Using the USLE

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

Using the USLE

- A=**225** x K x LS x C x P

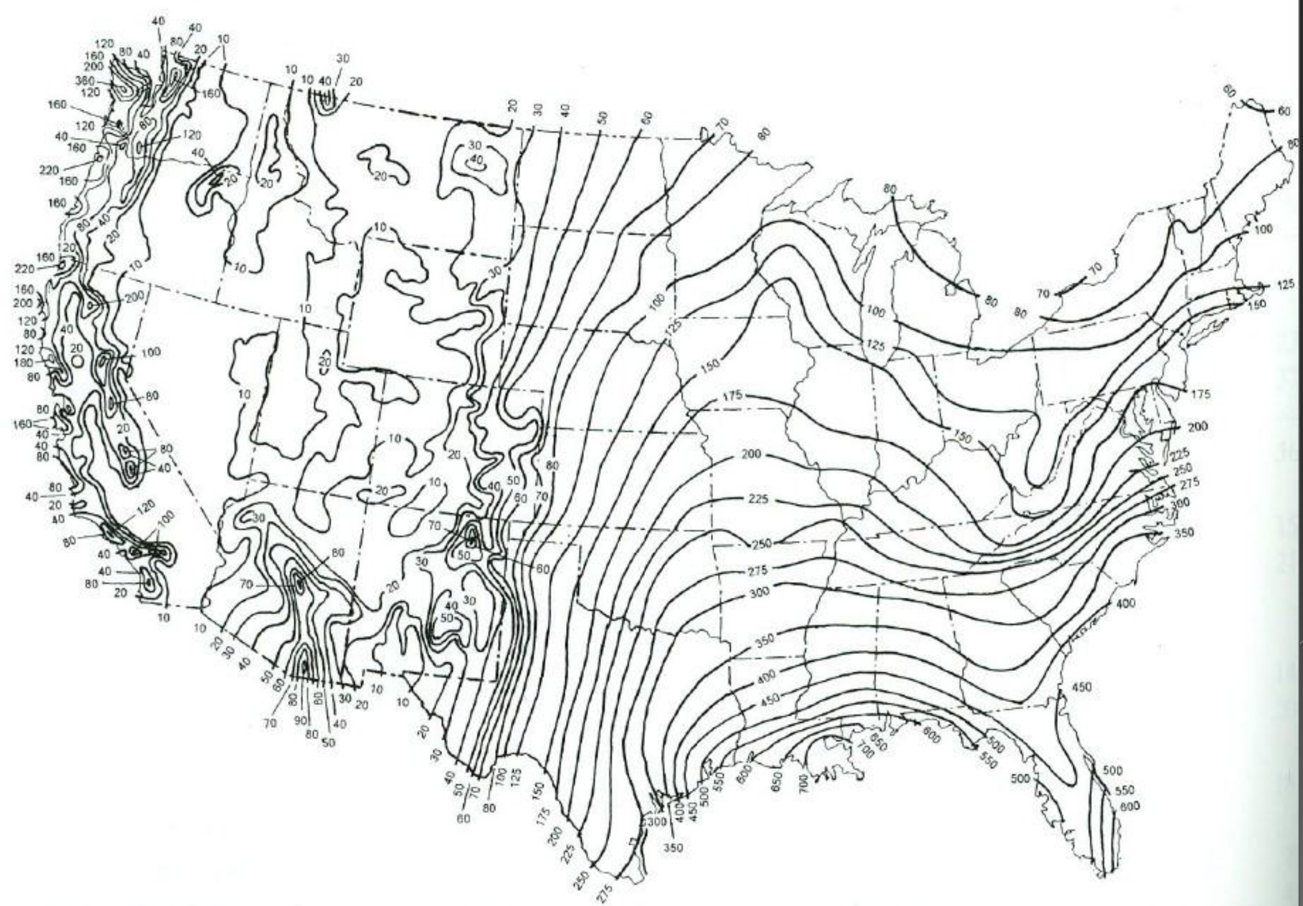


Figure 6–2 Isoerodent map (*R* values) in units of 100 ft-ton/ac-yr for the conterminous United States. (Modified from Renard, et al., 1997.)

