step 2	=	20 ft.
Terrace Spacing	=	140 ft.

(Farming Width = 140 ft.)

b) Grass Backslope Terraces

H.I. from steps 1 and 2	=	160 ft.
Front slope from Step 2	=	20 ft.
*Approximate backslope "b"	=	8 ft.
Terrace Spacing	=	188 ft.

*Note: Table 8 IL-6 page IL 8-117 shows backslope widths for different landslopes and depths of terraces. The backslope widths were calculated assuming that all of the earth for construction was borrowed from below the terrace ridge.

STEP 4 - DETERMINE HYDROLOGIC AND HYDRAULIC DESIGN DATA

a) Determine 10 year, 24 hour rainfall. (See EFM pages 2-36.24, and 2-36.25.)

b) Determine hydrologic soil group (see EFM pages 2-10.1 to 2-10.4).

c) Determine runoff curve no. (see EFM page 2-30.1).

d) Determine direct runoff (see EFM pages 2-50.1 to 2-50.14).

e) Determine the maximum allowable channel velocity in ft./sec.

Example: 1,200 ft. long terraces in Montgomery Co., Harrison silt loam

a) 10 year, 24 hr. rainfall = 4.7 inches

b) Harrison silt loam - Hydrologic soil group "C"

c) Runoff curve no. - - - - - - - - - - 82

d) Direct runoff - - - - - - - - - - - 2.81"

e) Estimated maximum allowable channel velocity = 2.0 ft./sec.

STEP 5 - DETERMINE DESIGN DEPTHS AND CHANNEL SLOPES BY METHOD 1 OR BY METHOD 2

METHOD 1 PROCEDURE

a) Determine peak design flow (see page IL 8-118; Figure 8 IL-1)

Note: Figure 8 IL-1 is a graph for determining the design flow in c.f.s. per inch of runoff for a gradient terrace with a given spacing and length.

Peak terrace design flow is equal to the runoff in inches as determined under Step 4 (d) multiplied by the design flow in c.f.s. per inch of runoff.

b) Determine terrace design depths AND maximum grades. (see page IL 8-119; Figure 8 IL-2). The minimum grade is .2%

Note: Figure 8 IL-2 is a graph for determining the minimum and maximum terrace channel bottom slope for a terrace with a given cross section, design capacity and maximum allowable velocity. Enter the left side of the graph at the design flow in c.f.s. as determined under step 5(a) and read across to the design depth of flow and then down to the minimum channel slope. Enter the graph at the design capacity in c.f.s. and then across to the curved line (maximum allowable velocity) and then down to find the maximum channel slope. Figure 8 IL-3 page IL 8-120 is a chart form of this graph.

Example: METHOD 1 - GRASS BACK SLOPE TERRACES

Terrace Spacing = 188 ft.
Maximum Allowable Velocity = 2 ft./sec.

(a) See Figure 8 IL-1				b) See Figure 8 IL-2	
Sta. to Sta.	Design Flow	Runoff	Peak Design Flow	Design Depth	Max. Allow. Channel Slope
Feet	cfs x	inches =	cfs	1/ FT.	2/ %
0+00 to 2+00	1.6	2.81	4.5	.7	1.4
2+00 to 4+00	2.9	"	8.2	.9	.9
4+00 to 6+00	4.0	"	11.3	1.1	.7
6+00 to 8+00	4.8	"	13.5	1.2	.6

Continued:

Sta. to Sta.	Design Flow	Runoff	Peak Design Flow	Design Depth	Max. Allow. Channel Slope
Feet	cfs x	inches =	cfs	1/ FT.	2/ %
8+00 to 10+00	5.7	"	16.0	1.3	.55
10+00 to 12+00	6.6	"	18.6	1.4	.5

1/ The design depth of channel will carry the peak design flow when the channel slope equals or exceeds .2%.

2/ The channel bottom can be constructed with slopes variable between the maximum and minimum shown and the maximum allowable velocity will not be exceeded.

METHOD 2 PROCEDURE

a) Determine channel design depths and the maximum allowable channel bottom slopes. (see pages IL 8-121 through IL 8-129 Tables 8 IL-7 through 8 IL-15).

Note: Tables 8 IL-7 through Table 8 IL-15 show required terrace depths and the maximum allowable terrace channel grades in percent for different terrace spacings and lengths. The design depths and grades were developed for 2.0, 2.5 and 3.0 inches of runoff and allowable velocities equal to 1.5, 2.0, 2.5 cu. ft. per sec. for each runoff volume. (Using the direct runoff as found in Step 4d, the estimated allowable velocity found in Step 4e, and the terrace spacing from Step 3 enter the applicable table and read the required design depths and maximum allowable channel slopes.)

Example: METHOD 2 - Grass Backslope Terraces

a) Terrace Spacing = 188 ft. (Use terrace spacing 180 to 200 ft.)
Runoff = 2.7 in. (Use runoff 3.0 inches)

See Table 8 IL-14		
Sta. to Sta.	Design Depth	Max. Allow. Channel Slope
Feet	Feet	1/ %
0+00 - 2+00	.7	1.4
2+00 - 4+00	1.0	.9
4+00 - 6+00	1.2	.7
6+00 - 8+00	1.3	.6
8+00 - 10+00	1.4	.55
10+00 - 12+00	1.5	.4

1/ The minimum channel grade = .2%. The channel can be constructed with the slope variable between the maximum and minimum shown and not exceed the allowable velocity.

STEP 6 - DETERMINE REQUIRED MANAGEMENT PRACTICES

a) Determine soil data (see RCP-TN-IL-4)
b) Required rainfall data (see RCP-TN-IL-4)
c) Determine required management practices (see Universal Soil Loss Equation Calculator and RCP-TN-IL-4).

Example:

a) Soils No. = 127 Soil TYPE = Harrison Silt Loam
Allow. Soil Loss "T" = 4ft./ac.
"K" = .32
"T/K" = 12.5

b) Rainfall Data
Rainfall Curve No. = 16
Rainfall Factor "R" = 200

c) Required Management: Grass Backslope Terraces
Horizontal Interval = 160 ft.
Constructed Slope = 3.0 to 3.3%
Ave. Constructed Slope = 3.2%
"C" - = .35
Rotation - Corn, Corn, Soybeans
Management - Plow Plant

PART 2 - STORAGE TYPE TERRACES, WITH UNDERGROUND OUTLET

Part 2 Problem - Determine the total required storage and the capacity of the underground outlet for the gradient terraces designed in Part 1 when the duration of flooding is 24 hrs.

From Part 1 -	Terrace Length	=	1,200 ft.
	Terrace Spacing	=	188 ft.
	Allowable Soil Loss	=	4 T/AC.
	10 yr. 24 hr. Runoff	=	2.81 inches

STEP 1 - DETERMINE STORAGE REQUIREMENTS

(See page IL 8-130; Tables 8 IL-16 and 8 IL-17)

a) Sediment Storage + Water Storage = Total Storage
b) Compute Total Required Storage

Example:

a) Sediment storage = .28in. per unit of area
Water storage = 1.41 in. per unit of area
Total storage = 1.69 in. per unit of area

$$\text{Total Required Storage} = \frac{188 \text{ ft.} \times 1{,}200 \text{ ft.} \times 1.69 \text{ in.}}{12 \text{ in./ft.}} = 31{,}772 \text{ cu. ft.}$$

STEP 2 - DETERMINE UNDERGROUND OUTLET CAPACITY

(See page IL 8-130; Table 8 IL-17)

a) Determine design outflow in c.f.s. per inch of runoff.

b) Determine area drained.

c) Compute peak design outflow.

Example:

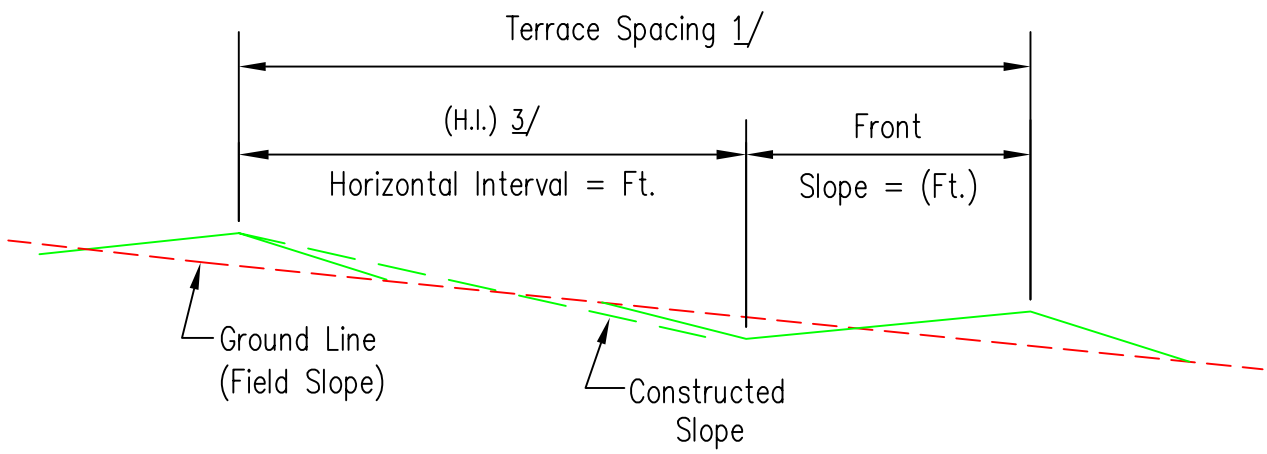
a) Design outflow = .035 cfs/acre-inch of runoff

b) $\text{Area Drained} = \frac{188 \text{ ft.} \times 1{,}200 \text{ ft.}}{43{,}560 \text{ sq.ft./ac.}} = 5.2 \text{ acres}$

c) Peak Design Outflow = 5.2 ac. x .035 cfs/ac. in. x 2.81" runoff = .51 c.f.s.

