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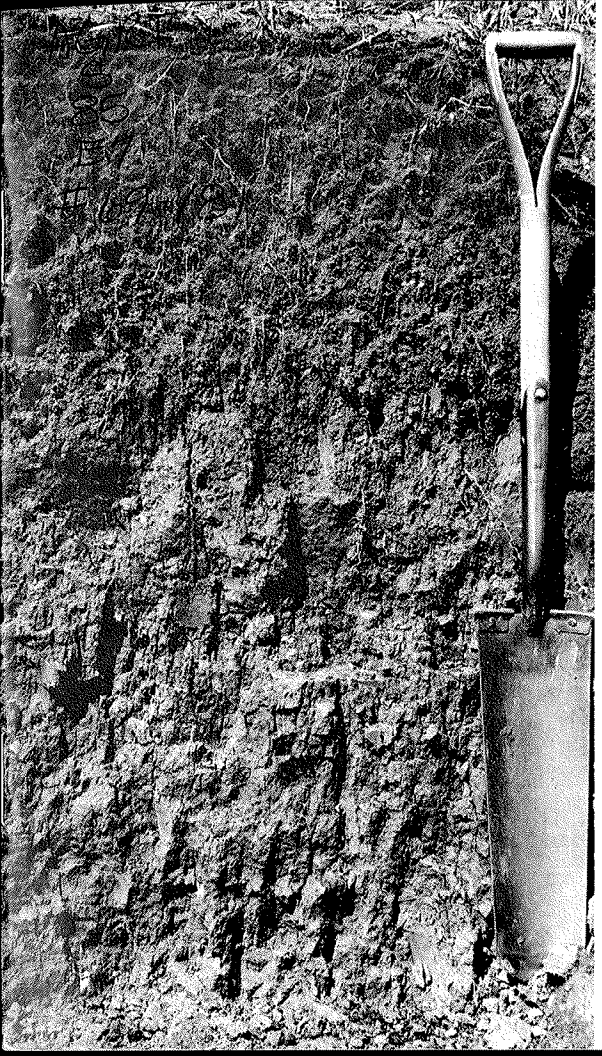

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know nebraska's soils

WITH A SOIL SURVEY

By Harold H. Gilman, Extension Conservationist

Cooperative Extension Service, University of Nebraska College of Agriculture
And Home Economics, And U.S. Department of Agriculture Cooperating
E. F. Frolik, Dean J. L. Adams, Director

Acknowledgment: The author is grateful to Mr. Lloyd E. Mitchell, State Soil Scientist, Soil Conservation Service, for help in preparation of this circular.

All photos taken by and used through the courtesy of the Soil Conservation Service and Department of Information, University of Nebraska.

HISTORY OF SOIL MAPPING IN NEBRASKA

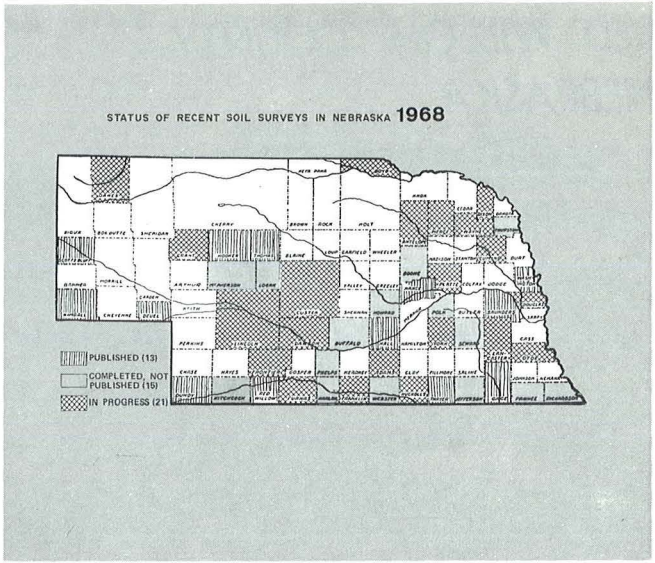
Soil surveys were first published in Nebraska in 1905. Most counties were surveyed and results published on small scale maps.

Since the original surveys were made, soils have been studied, correlated and mapped with improved technology. They are now mapped on aerial photographs which provide more accuracy and detail.