Using the USLE

- A=225 x K x LS x C x P
- Nomograph or table to determine K using texture

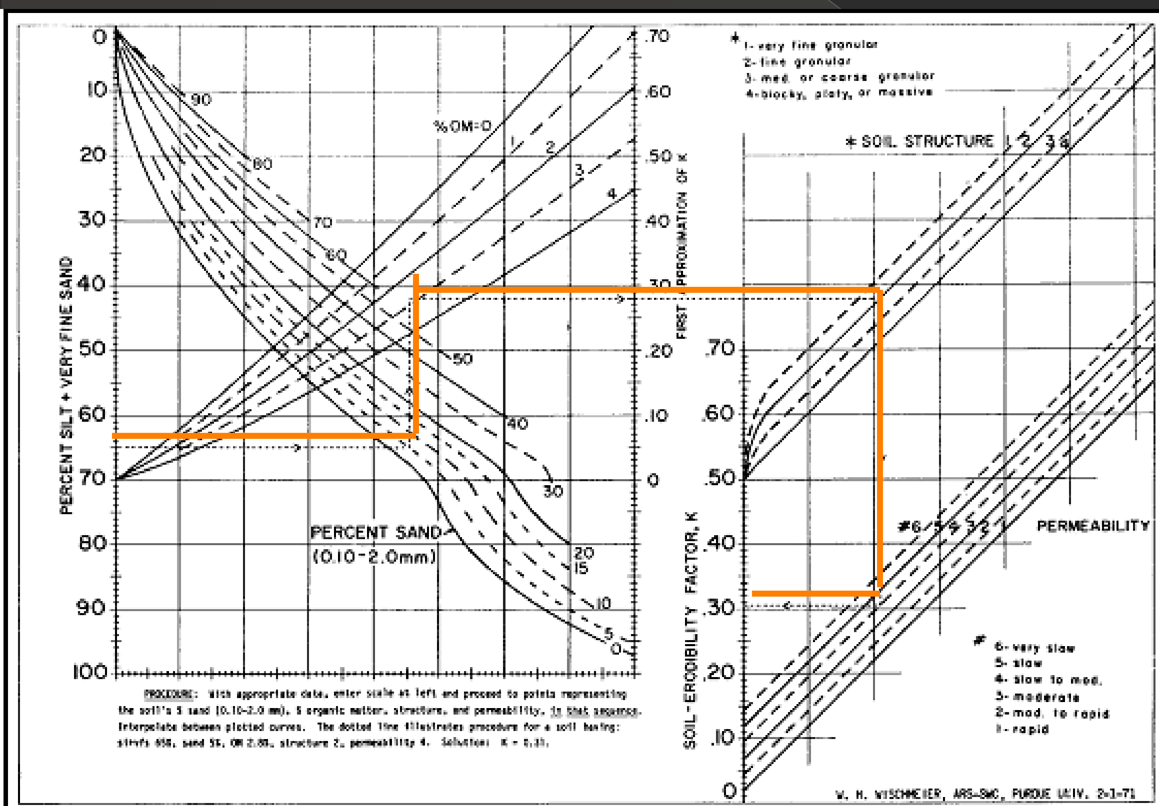
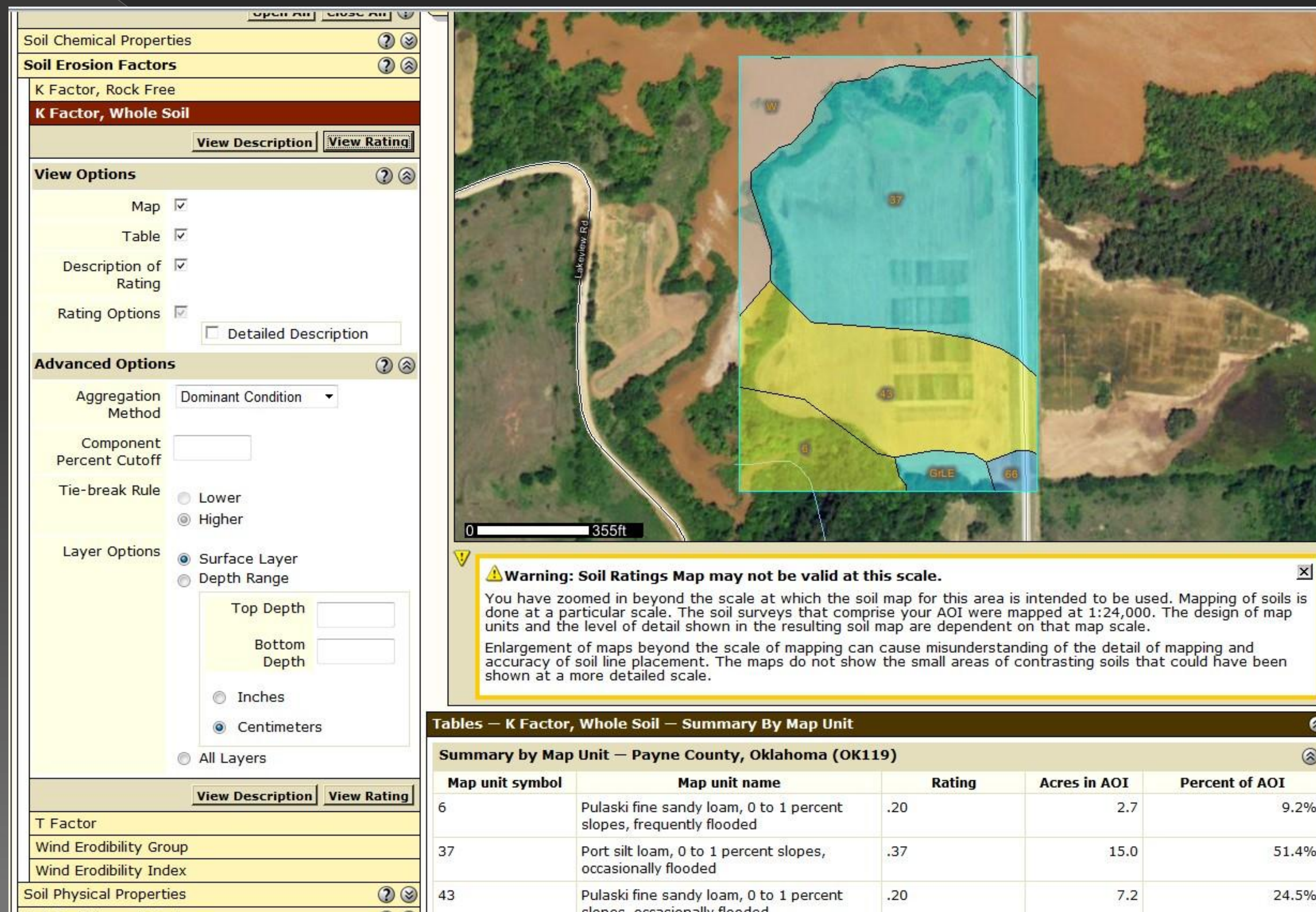