TABLE 8 IL-1 BROAD BASE TERRACES - TABLE OF HORIZONTAL INTERVALS AND CONSTRUCTED FIELD SLOPES

Field Slope Percent	BROAD BASE TERRACES	
	3/ Horizontal Interval (H.I.)	2/Average Constructed Field Slope
	Feet	Percent
1	300	1.6
2	200	2.9
3	160	4.2
4	120	5.5
5	100	7.0
6	90	8.4
7	80	9.9



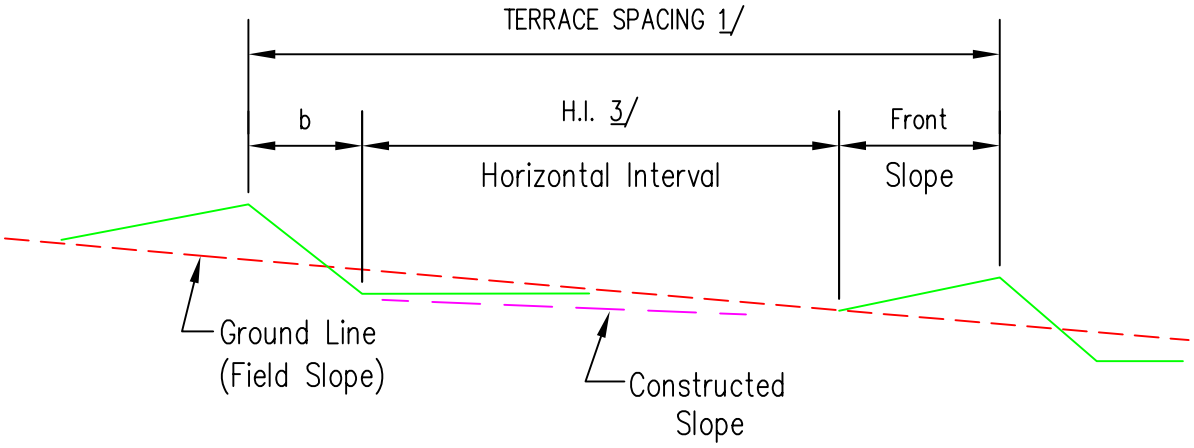
1/ Terrace Spacing (ft.) = Horizontal Interval (ft.) + Front Slope (ft.)

2/ Use constructed slope and horizontal interval to determine the required management factor for field slopes steeper than 3%. See pages IL 8-115 and IL 8-116, Table 8 IL-5 for constructed field slopes.

3/ The horizontal interval may be increased or decreased up to 10% to fit machinery.

TABLE 8 IL-2 GRASS BACKSLOPE TERRACES
TABLE OF HORIZONTAL INTERVALS AND CONSTRUCTED FIELD SLOPES

Field Slope Percent	GRASS BACKSLOPE TERRACES	
	Horizontal Interval	2/Average Constructed Field Slope
	Feet	Percent
3	180	2.4
4	160	3.2
5	140	4.0
6	130	4.8
7	110	5.3
8	100	5.9
9	90	7.1
10	90	7.8
12	90	8.5



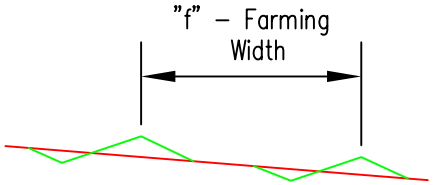
Typical Grass Backslope Terrace System Section

1/ Terrace Spacing (ft.) = Horizontal Interval (ft.) + Front Slope (ft.) + Back Slope (ft.)

2/ Use constructed slope and horizontal interval to determine the required management factor from Conservation Planning Technical Note No. 4, the Universal Soil Loss Equation Calculator. See pages IL 8-117, Table 8 IL-6 for Constructed Field Slopes.

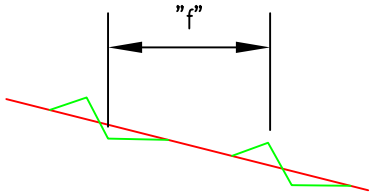
3/ The horizontal interval may be increased or decreased by 10% to fit machinery.

TABLE 8 IL-3 – TERRACE SPACING FOR DIFFERENT FARMING EQUIPMENT WIDTHS



Broad Base Terraces

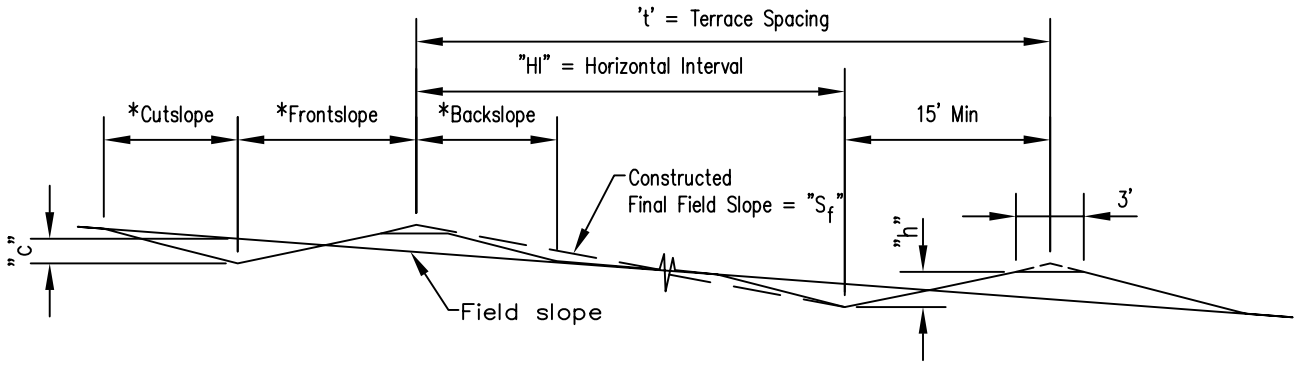
Width Of One Trip Across field						
No. Of Rows	Width Of Row					
	30 Inch	32 Inch	34 Inch	36 Inch	38 Inch	40 Inch
4	10'-0"	10'-8"	11'-4"	12'-0"	12'-8"	13'-4"
6	15'-0"	16'-0"	17'-0"	18'-0"	19'-0"	20'-0"
8	20'-0"	21'-4"	22'-8"	24'-0"	25'-4"	26'-8"
12	30'-0"	32'-0"	34'-0'	36'-0'		
16	40'-0"	42'-8"				



Grass Backslope Terraces

FARMING WIDTHS "f" FOR DIFFERENT MACHINERY SIZES														
No. Of Trips	4 Rows				6 Rows				8 Rows				12 Rows	16 Rows
	30 Inch	36 Inch	38 Inch	40 Inch	30 Inch	36 Inch	38 Inch	40 Inch	30 Inch	36 Inch	38 Inch	40 Inch	30 Inch	30 Inch
4						72'-0"	76'-0"	80'-0"	80'-0"	96'-0"	101'-4"	106'-8"	120'-0"	160'-0"
5				66'-8"	75'-0"	90'-0"	95'-0"	100'-0"	100'-0"	120'-0"	126'-8"	133'-4"	150'-0"	200'-0"
6			76'-0"	92'-0"	90'-0"	108'-0"	114'-0"	120'-0"	120'-0"	144'-0"	152'-0"	160'-0"	180'-0"	240'-0"
7		84'-0"	88'-8"	105'-4"	105'-0"	126'-0"	133'-0"	140'-0"	140'-0"	168'-0"	177'-4"	186'-8"	210'-0"	280'-0"
8	80'-0"	96'-0"	101'-4"	106'-8"	120'-0"	144'-0"	152'-0"	160'-0"	160'-0"	192'-0"	202'-8"	213'-4"	240'-0"	320'-0"
9	90'-0"	108'-0"	114'-0"	120'-0"	135'-0"	162'-0"	171'-0"	180'-0"	180'-0"	216'-0"	228'-0"	240'-0"	270'-0"	360'-0"
10	100'-0"	120'-0"	126'-8"	133'-4"	150'-0"	180'-0"	190'-0"	200'-0"	200'-0"	240'-0"	253'-4"	266'-8"	300'-0"	400'-0"
11	110'-0"	132'-0"	139'-4"	146'-8"	165'-0"	198'-0"	209'-0"	220'-0"	220'-0"	264'-0"	278'-8"	293'-4"	330'-0"	440'-0"
12	120'-0"	144'-0"	152'-0"	160'-0"	180'-0"	216'-0"	228'-0"	240'-0"	240'-0"	288'-0"	304'-0"	320'-0"	360'-0"	
13	130'-0"	156'-0"	164'-8"	173'-4"	195'-0"	234'-0"	247'-0"	260'-0"	260'-0"	312'-0"	324'-4"	346'-8"	390'-0"	
14	140'-0"	168'-0"	177'-4"	186'-8"	210'-0"	252'-0"	266'-0"	280'-0"	280'-0"	336'-0"	354'-8"	373'-4"	420'-0"	
15	150'-0"	180'-0"	190'-0"	200'-0"	255'-0"	270'-0"	285'-0"	300'-0"	300'-0"	360'-0"	380'-0"	400'-0"	450'-0"	
16	160'-0"	192'-0"	202'-8"	213'-4"	240'-0"	288'-0"	304'-0"	320'-0"	320'-0"	384'-0"	405'-4"	426'-8"		
17	170'-0"	204'-0"	215'-4"	226'-8"	255'-0"	306'-0"	323'-0"	340'-0"	340'-0"	408'-0"	430'-8"			
18	180'-0"	216'-0"	228'-0"	240'-0"	270'-0"	324'-0"	342'-0"	360'-0"	360'-0"	432'-0"				
19	190'-0"	228'-0"	240'-8"	253'-4"	285'-0"	342'-0"	361'-0"	380'-0"	380'-0"					
20	200'-0"	240'-0"	253'-4"	266'-8"	300'-0"	360'-0"	380'-0"	400'-0"	400'-0"					

BROADBASE TERRACES



c = Cut Depth At Stakeline
h = Design Height Of Terrace

* Length of cutslope, frontslope and backslope shall be in increments of machinery width and shall be no shorter than 15 feet nor steeper 6:1.