The first new county soil survey published in Nebraska was that of Nance County in 1961. Since 1961 thirteen new county surveys have been published. Field work has been completed in 15 other counties and 15 are awaiting final soil correlation.

To obtain soils information in counties where surveys are not published, contact the local Soil Conservation Service Office in the county.

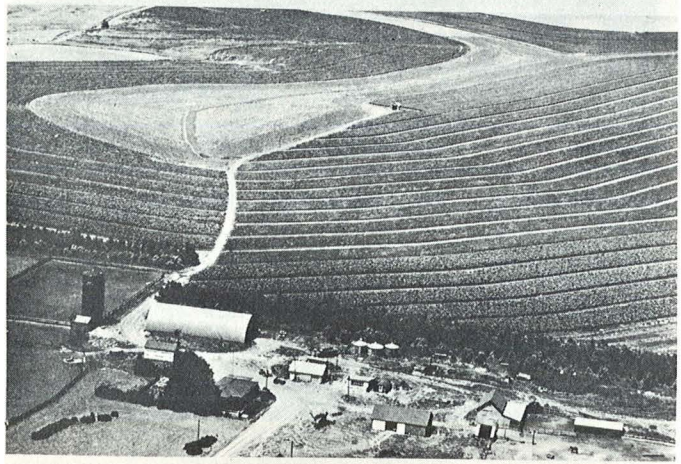
Soil survey work is carried out by the Soil Conservation Service in cooperation with the Conservation and Survey Division of the University of Nebraska.



Issued April 1

Soil Survey

RED WILLOW COUNTY NEBRASKA



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
UNIVERSITY OF NEBRASKA
Conservation and Survey Division

WHAT IS A SOIL SURVEY?

A soil survey is an inventory of the soil resources of a county. It is a written summary and map of the basic facts about soils of the county and related information pertaining to them. The boundaries of the soils are drawn on aerial photographs together with the locations of other physical features of the landscape. The survey is an essential guide to the use and management of soils.

HOW A SOIL SURVEY IS MADE

The soil scientist studies the land acre by acre. He examines the soil, the landscape, geologic formation and vegetation for clues to differences in soil behavior. He classifies the soils and gives them names in the National Soil Classification System. Boundaries between the different kinds of soil are plotted on aerial photographs. He also writes soil descriptions and interpretations to go along with the soil map.

Working tools of a soils scientist

He determines the slope of the land

He measures depths of soil horizons

He selects the color for the soil description

He determines the soil texture

The soil map is inked

Descriptions of the Soils

In this section each soil series is described and important features that apply to all the soils in the series are discussed. The location of the soils in the county and their position in the landscape are given, a comparison with nearby soils or similar soils is made, and the use of the soils is briefly noted.

Following the description of each series are descriptions of each soil in the series. These descriptions generally tell how the various layers or horizons of the soil profile differ from the layers described as representative of the series. The description of each soil also tells about the suitability of the soil for agriculture, its use, and something about its management.

A detailed description of each soil series is provided in the section "Detailed Descriptions of Soil Series." For more general information about the soils, refer to the section "General Soil Map," which describes the broad patterns of soils in the county.

1. *Soil Associations:* Landscapes that have distinctive patterns of soils. Soil associations give a broad picture of the county.

2. *Soil Series.* A group of soils that have major horizons similar in thickness and arrangement, but do have different textures in the surface layer.

3. *Capability Classification:* Capability classification is the grouping of soils into eight land classes according to their suitability for farming. This classification is based on the risk of damage to soils when they are used and how they respond to treatment.