TABLE 2: K Factor Data

	Organic Matter Content		
Textural Class	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 x **0.37** x LS x C x P
- K from Soil Survey, Port silt loam



Using the USLE

- A=225 x .37 x **0.196** x C x 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 x .37 x 0.196 x **0.09** x 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 x .37 x 0.196 x 0.07 x **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 x .37 x 0.196 x 0.07 x **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

=0.35*0.60

- A=225 x .37 x 0.196 x 0.21 x 0.75=

  2.6 tons/acre yr

  Change to stubble mulch wheat

TABLE 4A. Crop Type Factor

Crop Type	Factor
Grain Corn	0.40
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TABLE 4B. Tillage Method Factor

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Fall Plow	1.0
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Zone Tillage	0.25
No-Till	0.25

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

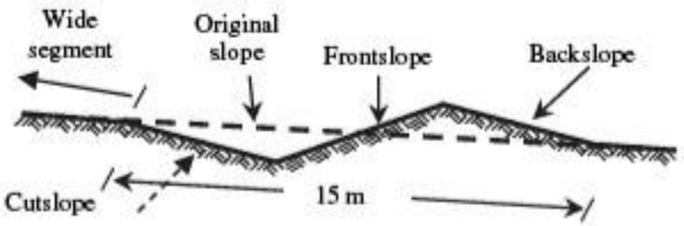
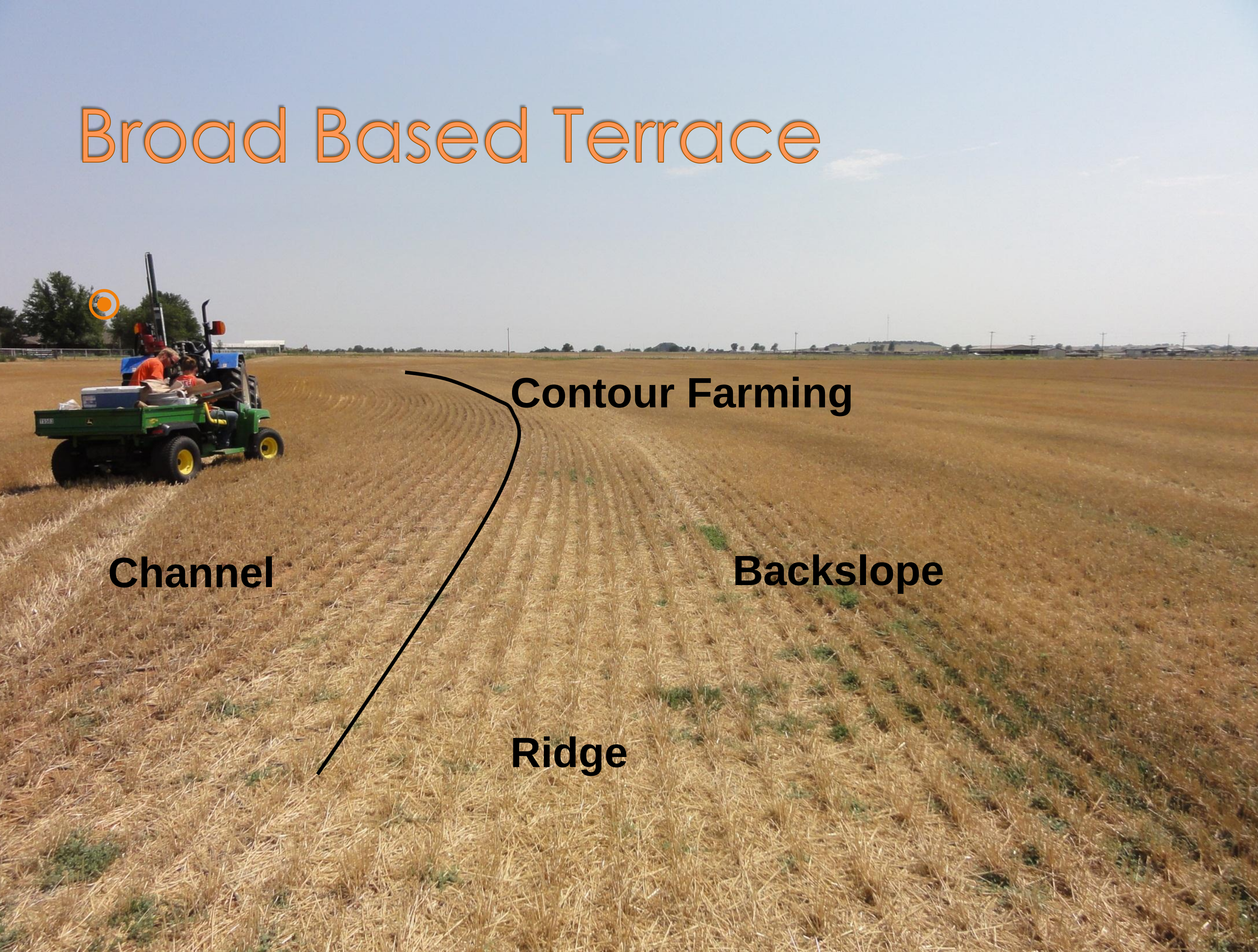


Fig. 11.6 Cross sectional view of lower portion of a broad-base terrace. The broad-base consists of lower and upper section. The lower section confines the channel and ridge (about 15 m wide) while the upper section confines the wide segment (about 30 m wide) (After ASAE, 2003)

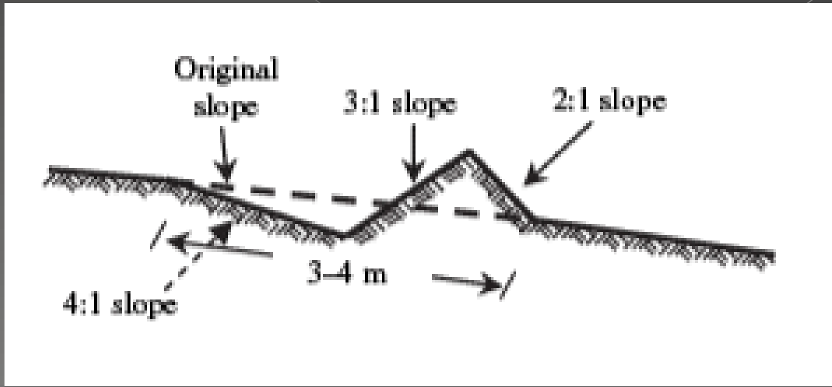
Broad Based Terrace



Broad Based Terrace

Narrow Base Terraces

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



Pictures from NRCS

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