TABLE 8 IL-4 TYPICAL DIMENSIONS OF BROAD BASED TERRACES

1/ Depth of Cut At Stake Line For Balanced Sections									
Field Slope	Design Height Of Terrace -h In Feet								
	0.8	1.0	1.2	1.4	1.6	1.8	2.0	2.2	2.4
1%	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4
2%	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5
3%	0.75	0.85	0.95	1.05	1.15	1.25	1.35	1.45	1.55
4%	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6
5%	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7
6%	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
7%	1.05	1.15	1.25	1.35	1.45	1.55	1.65	1.75	1.85
8%	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9

1/ Cuts and fills are balanced - No allowance for shrinkage

TABLE 8 IL-5 BROAD BASE TERRACES

FINAL CONSTRUCTED DIMENSIONS AND FIELD SLOPES					
Field Slope 1/	Design Dimension - "Ft"		Final Constructed Field Slopes For Given Horizontal Intervals "HI" = Ft.		
	"h"	"c"			
1%			HI = 280	HI = 300	HI = 320
	0.8	0.6	1.45%	1.4%	1.35%
	1.0	0.7	1.5	1.4	1.4
	1.2	0.8	1.6	1.5	1.5
	1.4	0.9	1.6	1.6	1.5
	1.6	1.0	1.7	1.6	1.6
	1.8	1.2	1.8	1.7	1.7
	2.0	1.4	1.9	1.8	1.7
2%			HI = 180	HI = 200	HI = 220
	0.8	0.7	2.8%	2.7%	2.6%
	1.0	0.8	2.9	2.8	2.7
	1.2	0.9	3.0	2.9	2.8
	1.4	1.0	3.1	3.0	2.9
	1.6	1.1	3.2	3.1	3.0
	1.8	1.2	3.3	3.2	3.1
3%			HI = 140	HI = 160	HI = 180
	0.8	0.7	4.1%	3.9%	3.8%
	1.0	0.8	4.2	4.1	3.9
	1.2	0.9	4.3	4.2	4.0
	1.4	1.0	4.5	4.3	4.1
	1.6	1.1	4.6	4.4	4.2

1/ Use existing field slopes to compute required management practices when field slope does not exceed 3%.

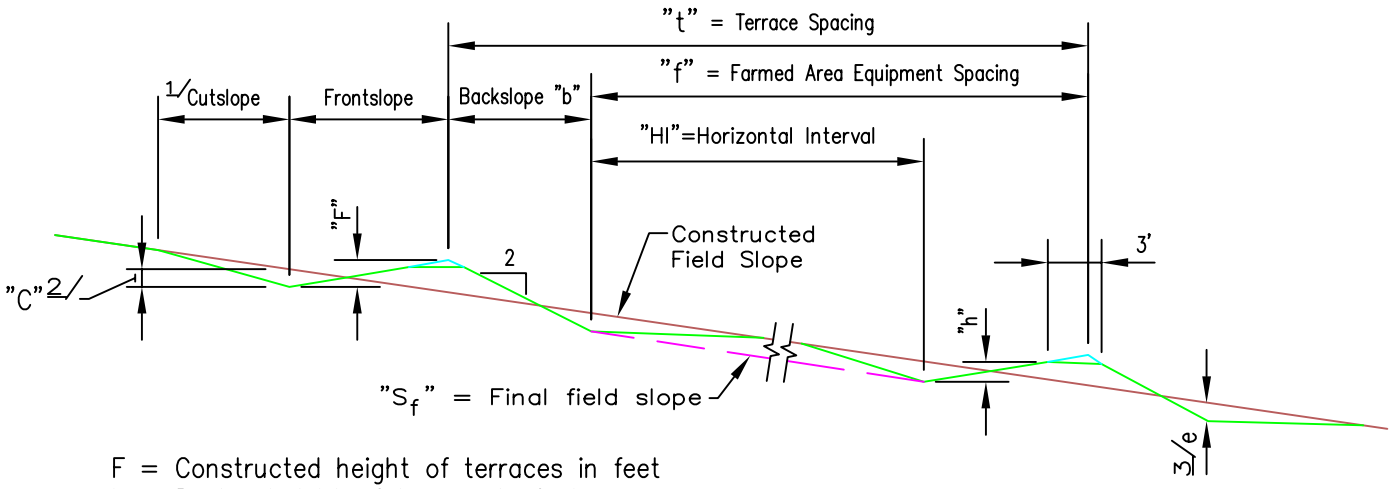
BROADBASE TERRACES

TABLE 8 IL-5 Continued

FINAL CONSTRUCTED DIMENSIONS AND FIELD SLOPES					
Field Slope	Design Dimension – "Ft"		Final Constructed Field Slopes 2/ For Given Horizontal Intervals "HI" = Ft.		
	"h"	"c"			
4%			HI=100	HI=120	HI=140
	0.8	0.8	5.75%	5.4%	5.0%
	1.0	0.9	5.8	5.5	5.1
	1.2	1.0	6.1	5.7	5.3
	1.4	1.1	6.2	5.8	5.4
	1.6	1.2	6.4	6.0	5.5
5%			HI=90	HI=100	HI=110
	0.8	0.9	7.0%	6.8%	6.6%
	1.0	1.0	7.2	7.0	6.8
	1.2	1.1	7.4	7.2	7.0
	1.4	1.2	7.6	7.4	7.2
	1.6	1.3	7.8	7.6	7.4
6%			HI=80	HI=90	HI=100
	0.8	1.0	8.4%	8.2%	8.0%
	1.0	1.1	8.7	8.4	8.2
	1.2	1.2	8.9	8.6	8.4
	1.4	1.3	9.1	8.8	8.6
7%			HI=80	HI=90	
	0.8	1.0	9.6%	8.2%	
	1.0	1.1	9.9	8.4	
	1.2	1.2	10.1	8.6	
	1.4	1.3		8.8	

2/ Use final constructed field slopes to compute required management practices when the field slope exceeds 3%.

GRASS BACKSLOPE TERRACES



F = Constructed height of terraces in feet
h = Design height of terrace in feet
c = Cut depth at stakeline in feet
e = Depth of excavation for borrow in feet
b = Backslope

1/ Length of cut slope and front slope shall be in increments of machinery widths but not shorter than 15 feet nor steeper than 6:1.

2/ Cuts at stakeline shall be made only to construct the channel grade. Dimensions shown in Table 8 IL-6 are tabulated for "c" = 0.

TABLE 8 IL-6 GRASSED BACKSLOPE TERRACES

FINAL CONSTRUCTED DIMENSIONS AND FIELD SLOPES							
Field Slope	Design Dimensions – "Ft"				Constructed Field Slopes For Horizontal Intervals As Shown (HI) = Feet		
	"h"	"F"	"e"	"b"			
3%					HI=160	HI=180	HI=200
	0.8	1.0	0.9	5.0	2.45%	2.5%	2.55%
	1.0	1.2	1.0	5.6	2.4	2.4	2.5
	1.2	1.5	1.1	6.2	2.3	2.4	2.4
	1.4	1.7	1.2	6.8	2.2	2.3	2.4
	1.6	1.9	1.3	7.0	2.4	2.3	2.3
4%					HI=150	HI=160	HI=180
	0.8	1.0	1.1	6.2	3.2%	3.3%	3.5%
	1.0	1.2	1.2	6.8	3.1	3.25	3.4
	1.2	1.5	1.3	7.4	3.1	3.2	3.3
	1.4	1.7	1.4	8.0	3.0	3.1	3.2
	1.6	1.9	1.5	8.5	2.9	3.05	3.1
5%					HI=130	HI=140	HI=150
	0.8	1.0	1.3	7.1	4.0%	4.1%	4.15%
	1.0	1.2	1.4	7.5	3.9	4.0	4.0
	1.2	1.5	1.5	8.0	3.8	3.9	4.0
	1.4	1.7	1.6	8.8	3.7	3.85	3.9
	1.6	1.9	1.7	10.0	3.7	3.8	3.8
6%					HI=120	HI=130	HI=140
	0.8	1.0	1.5	7.4	4.75%	4.8%	4.9%
	1.0	1.2	1.6	8.0	4.7	4.7	4.8
	1.2	1.5	1.7	9.2	4.6	4.7	4.8
	1.4	1.7	1.8	10.0	4.5	4.6	4.7
	1.6	1.9	1.9	10.8	4.4	4.5	4.65
7%					HI=110	HI=120	HI=130
	0.8	1.0	1.8	9.1	5.2%	5.4%	5.5%
	1.0	1.2	1.9	9.8	5.1	5.3	5.4
	1.2	1.5	2.0	10.5	5.0	5.2	5.3
	1.4	1.7	2.1	11.2	4.9	5.1	5.25
	1.6	1.9	2.2	12.8	4.8	5.0	5.2
8%					HI=90	HI=100	HI=110
	0.8	1.0	2.0	10.4	5.8%	6.0%	6.2%
	1.0	1.2	2.1	11.0	5.7	5.9	6.1
	1.2	1.5	2.2	11.6	5.5	5.8	6.0
	1.4	1.7	2.3	12.3	5.4	5.7	5.9
	1.6	1.9	2.4	13.0	5.3	5.6	5.8
9%					HI=80	90	100
	0.8	1.0	2.2	10.4	6.25%	6.55%	6.8%
	1.0	1.2	2.3	11.4	6.1	6.4	6.7
	1.2	1.5	2.4	12.4	6.0	6.3	6.6
	1.4	1.7	2.5	13.4	5.9	6.2	6.5
	1.6	1.9	2.6	14.4	5.7	6.1	6.4
10%					HI=80	90	100
	0.8	1.0	2.5	11.9	6.9%	7.2%	7.5%
	1.0	1.2	2.6	12.9	6.7	7.1	7.4
	1.2	1.5	2.7	13.9	6.6	7.0	7.3
	1.4	1.7	2.8	14.9	6.5	6.9	7.2
	1.6	1.9	2.9	15.8	6.4	6.8	7.1
11%					HI=80	90	100
	0.8	1.1	2.8	13.5	7.5%	7.9%	8.2%
	1.0	1.3	2.9	14.5	7.4	7.8	8.1
	1.2	1.5	3.0	15.5	7.2	7.7	8.0
	1.4	1.7	3.1	16.6	7.1	7.6	7.9
	1.6	1.9	3.2	17.4	7.0	7.5	7.8
12%					HI=80	90	100
	0.8	1.1	3.1	15.0	8.1%	8.6%	8.9%
	1.0	1.3	3.2	16.0	8.0	8.4	8.8
	1.2	1.5	3.3	17.0	7.9	8.3	8.7
	1.4	1.7	3.4	18.2	7.8	8.2	8.6
	1.6	1.9	3.5	19.0	7.6	8.1	8.5

