

Using the USLE

- $A = R \times K \times LS \times C \times P$
- R from Isoerodent Map
- K from soil Survey
- LS from measurements and tables
- C from tables
- P from tables

Using the USLE

$$\odot A = 225 \times K \times LS \times C \times P$$

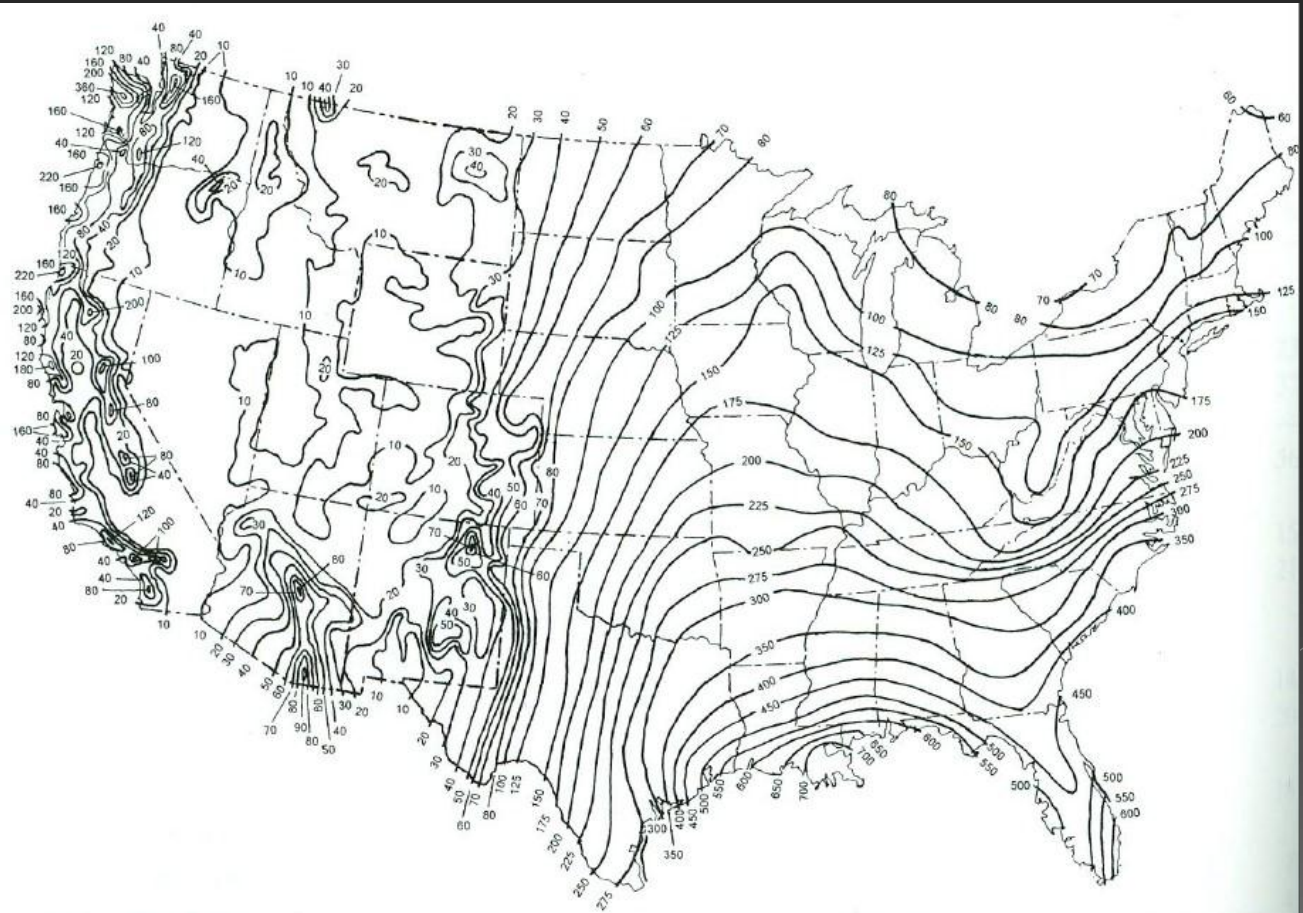


Figure 6-2 Isoerodent map (R values) in units of 100 ft-ton/ac-yr for the conterminous United States. (Modified from Renard, et al., 1997.)