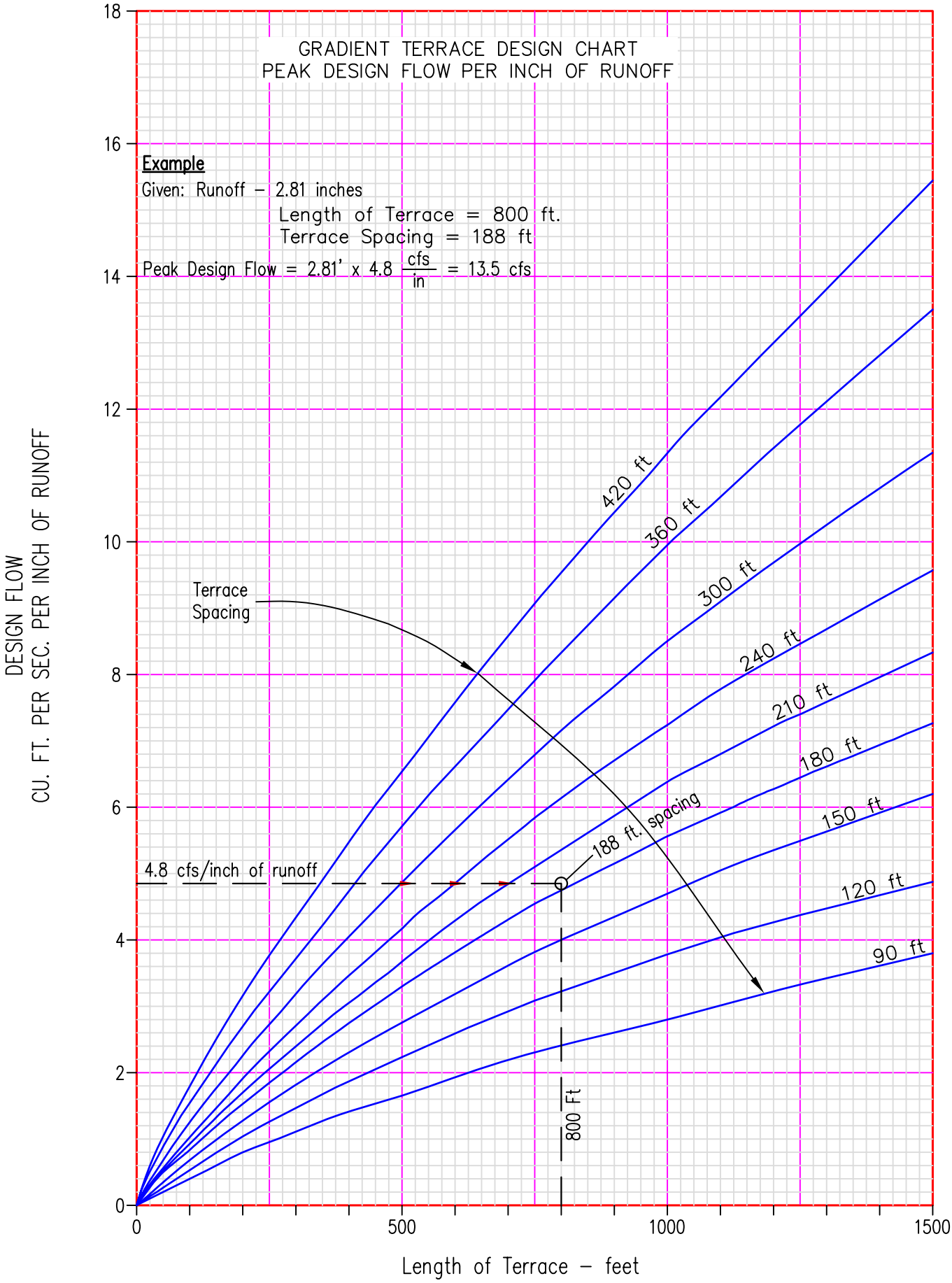
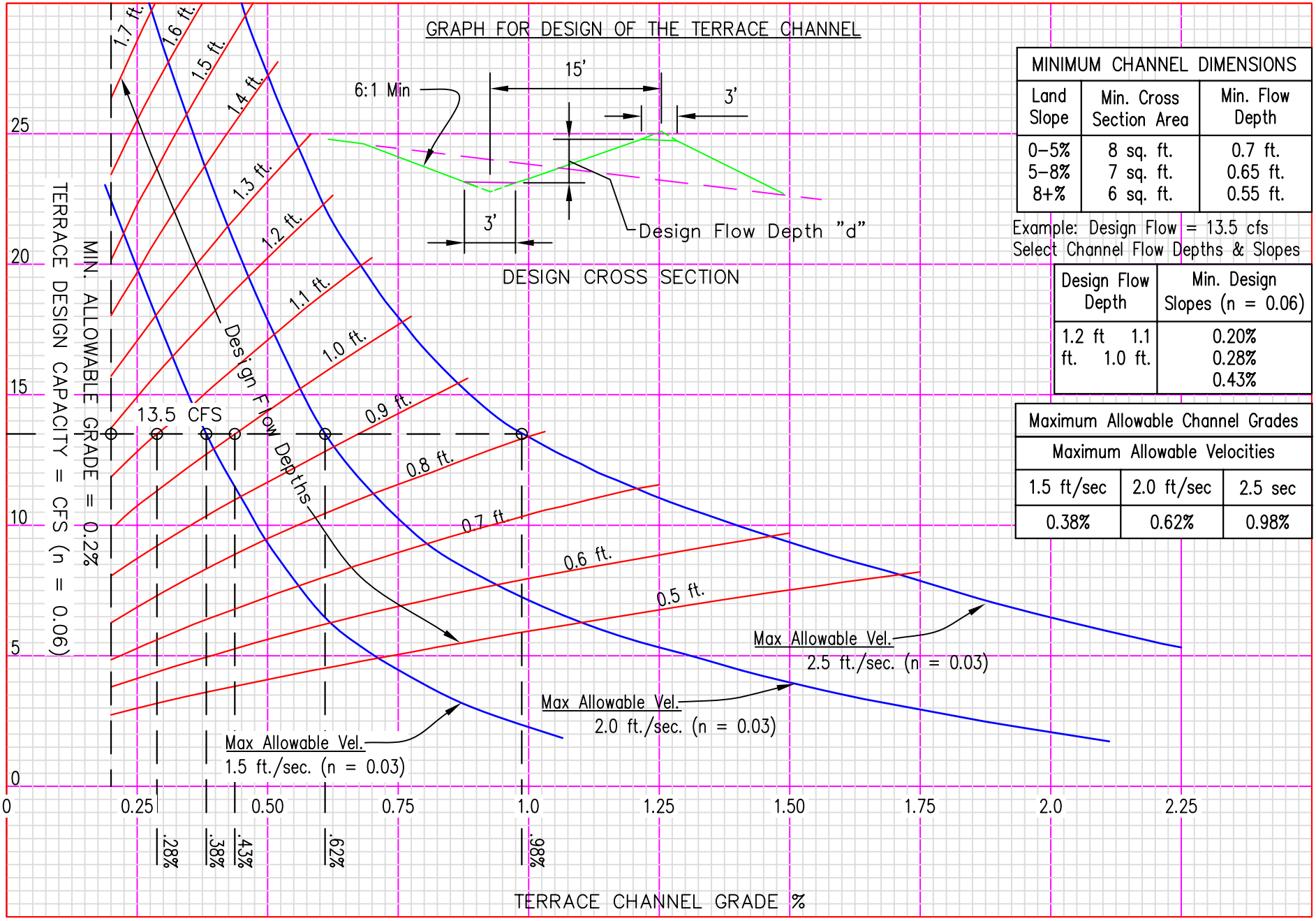

GRADIENT TERRACE DESIGN CHART
PEAK DESIGN FLOW PER INCH OF RUNOFF
Example
Given: Runoff – 2.81 inches
Length of Terrace = 800 ft.
Terrace Spacing = 188 ft
Peak Design Flow = 2.81' x 4.8 cfs/in = 13.5 cfs
DESIGN FLOW
CU. FT. PER SEC. PER INCH OF RUNOFF
Terrace Spacing
420 ft
360 ft
300 ft
240 ft
210 ft
180 ft
150 ft
120 ft
90 ft
188 ft. spacing
4.8 cfs/inch of runoff
800 Ft
0
2
4
6
8
10
12
14
16
18
0
500
1000
1500
Length of Terrace – feet

Figure 8 IL–1

Figure 8 IL–2



MINIMUM CHANNEL DIMENSIONS		
Land Slope	Min. Cross Section Area	Min. Flow Depth
0–5%	8 sq. ft.	0.7 ft.
5–8%	7 sq. ft.	0.65 ft.
8+%	6 sq. ft.	0.55 ft.

Example: Design Flow = 13.5 cfs
Select Channel Flow Depths & Slopes

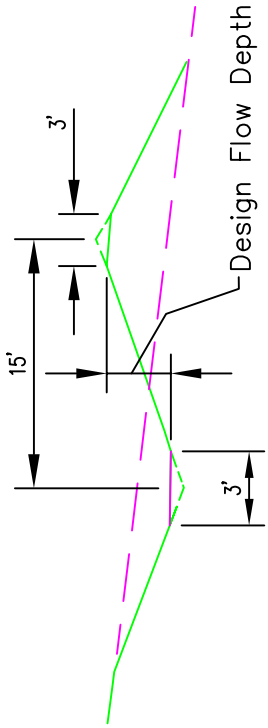
Design Flow Depth	Min. Design Slopes (n = 0.06)
1.2 ft 1.1 ft. 1.0 ft.	0.20% 0.28% 0.43%

Maximum Allowable Channel Grades		
Maximum Allowable Velocities		
1.5 ft/sec	2.0 ft/sec	2.5 sec
0.38%	0.62%	0.98%

TERRACE DESIGN CHART
MAXIMUM AND MINIMUM CHANNEL SLOPES

Design Flow	Channel Slopes In Percent								
	Design Flow Depths								
cfs	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3
3	0.27 0.90 1.72 3.50								
4	0.50 0.78 1.50 3.00	0.22 0.78 1.50 3.00							
5	0.75 *___ 1.30 2.35	0.40 0.70 1.30 2.35	0.23 0.70 1.30 2.35						
6	1.05 *___ 1.15 2.10	0.57 0.63 1.15 2.10	0.35 0.63 1.15 2.10	0.20 0.63 1.15 2.10					
7	1.30 *___ *___ 1.92	0.75 0.58 1.02 1.92	0.47 0.58 1.02 1.92	0.28 0.58 1.02 1.92					
8	1.65 *___ *___ 1.75	1.00 *___ *___ 1.75	0.62 *___ 0.78 1.75	0.35 0.53 0.90 1.75	0.20 0.53 0.90 1.75				
9		1.32 *___ *___ 1.55	0.79 *___ 0.82 1.55	0.45 0.50 0.82 1.55	0.28 0.50 0.82 1.55				
10			0.93 *___ *___ 1.40	0.57 *___ 0.75 1.40	0.35 0.47 0.75 1.40	0.22 0.47 0.75 1.40			
11			1.15 *___ *___ 1.25	0.68 *___ 0.70 1.25	0.43 0.44 0.70 1.25	0.28 0.44 0.70 1.25	0.20 0.44 0.70 1.25		
12				0.82 *___ *___ 1.12	0.52 *___ 0.67 1.12	0.34 0.42 0.67 1.12	0.23 0.42 0.67 1.12		
13				0.96 *___ *___ 1.03	0.62 *___ 0.62 1.03	0.42 *___ 0.62 1.03	0.28 0.39 0.62 1.03	0.20 0.39 0.62 1.03	
14					0.72 *___ *___ 0.95	0.48 *___ 0.59 0.95	0.33 0.37 0.59 0.95	0.22 0.37 0.59 0.95	
15					0.82 *___ *___ 0.88	0.54 *___ 0.55 0.88	0.38 *___ 0.55 0.88	0.27 0.35 0.55 0.88	
16						0.62 *___ *___ 0.83	0.44 *___ 0.53 0.83	0.30 0.33 0.53 0.83	0.22 0.33 0.53 0.83

*Note:
Velocity exceeds maximum allowable velocity (n = 0.03) when channel is constructed to minimum design channel slope - % (n = 0.06).



TERRACE CROSS SECTION

LEGEND

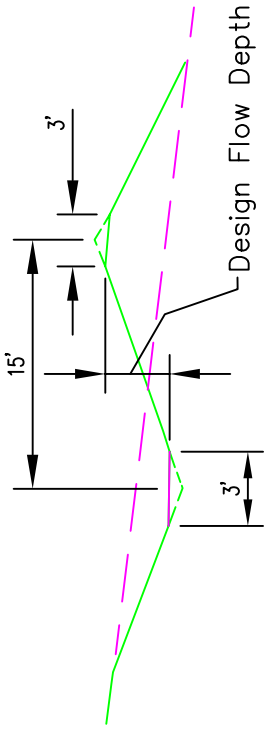
Design Flow Depth
Minimum Design Channel Slope for Capacity (n = 0.06)
Maximum Allowable Slope (Vel = 1.5 ft./sec., n = 0.03)
Maximum Allowable Slope (Vel = 2.0 ft./sec., n = 0.03)
Maximum Allowable Slope (Vel = 2.5 ft./sec., n = 0.03)

Figure 8 IL-3

TERRACE DESIGN CHART
MAXIMUM AND MINIMUM CHANNEL SLOPES

Design Flow	Channel Slopes In Percent							
	Design Flow Depths							
cfs	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7
17	0.20 *___ *___ 0.78	0.50 *___ 0.51 0.78	0.33 *___ 0.51 0.78	0.25 0.31 0.51 0.78	0.20 0.31 0.51 0.78			
18		0.56 *___ *___ 0.73	0.38 *___ 0.48 0.73	0.28 0.28 0.48 0.78	0.22 0.28 0.48 0.73			
19		0.62 *___ *___ 0.70	0.43 *___ 0.46 0.70	0.33 *___ 0.46 0.70	0.24 0.26 0.46 0.70			
20			0.48 *___ 0.44 0.67	0.36 *___ 0.44 0.67	0.27 *___ 0.44 0.67	0.20 0.24 0.44 0.67		
21			0.53 *___ *___ 0.63	0.41 *___ 0.42 0.63	0.30 *___ 0.42 0.63	0.22 0.22 0.42 0.63		
22			0.57 *___ *___ 0.61	0.45 *___ *___ 0.61	0.33 *___ 0.40 0.61	0.25 *___ 0.40 0.61	0.20 0.20 0.40 0.61	
23				0.48 *___ *___ 0.58	0.38 *___ 0.38 0.58	0.27 *___ 0.38 0.58	0.22 *___ 0.38 0.58	
24				0.53 *___ *___ 0.57	0.38 *___ *___ 0.57	0.30 *___ 0.37 0.57	0.24 *___ 0.37 0.57	
25					0.42 *___ *___ 0.53	0.32 *___ 0.34 0.53	0.26 *___ 0.34 0.53	
26					0.46 *___ *___ 0.52	0.35 *___ *___ 0.52	0.28 *___ 0.33 0.52	
27					0.50 *___ *___ 0.50	0.37 *___ *___ 0.50	0.30 *___ 0.31 0.50	0.22 *___ 0.31 0.50
28						0.40 *___ *___ 0.46	0.32 *___ *___ 0.46	0.24 *___ 0.30 0.46
29						0.43 *___ *___ 0.46	0.34 *___ *___ 0.46	0.26 *___ 0.28 0.46
30							0.37 *___ *___ 0.44	0.27 *___ 0.27 0.44

*Note: Velocity exceeds maximum allowable velocity (n = 0.03) when channel is constructed to minimum design channel slope - % (n = 0.06).



TERRACE CROSS SECTION

LEGEND

Design Flow Depth
Minimum Design Channel Slope for Capacity (n = 0.06)
Maximum Allowable Slope (Vel = 1.5 ft./sec., n = 0.03)
Maximum Allowable Slope (Vel = 2.0 ft./sec., n = 0.03)
Maximum Allowable Slope (Vel = 2.5 ft./sec., n = 0.03)

Figure 8 IL-3

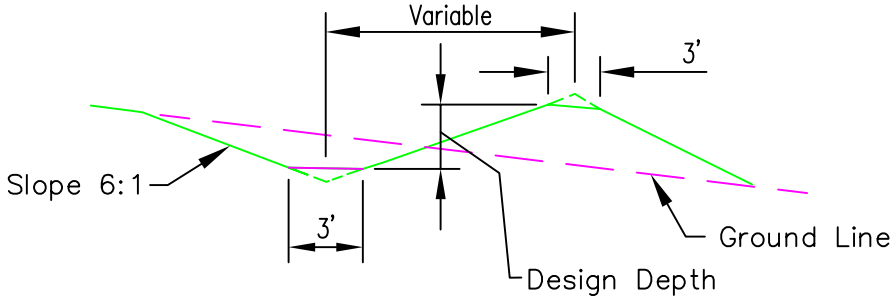
TABLE 8 IL–7
TABLE OF TERRACE DESIGN DEPTHS IN FEET AND MAXIMUM ALLOWABLE TERRACE CHANNEL GRADES IN PERCENT

Runoff _____ 2.0 Inches
Max Allow. Vel. – 1.5 Ft./Sec.
Allow. Grades – 0.2% To Max.

TERRACE STATIONS															
0+00 – 2+00				4+00 – 6+00		6+00 – 8+00		8+00 – 10+00		10+00 – 12+00		12+00 – 14+00		14+00 – 16+00	
Design Depth	Grade %			Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %
0.7	1.1			0.7	0.8	0.7	0.7	0.8	0.6	0.8	0.6	0.9	0.5	1.0	0.5
0.7	1.0			0.8	0.7	0.9	0.6	0.9	0.6	1.0	0.5	1.0	0.5	1.1	0.5
0.7	1.0			0.8	0.6	0.9	0.6	1.0	0.5	1.0	0.5	1.1	0.5	1.1	0.4
0.7	0.9			0.9	0.6	1.0	0.5	1.0	0.5	1.1	0.5	1.2	0.4	1.2	0.4
0.7	0.9			0.9	0.6	1.0	0.5	1.1	0.4	1.2	0.4	1.2	0.4	1.3	0.3
0.7	0.9			1.0	0.5	1.1	0.5	1.2	0.4	1.3	0.4	1.3	0.3	1.4	0.3
0.7	0.8			1.0	0.5	1.1	0.4	1.2	0.4	1.3	0.3	1.4	0.3	1.4	0.3
0.7	0.8		6	1.0	0.5	1.2	0.4	1.3	0.4	1.4	0.3	1.5	0.3	1.5	0.3
0.7	0.8	0.9	0.6	1.1	0.5	1.2	0.4	1.3	0.3	1.4	0.3	1.5	0.3	1.6	0.2
0.7	0.8	0.9	0.6	1.1	0.5	1.2	0.4	1.4	0.3	1.5	0.3	1.6	0.2	1.6	0.2
0.7	´	0.9	0.5	1.1	0.4	1.3	0.4	1.4	0.3	1.5	0.3	1.6	0.2	1.6	
		1.0	0.5	1.2	0.4	1.3	0.4	1.4	0.3	1.6	0.2	1.6	0.2	1.7	

NOTES:

1. The upstream end of the channel is at Station 0+00
2. The design depths were computed using n = 0.06 and a channel bottom grade of 0.2%.
3. The allowable grades were computed using n = 0.03.



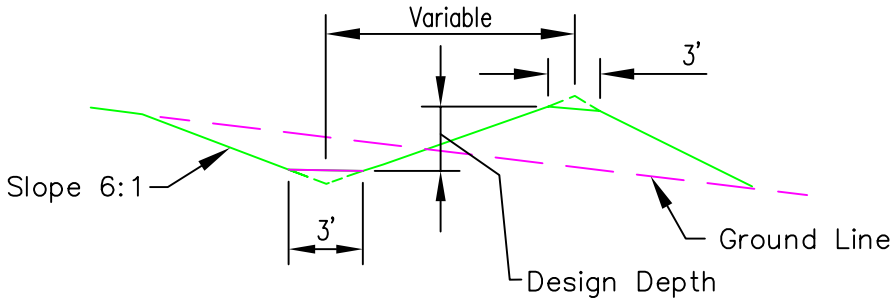
TYPICAL TERRACE DESIGN SECTION

TABLE 8 IL–8
TABLE OF TERRACE DESIGN DEPTHS IN FEET
AND
MAXIMUM ALLOWABLE TERRACE CHANNEL GRADES IN PERCENT

Runoff _____ 2.0 Inches
Max Allow. Vel. – 2.0 Ft./Sec.
Allow. Grades – 0.2% To Max.