Using the USLE

- $A=225 \times K \times LS \times C \times P$
- Nomograph or table to determine K using texture

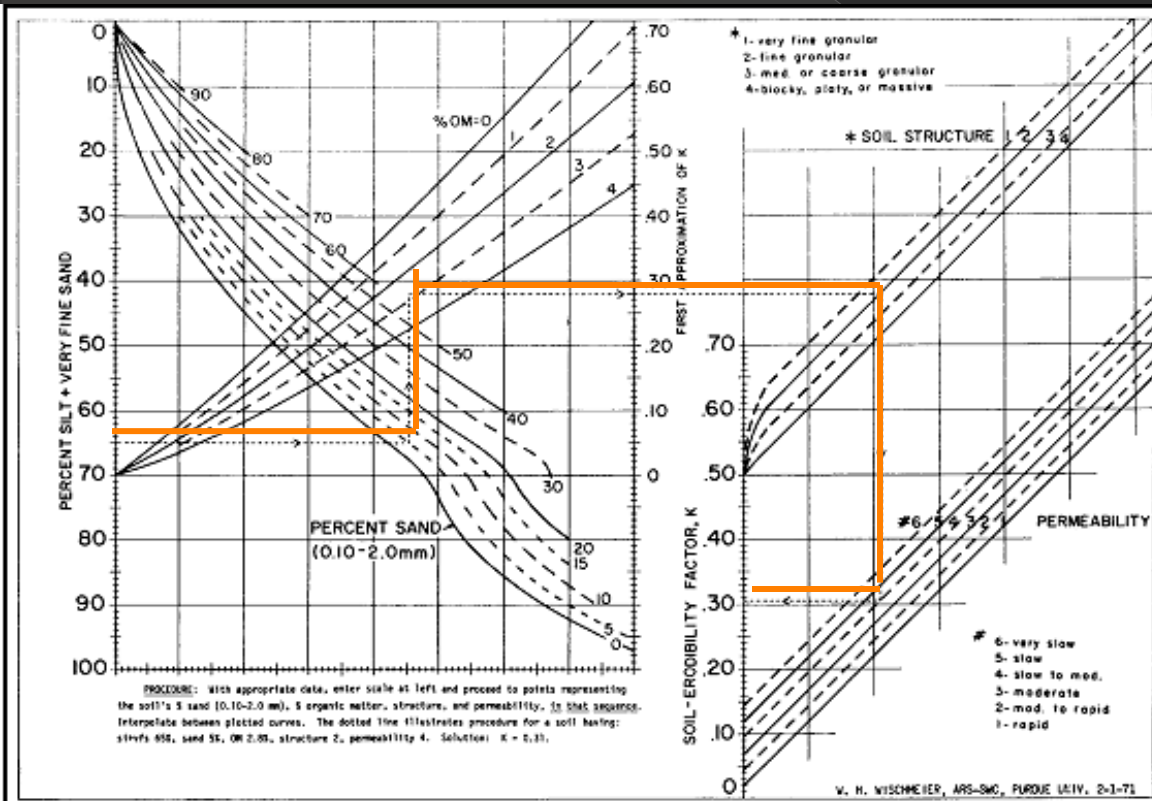


TABLE 2: K Factor Data

Textural Class	Organic Matter Content		
	Average	Less than 2 %	More than 2 %
Clay	0.22	0.24	0.21
Clay Loam	0.30	0.33	0.28
Coarse Sandy Loam	0.07	—	0.07
Fine Sand	0.08	0.09	0.06
Fine Sandy Loam	0.18	0.22	0.17
Heavy Clay	0.17	0.19	0.15
Loam	0.30	0.34	0.26
Loamy Fine Sand	0.11	0.15	0.09
Loamy Sand	0.04	0.05	0.04
Loamy Very Fine Sand	0.39	0.44	0.25
Sand	0.02	0.03	0.01
Sandy Clay Loam	0.20	—	0.20
Sandy Loam	0.13	0.14	0.12
Silt Loam	0.38	0.41	0.37
Silty Clay	0.26	0.27	0.26
Silty Clay Loam	0.32	0.35	0.30
Very Fine Sand	0.43	0.46	0.37
Very Fine Sandy Loam	0.35	0.41	0.33