TERRACE STATIONS																
Terrace Spacing	0+00 – 2+00		2+00 – 4+00		4+00 – 6+00		6+00 – 8+00		8+00 – 10+00		10+00 – 12+00		12+00 – 14+00		14+00 – 16+00	
Feet	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %
80 – 100	0.7	2.1	0.7	1.7	0.7	1.5	0.7	1.3	0.8	1.1	0.8	1.0	0.9	0.9	1.0	0.8
101 – 120	0.7	2.0	0.7	1.6	0.8	1.3	0.9	1.1	0.9	1.0	1.0	0.9	1.0	0.8	1.1	0.7
121 – 140	0.7	1.9	0.7	1.5	0.8	1.2	0.9	1.0	1.0	0.8	1.0	0.8	1.1	0.7	1.1	0.7
141 – 160	0.7	1.8	0.7	1.4	0.9	1.1	1.0	0.9	1.0	0.8	1.1	0.7	1.2	0.7	1.2	0.6
161 – 180	0.7	1.7	0.7	1.3	0.9	1.0	1.0	0.8	1.1	0.7	1.2	0.7	1.2	0.6	1.3	0.6
181 – 200	0.7	1.7	0.8	1.2	1.0	0.9	1.1	0.7	1.2	0.7	1.3	0.6	1.3	0.6	1.4	0.6
201 – 220	0.7	1.6	0.9	1.1	1.0	0.8	1.1	0.7	1.2	0.6	1.3	0.6	1.4	0.5	1.4	0.5
221 – 240	0.7	1.5	0.9	1.1	1.0	0.8	1.2	0.7	1.3	0.6	1.4	0.5	1.5	0.5	1.5	0.5
241 – 260	0.7	1.5	0.9	1.0	1.1	0.7	1.2	0.6	1.3	0.6	1.4	0.5	1.5	0.5	1.6	0.4
261 – 280	0.7	1.5	0.9	1.0	1.1	0.7	1.2	0.6	1.4	0.5	1.5	0.5	1.6	0.5	1.6	0.4
281 – 300	0.7	1.4	0.9	0.9	1.1	0.7	1.3	0.6	1.4	0.5	1.5	0.5	1.6	0.4	1.6	0.4
301 – 320	0.7	1.3	1.0	0.9	1.2	0.7	1.3	0.6	1.4	0.5	1.6	0.4	1.6	0.4	1.7	0.4

NOTES:
1. The upstream end of the channel is at Station 0+00
2. The design depths were computed using n = 0.06 and a channel bottom grade of 0.2%.
3. The allowable grades were computed using n = 0.03.



TYPICAL TERRACE DESIGN SECTION

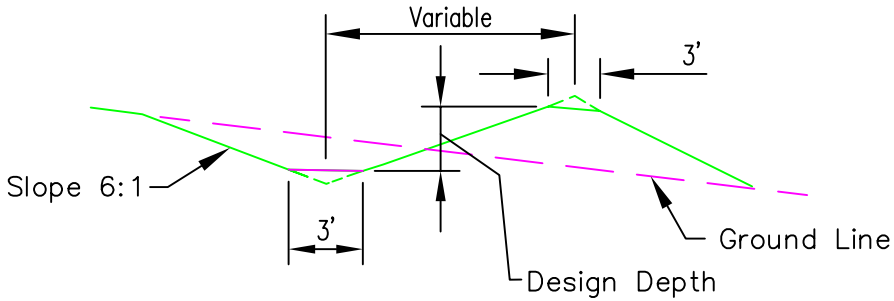
TABLE 8 IL–9
TABLE OF TERRACE DESIGN DEPTHS IN FEET
AND
MAXIMUM ALLOWABLE TERRACE CHANNEL GRADES IN PERCENT

Runoff _____ 2.0 Inches
Max Allow. Vel. – 2.5 Ft./Sec.
Allow. Grades – 0.2% To Max.

TERRACE STATIONS																
Terrace Spacing	0+00 – 2+00		2+00 – 4+00		4+00 – 6+00		6+00 – 8+00		8+00 – 10+00		10+00 – 12+00		12+00 – 14+00		14+00 – 16+00	
Feet	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %
80 – 100	0.7	4.9	0.7	3.4	0.7	2.5	0.7	2.3	0.8	2.1	0.8	1.9	0.9	1.8	1.0	1.8
101 – 120	0.7	4.4	0.7	3.0	0.8	2.3	0.9	2.0	0.9	1.8	1.0	1.7	1.0	1.7	1.1	1.6
121 – 140	0.7	3.9	0.7	2.6	0.8	2.2	0.9	1.8	1.0	1.6	1.0	1.4	1.1	1.5	1.1	1.4
141 – 160	0.7	3.5	0.7	2.3	0.9	1.9	1.0	1.6	1.0	1.5	1.1	1.3	1.2	1.3	1.2	1.2
161 – 180	0.7	3.4	0.7	2.2	0.9	1.8	1.0	1.5	1.1	1.2	1.2	1.1	1.2	1.0	1.3	0.9
181 – 200	0.7	3.2	0.8	2.1	1.0	1.7	1.1	1.4	1.2	1.1	1.3	0.9	1.3	0.9	1.4	0.8
201 – 220	0.7	3.0	0.9	2.0	1.0	1.6	1.1	1.2	1.2	1.0	1.3	0.9	1.4	0.8	1.4	0.8
221 – 240	0.7	2.8	0.9	1.9	1.0	1.5	1.2	1.1	1.3	0.9	1.4	0.8	1.5	0.7	1.5	0.7
241 – 260	0.7	2.6	0.9	1.8	1.1	1.4	1.2	1.1	1.3	0.9	1.4	0.8	1.5	0.7	1.6	0.7
261 – 280	0.7	2.5	0.9	1.8	1.1	1.3	1.2	1.0	1.4	0.8	1.5	0.7	1.6	0.7	1.6	0.6
281 – 300	0.7	2.4	0.9	1.8	1.1	1.2	1.3	0.9	1.4	0.8	1.5	0.7	1.6	0.6	1.6	0.6
301 – 320	0.7	2.4	1.0	1.7	1.2	1.1	1.3	0.9	1.4	0.8	1.6	0.7	1.6	0.6	1.7	0.5

NOTES:

1. The upstream end of the channel is at Station 0+00
2. The design depths were computed using n = 0.06 and a channel bottom grade of 0.2%.
3. The allowable grades were computed using n = 0.03.



TYPICAL TERRACE DESIGN SECTION

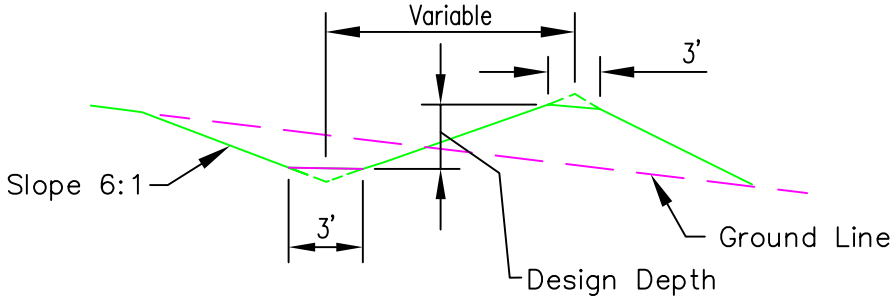
TABLE 8 IL–10
TABLE OF TERRACE DESIGN DEPTHS IN FEET
AND
MAXIMUM ALLOWABLE TERRACE CHANNEL GRADES IN PERCENT

Runoff _____ 2.5 Inches
Max Allow. Vel. – 1.5 Ft./Sec.
Allow. Grades – 0.2% To Max.

TERRACE STATIONS																
Terrace Spacing	0+00 – 2+00		2+00 – 4+00		4+00 – 6+00		6+00 – 8+00		8+00 – 10+00		10+00 – 12+00		12+00 – 14+00		14+00 – 16+00	
Feet	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %
80 – 100	0.7	1.0	0.7	0.8	0.8	0.7	0.9	0.6	0.9	0.6	1.0	0.5	1.0	0.5	1.1	0.4
101 – 120	0.7	1.0	0.7	0.7	0.9	0.6	0.9	0.5	1.0	0.5	1.1	0.5	1.1	0.4	1.2	0.4
121 – 140	0.7	0.9	0.8	0.7	0.9	0.6	1.0	0.5	1.1	0.5	1.1	0.4	1.2	0.4	1.3	0.4
141 – 160	0.7	0.9	0.8	0.6	1.0	0.5	1.1	0.5	1.2	0.4	1.2	0.4	1.3	0.3	1.4	0.3
161 – 180	0.7	0.8	0.9	0.6	1.0	0.5	1.1	0.4	1.3	0.4	1.3	0.3	1.4	0.3	1.5	0.3
181 – 200	0.7	0.8	0.9	0.6	1.1	0.5	1.2	0.4	1.3	0.3	1.4	0.3	1.5	0.3	1.6	0.2
201 – 220	0.7	0.7	0.9	0.6	1.1	0.5	1.3	0.4	1.4	0.3	1.5	0.3	1.6	0.2	1.6	0.2
221 – 240	0.7	0.7	1.0	0.5	1.2	0.4	1.3	0.3	1.4	0.3	1.6	0.2	1.6	0.2		
241 – 260	0.8	0.7	1.0	0.5	1.2	0.4	1.4	0.3	1.5	0.3	1.6	0.2				
261 – 280	0.8	0.7	1.0	0.5	1.2	0.4	1.4	0.3	1.5	0.2	1.7	0.2				
281 – 300	0.8	0.7	1.0	0.5	1.3	0.4	1.4	0.3	1.6	0.2						
301 – 320	0.8	0.6	1.1	0.5	1.3	0.4	1.5	0.3	1.6	0.2						

NOTES:

1. The upstream end of the channel is at Station 0+00
2. The design depths were computed using n = 0.06 and a channel bottom grade of 0.2%.
3. The allowable grades were computed using n = 0.03.



TYPICAL TERRACE DESIGN SECTION

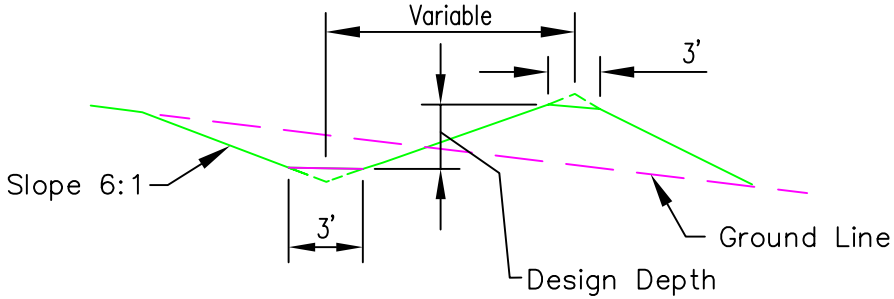
TABLE 8 IL–11
TABLE OF TERRACE DESIGN DEPTHS IN FEET
AND
MAXIMUM ALLOWABLE TERRACE CHANNEL GRADES IN PERCENT

Runoff _____ 2.5 Inches
Max Allow. Vel. – 2.0 Ft./Sec.
Allow. Grades – 0.2% To Max.

TERRACE STATIONS																
Terrace Spacing	0+00 – 2+00		2+00 – 4+00		4+00 – 6+00		6+00 – 8+00		8+00 – 10+00		10+00 – 12+00		12+00 – 14+00		14+00 – 16+00	
Feet	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %
80 – 100	0.7	1.9	0.7	1.5	0.8	1.3	0.9	1.1	0.9	0.9	1.0	0.8	1.0	0.8	1.1	0.7
101 – 120	0.7	1.8	0.7	1.4	0.9	1.1	0.9	0.9	1.0	0.8	1.1	0.7	1.1	0.7	1.2	0.6
121 – 140	0.7	1.7	0.8	1.2	0.9	1.0	1.0	0.8	1.1	0.7	1.1	0.7	1.2	0.6	1.3	0.6
141 – 160	0.7	1.6	0.8	1.1	1.0	0.9	1.1	0.7	1.2	0.7	1.2	0.6	1.3	0.6	1.4	0.5
161 – 180	0.7	1.6	0.9	1.1	1.0	0.8	1.1	0.7	1.3	0.6	1.3	0.6	1.4	0.5	1.5	0.5
181 – 200	0.7	1.5	0.9	1.0	1.1	0.8	1.2	0.6	1.3	0.6	1.4	0.5	1.5	0.5	1.6	0.5
201 – 220	0.7	1.4	0.9	0.9	1.1	0.7	1.3	0.6	1.4	0.5	1.5	0.5	1.6	0.5	1.6	0.4
221 – 240	0.7	1.4	1.0	0.9	1.2	0.7	1.3	0.6	1.4	0.5	1.6	0.4	1.6	0.4	1.7	0.3
241 – 260	0.8	1.3	1.0	0.8	1.2	0.6	1.4	0.5	1.5	0.5	1.6	0.4	1.7	0.4	1.7	0.3
261 – 280	0.8	1.3	1.0	0.8	1.2	0.6	1.4	0.5	1.5	0.5	1.7	0.4	1.7	0.4	1.8	0.3
281 – 300	0.8	1.2	1.0	0.8	1.3	0.6	1.4	0.5	1.6	0.4	1.7	0.4	1.8	0.3	1.8	0.3
301 – 320	0.8	1.2	1.1	0.7	1.3	0.6	1.5	0.5	1.6	0.4	1.7	0.3	1.8	0.3	1.9	0.3

NOTES:

1. The upstream end of the channel is at Station 0+00
2. The design depths were computed using n = 0.06 and a channel bottom grade of 0.2%.
3. The allowable grades were computed using n = 0.03.



TYPICAL TERRACE DESIGN SECTION

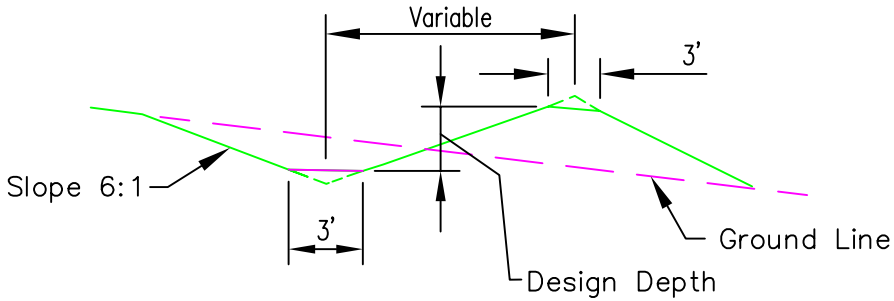
TABLE 8 IL–12
TABLE OF TERRACE DESIGN DEPTHS IN FEET
AND
MAXIMUM ALLOWABLE TERRACE CHANNEL GRADES IN PERCENT

Runoff _____ 2.5 Inches
Max Allow. Vel. – 2.5 Ft./Sec.
Allow. Grades – 0.2% To Max.

TERRACE STATIONS																
Terrace Spacing	0+00 – 2+00		2+00 – 4+00		4+00 – 6+00		6+00 – 8+00		8+00 – 10+00		10+00 – 12+00		12+00 – 14+00		14+00 – 16+00	
Feet	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %
80 – 100	0.7	4.1	0.7	3.0	0.8	2.3	0.9	2.0	0.9	1.8	1.0	1.6	1.0	1.4	1.1	1.2
101 – 120	0.7	3.8	0.7	2.5	0.9	2.0	0.9	1.7	1.0	1.5	1.1	1.3	1.1	1.2	1.2	1.1
121 – 140	0.7	3.4	0.8	2.3	0.9	1.8	1.0	1.5	1.1	1.3	1.1	1.1	1.2	1.0	1.3	0.9
141 – 160	0.7	3.2	0.8	2.1	1.0	1.6	1.1	1.3	1.2	1.1	1.2	1.0	1.3	0.9	1.4	0.8
161 – 180	0.7	3.1	0.9	2.0	1.0	1.5	1.1	1.2	1.3	1.0	1.3	0.9	1.4	0.8	1.5	0.7
181 – 200	0.7	2.9	0.9	1.8	1.1	1.3	1.2	1.0	1.3	0.9	1.4	0.8	1.5	0.7	1.6	0.7
201 – 220	0.7	2.7	0.9	1.7	1.1	1.2	1.3	1.0	1.4	0.8	1.5	0.7	1.6	0.7	1.6	0.6
221 – 240	0.7	2.4	1.0	1.6	1.2	1.1	1.3	0.9	1.4	0.7	1.6	0.6	1.6	0.6	1.7	0.6
241 – 260	0.8	2.3	1.0	1.5	1.2	1.1	1.4	0.8	1.5	0.7	1.6	0.6	1.7	0.5	1.7	0.5
261 – 280	0.8	2.3	1.0	1.5	1.2	1.0	1.4	0.8	1.5	0.7	1.7	0.6	1.7	0.5	1.8	0.5
281 – 300	0.8	2.4	1.0	1.4	1.3	0.9	1.4	0.8	1.6	0.6	1.7	0.6	1.8	0.5	1.8	0.5
301 – 320	0.8	2.1	1.1	1.3	1.3	0.9	1.5	0.7	1.6	0.6	1.7	0.5	1.8	0.5	1.9	0.4

NOTES:

1. The upstream end of the channel is at Station 0+00
2. The design depths were computed using n = 0.06 and a channel bottom grade of 0.2%.
3. The allowable grades were computed using n = 0.03.



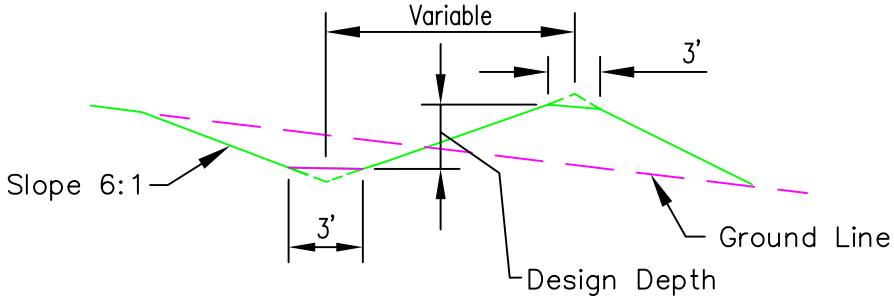
TYPICAL TERRACE DESIGN SECTION

TABLE 8 IL–13
TABLE OF TERRACE DESIGN DEPTHS IN FEET
AND
MAXIMUM ALLOWABLE TERRACE CHANNEL GRADES IN PERCENT

Runoff _____ 3.0 Inches
Max Allow. Vel. – 1.5 Ft./Sec.
Allow. Grades – 0.2% To Max.