Using the USLE

- $A = 225 \times 0.37 \times LS \times C \times P$
- K from Soil Survey, Port silt loam

Soil Chemical Properties

Soil Erosion Factors

K Factor, Rock Free

K Factor, Whole Soil

[View Description](#) [View Rating](#)

View Options

Map

Table

Description of Rating

Rating Options Detailed Description

Advanced Options

Aggregation Method: Dominant Condition

Component Percent Cutoff:

Tie-break Rule: Lower Higher

Layer Options: Surface Layer Depth Range

Top Depth:

Bottom Depth:

Inches Centimeters All Layers

[View Description](#) [View Rating](#)

T Factor

Wind Erodibility Group

Wind Erodibility Index

Soil Physical Properties

Soil Qualities and Features



Warning: Soil Ratings Map may not be valid at this scale.

You have zoomed in beyond the scale at which the soil map for this area is intended to be used. Mapping of soils is done at a particular scale. The soil surveys that comprise your AOI were mapped at 1:24,000. The design of map units and the level of detail shown in the resulting soil map are dependent on that map scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Tables — K Factor, Whole Soil — Summary By Map Unit

Summary by Map Unit — Payne County, Oklahoma (OK119)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
6	Pulaski fine sandy loam, 0 to 1 percent slopes, frequently flooded	.20	2.7	9.2%
37	Port silt loam, 0 to 1 percent slopes, occasionally flooded	.37	15.0	51.4%
43	Pulaski fine sandy loam, 0 to 1 percent slopes, occasionally flooded	.20	7.2	24.5%

Using the USLE

- $A=225 \times .37 \times 0.196 \times C \times P$
- LS from table or Calculations
 - > 1% at 400 ft

TABLE 3A. LS Factor Calculation

Slope Length ft (m)	Slope (%)	LS Factor
100 (31)	10	1.3800
	8	0.9964
	6	0.6742
	5	0.5362
	4	0.4004
	3	0.2965
	2	0.2008
	1	0.1290
	0	0.0693
200 (61)	10	1.9517
	8	1.4092
	6	0.9535
	5	0.7582
	4	0.5283
	3	0.3912
	2	0.2473
	1	0.1588
	0	0.0796
400 (122)	10	2.7602
	8	1.9928
	6	1.3484
	5	1.0723
	4	0.6971
	3	0.5162
	2	0.3044
	1	0.1955
	0	0.0915
800 (244)	10	3.9035
	8	2.8183
	6	1.9070
	5	1.5165
	4	0.9198

Using the USLE

- $A = 225 \times .37 \times 0.196 \times 0.09 \times P$
- C from tables
 - > Wheat=0.35
 - > No-till=0.25
 - > Multiple them

TABLE 4A. Crop Type Factor

Crop Type	Factor
Grain Corn	0.40
Silage Corn, Beans & Canola	0.50
Cereals (Spring & Winter)	0.35
Seasonal Horticultural Crops	0.50
Fruit Trees	0.10
Hay and Pasture	0.02

TABLE 4B. Tillage Method Factor

Tillage Method	Factor
Fall Plow	1.0
Spring Plow	0.90
Mulch Tillage	0.60
Ridge Tillage	0.35
Zone Tillage	0.25
No-Till	0.25

Using the USLE

- $A = 225 \times .37 \times 0.196 \times 0.07 \times \mathbf{0.75} =$
0.85 or 1 ton/acre yr
- P from tables
 - > Cross slope tillage

TABLE 5. P Factor Data

Support Practice	P Factor
Up & Down Slope	1.0
Cross Slope	0.75
Contour farming	0.50
Strip cropping, cross slope	0.37
Strip cropping, contour	0.25

Using the USLE

- $A = 225 \times .37 \times 0.196 \times 0.07 \times \mathbf{0.75} =$
0.85 or 1 ton/acre yr
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Using the USLE

- $A = 225 \times .37 \times 0.196 \times 0.21 \times 0.75 =$
2.6 tons/acre yr
Change to stubble mulch wheat

$$= 0.35 \times 0.60$$



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Revised USLE

- Basic equation was not changed
- Input parameters were fine tuned and expanded to include many more conditions
- Still only useful for agricultural land and construction sites.
- RUSLE is still only meant to provide estimates of hill slope erosion
- Is not meant for watershed scale sediment loads estimates

Examples of improvements

- R factors were developed using rainfall databases from across U.S.
- K Factors, includes K factors for all soils (found in WebSoilSurvey)
- LS Factor, multiple slope segments can be included in calculation
 - > Allows for depositional features in slope
- C Factors, many more conservation tillage and crop options are available.
- P Factor, the impact of terraces on sediment deposition was included.

Water Erosion Prediction Model

- Can be used for hill slopes and **watersheds**
- Provides better estimate of off-site impacts
- Can be used at different temporal scales
- Includes many more site specific parameters:
 - > Water balance, plant growth, watershed channel hydrology, etc. (page 90, Blanco)
- [Web Resources](#)

Erosion Control: Terraces

- Read sections 11.3-11.8 (Blonco)
- K-State [factsheet](#) is also good
- Terrace Functions:
 - > Reduce slope length
 - > Reduce runoff velocity
 - > Reduce erosion from concentrated flow
 - > Promote soil water storage
 - Increased water content decreases wind erosion
 - > Improve water quality by removal of sediment and chemicals



Factors that Influence Terrace Design and Layout

- Topography
- Climate (rainfall amount and intensity)
- Soil type
- Tillage and Cropping system
- Cost
- Accessibility

Types of Terraces

◎ Broad-base Terraces

- > Found on long uniform slopes $< 5\%$
- > Most common form of terrace in OK
- > Can cultivate the channel and ridge

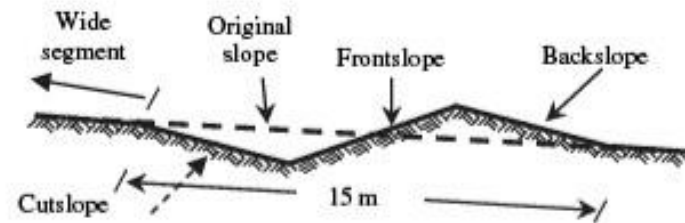


Fig. 11.6 Cross sectional view of lower portion of a broad-base terrace. The broad-base consists of lower and upper section. The lower section confines the channel and ridge (about 15 m wide) while the upper section confines the wide segment (about 30 m wide) (After ASAE, 2003)

Broad Based Terrace



Contour Farming

Channel

Backslope

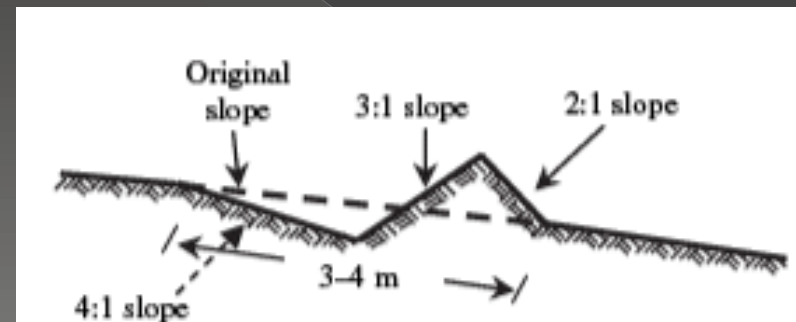
Ridge

Broad Based Terrace



Narrow Base Terraces

- Used on steeper slopes
- Result in less soil disturbance
- Back slope and/or front slopes are permanently vegetated.



Flat Channel Terrace

- Used in Low rainfall environments to capture runoff from up slope
- Flat area may be cropped annually while sloped area is periodically cropped