TERRACE STATIONS																
Terrace Spacing	0+00 – 2+00		2+00 – 4+00		4+00 – 6+00		6+00 – 8+00		8+00 – 10+00		10+00 – 12+00		12+00 – 14+00		14+00 – 16+00	
Feet	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %
80 – 100	0.7	1.6	0.7	0.7	0.9	0.6	0.9	0.5	1.0	0.5	1.1	0.5	1.2	0.4	1.2	0.4
101 – 120	0.7	0.9	0.8	0.7	0.9	0.6	1.0	0.5	1.1	0.4	1.2	0.4	1.3	0.4	1.4	0.3
121 – 140	0.7	0.9	0.9	0.6	1.0	0.5	1.1	0.4	1.2	0.4	1.3	0.4	1.4	0.3	1.5	0.3
141 – 160	0.7	0.8	0.9	0.6	1.1	0.5	1.2	0.4	1.3	0.4	1.4	0.3	1.4	0.3	1.5	0.3
161 – 180	0.7	0.8	0.9	0.5	1.1	0.4	1.3	0.4	1.4	0.3	1.5	0.3	1.5	0.2	1.6	0.2
181 – 200	0.7	0.7	1.0	0.5	1.2	0.4	1.3	0.3	1.4	0.3	1.5	0.2	1.6	0.2	1.7	
201 – 220	0.8	0.7	1.0	0.5	1.2	0.4	1.4	0.3	1.5	0.3	1.6	0.2	1.7		1.7	
221 – 240	0.8	0.7	1.1	0.5	1.3	0.4	1.5	0.3	1.6	0.2	1.7		1.8		1.8	
241 – 260	0.8	0.6	1.1	0.5	1.3	0.3	1.5	0.3	1.6	0.2	1.7		1.8		1.8	
261 – 280	0.9	0.6	1.2	0.4	1.4	0.3	1.6	0.2	1.7		1.8		1.9		1.9	
281 – 300	0.9	0.6	1.2	0.4	1.4	0.3	1.6	0.2	1.7		1.8		1.9		2.0	
301 – 320	0.9	0.6	1.2	0.4	1.4	0.3	1.6	0.2	1.7		1.8		2.0		2.1	

NOTES:
1. The upstream end of the channel is at Station 0+00
2. The design depths were computed using n = 0.06 and a channel bottom grade of 0.2%.
3. The allowable grades were computed using n = 0.03.



TYPICAL TERRACE DESIGN SECTION

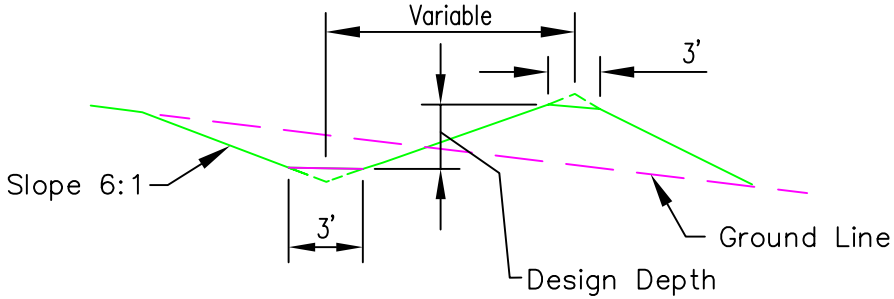
TABLE 8 IL–14
TABLE OF TERRACE DESIGN DEPTHS IN FEET
AND
MAXIMUM ALLOWABLE TERRACE CHANNEL GRADES IN PERCENT

Runoff _____ 3.0 Inches
Max Allow. Vel. – 2.0 Ft./Sec.
Allow. Grades – 0.2% To Max.

TERRACE STATIONS																
Terrace Spacing	0+00 – 2+00		2+00 – 4+00		4+00 – 6+00		6+00 – 8+00		8+00 – 10+00		10+00 – 12+00		12+00 – 14+00		14+00 – 16+00	
Feet	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %
80 – 100	0.7	1.8	0.7	1.4	0.9	1.1	0.9	0.9	1.0	0.8	1.1	0.7	1.2	0.7	1.2	0.6
101 – 120	0.7	1.7	0.8	1.2	0.9	1.0	1.0	0.8	1.1	0.7	1.2	0.7	1.3	0.6	1.4	0.6
121 – 140	0.7	1.5	0.9	1.1	1.0	0.8	1.1	0.7	1.2	0.6	1.3	0.6	1.4	0.5	1.5	0.5
141 – 160	0.7	1.5	0.9	1.0	1.1	0.8	1.2	0.7	1.3	0.6	1.4	0.5	1.4	0.5	1.5	0.5
161 – 180	0.7	1.4	0.9	0.9	1.1	0.7	1.3	0.6	1.4	0.5	1.5	0.5	1.5	0.4	1.6	0.4
181 – 200	0.7	1.4	1.0	0.8	1.2	0.7	1.3	0.6	1.4	0.5	1.5	0.4	1.6	0.4	1.7	0.4
201 – 220	0.8	1.3	1.0	0.8	1.2	0.6	1.4	0.5	1.5	0.5	1.6	0.4	1.7	0.4	1.7	0.4
221 – 240	0.8	1.2	1.1	0.7	1.3	0.6	1.5	0.5	1.6	0.4	1.7	0.4	1.8	0.3	1.8	0.3
241 – 260	0.8	1.2	1.1	0.7	1.3	0.6	1.5	0.5	1.6	0.4	1.7	0.3	1.8	0.3	1.8	0.3
261 – 280	0.9	1.1	1.2	0.7	1.4	0.5	1.6	0.4	1.7	0.4	1.8	0.3	1.9	0.3	1.9	
281 – 300	0.9	1.1	1.2	0.7	1.4	0.5	1.6	0.4	1.7	0.4	1.8	0.3	1.9	0.2	2.0	
301 – 320	0.9	1.0	1.2	0.6	1.4	0.5	1.6	0.4	1.7	0.3	1.8	0.3	2.0	0.2	2.1	

NOTES:

1. The upstream end of the channel is at Station 0+00
2. The design depths were computed using n = 0.06 and a channel bottom grade of 0.2%.
3. The allowable grades were computed using n = 0.03.



TYPICAL TERRACE DESIGN SECTION

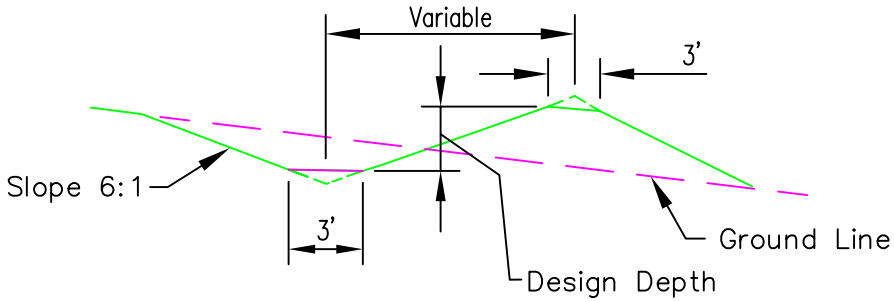
TABLE 8 IL–15
TABLE OF TERRACE DESIGN DEPTHS IN FEET AND MAXIMUM ALLOWABLE TERRACE CHANNEL GRADES IN PERCENT

Runoff _____ 3.0 Inches
Max Allow. Vel. – 2.5 Ft./Sec.
Allow. Grades – 0.2% To Max.

TERRACE STATIONS																
Terrace Spacing	0+00 – 2+00		2+00 – 4+00		4+00 – 6+00		6+00 – 8+00		8+00 – 10+00		10+00 – 12+00		12+00 – 14+00		14+00 – 16+00	
Feet	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %	Design Depth	Grade %
80 – 100	0.7	3.8	0.7	2.5	0.9	2.0	0.9	1.6	1.0	1.5	1.1	1.3	1.2	1.13	1.2	1.0
101 – 120	0.7	3.4	0.8	2.2	0.9	1.8	1.0	1.4	1.1	1.2	1.2	1.1	1.3	0.95	1.4	0.9
121 – 140	0.7	3.1	0.9	2.0	1.0	1.6	1.1	1.2	1.2	1.0	1.3	0.9	1.4	0.81	1.5	0.7
141 – 160	0.7	2.7	0.9	1.8	1.1	1.4	1.2	1.1	1.3	0.9	1.4	0.8	1.4	0.72	1.5	0.6
161 – 180	0.7	2.4	0.9	1.7	1.1	1.2	1.3	1.0	1.4	0.8	1.5	0.8	1.5	0.65	1.6	0.6
181 – 200	0.7	2.4	1.0	1.6	1.2	1.1	1.3	0.8	1.4	0.7	1.5	0.6	1.6	0.59	1.7	0.6
201 – 220	0.8	2.3	1.0	1.5	1.2	1.0	1.4	0.8	1.5	0.7	1.6	0.6	1.7	0.54	1.7	0.5
221 – 240	0.8	2.2	1.1	1.4	1.3	0.9	1.5	0.7	1.6	0.6	1.7	0.5	1.8	0.50	1.8	0.5
241 – 260	0.8	2.1	1.1	1.3	1.3	0.9	1.5	0.7	1.6	0.6	1.7	0.5	1.8	0.48	1.8	0.4
261 – 280	0.9	2.0	1.2	1.2	1.4	0.8	1.6	0.7	1.7	0.6	1.8	0.5	1.9	0.45	1.9	0.4
281 – 300	0.9	2.0	1.2	1.1	1.4	0.8	1.6	0.6	1.7	0.5	1.8	0.5	1.9	0.36	2.0	0.3
301 – 320	0.9	1.9	1.2	1.1	1.4	0.8	1.6	0.6	1.7	0.5	1.8	0.4	2.0	0.33	2.1	0.3

NOTES:

1. The upstream end of the channel is at Station 0+00
2. The design depths were computed using n = 0.06 and a channel bottom grade of 0.2%.
3. The allowable grades were computed using n = 0.03.



TYPICAL TERRACE DESIGN SECTION

SIZING TERRACE STORAGE BASINS AND OUTLETS FOR TERRACES WITH UNDERGROUND OUTLETS

The following tables provide a method of determining minimum storage volumes while accounting for the release through the underground outlet.

1. Sediment storage needs may be estimated using the following table after the average annual soil loss in tons per acre has been determined for the terrace interval. Where large areas of the terrace interval will be disturbed during construction, additional sediment storage may be added to allow for the high first year accumulation.

TABLE 8 IL-16

Soil Loss Tons per acre per year	Est. 10 year Sediment Yield Inches per Unit of Drainage Area
1	.07 inch
2	.14 inch
3	.21 inch
4	.28 inch
5	.34 inch
7	.48 inch
10	.69 inch
12	.83 inch
15	1.03 inch
18	1.24 inch

2. The required water storage, orifice plate capacity, and tile outlet capacity will be computed using the following table. 1/

TABLE 8 IL-17

Duration of Flooding	Water Storage	Design Outflow
hours	inches per inch of runoff per unit of area	c.f.s. per acre inch of runoff
6	.33	.10
12	.42	.06
18	.45	.049
24	.50	.035
30	.53	.029
36	.56	.025
42	.59	.021
48	.61	.019

1/ Computations were made with orifice plate 2 ft. or more below the ground line. See EFM 8-71, Fig. 8-65