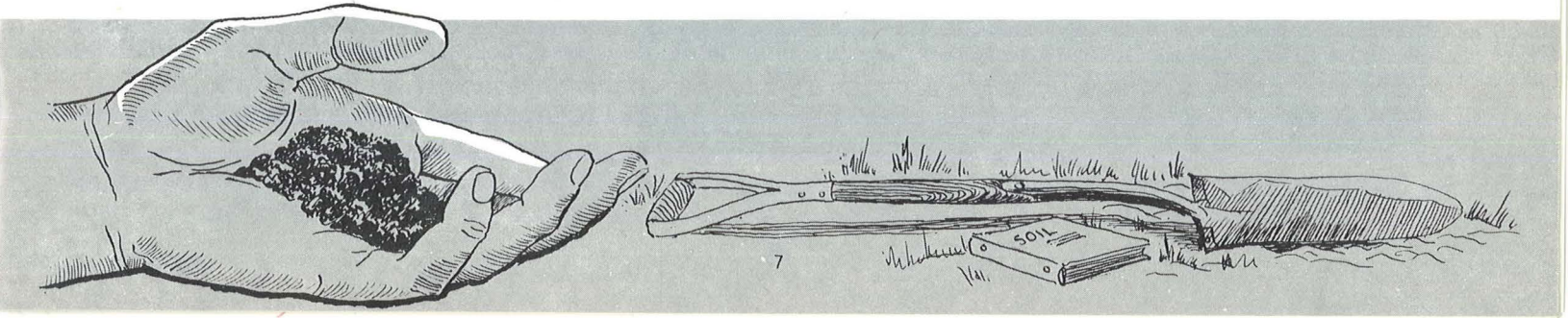
OTHER INFORMATION – ON MAPS OR REPORTS

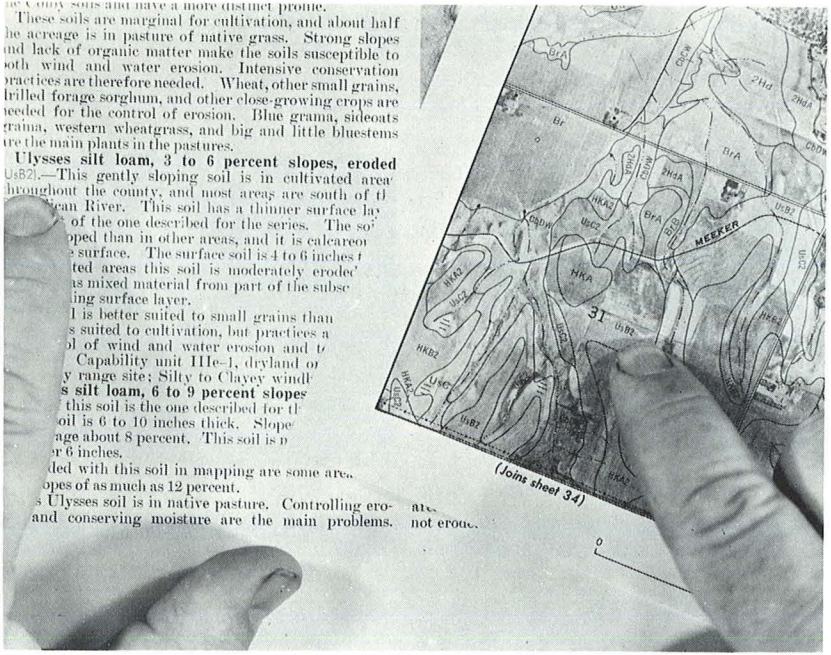
Soil surveys are made by soil scientists of the Soil Conservation Service. They dig, bore, or use a power probe to examine and study the soils. Information recorded on the aerial photograph or in a field notebook include:

- soil boundaries
- organic matter
- alkali spots
- structure
- soil type
- texture
- acidity
- color
- thickness of each layer of soil

- permeability of the subsoil
- hard sub-surface layers
- depth of rooting zone
- degree of erosion
- percent of slope
- rock outcrops

- power lines
- railroads
- buildings
- windmills
- ditches
- springs
- roads
- ponds





When the entire county has been mapped:

Refer to the index map and find the sheet that shows your farm or ranch.

Check the soil symbols on your farm.

Refer to the index of soil symbols and find the page number that describes your soils.

Also refer to the recommendations for managing cropland, range and pastureland, woodland, and windbreaks.

Managing Rangeland [1]

The original vegetation in Red Willow County was mainly grasses and forbs. The county is part of an area that is subject to alternate periods of drought and abundant rainfall. The kinds of plants that survived therefore were those that could adjust to such extremes of climate.

After settlement the steeply sloping areas on breaks along the Republican River and its tributaries were left in native plants. Much of the rest of the acreage in the county was plowed and farmed. In recent years, however, farming has been discontinued on the more sloping soils.

About 36 percent of the acreage in the county is now in grass used for hay or pasture for cattle, sheep, and horses. In 1959, according to the U.S. Census of Agriculture, income from the sale of livestock and livestock products in the county accounted for 57 percent of the total agricultural income. Herds of beef cows are the main enterprise, but the raising of yearlings is increasing.

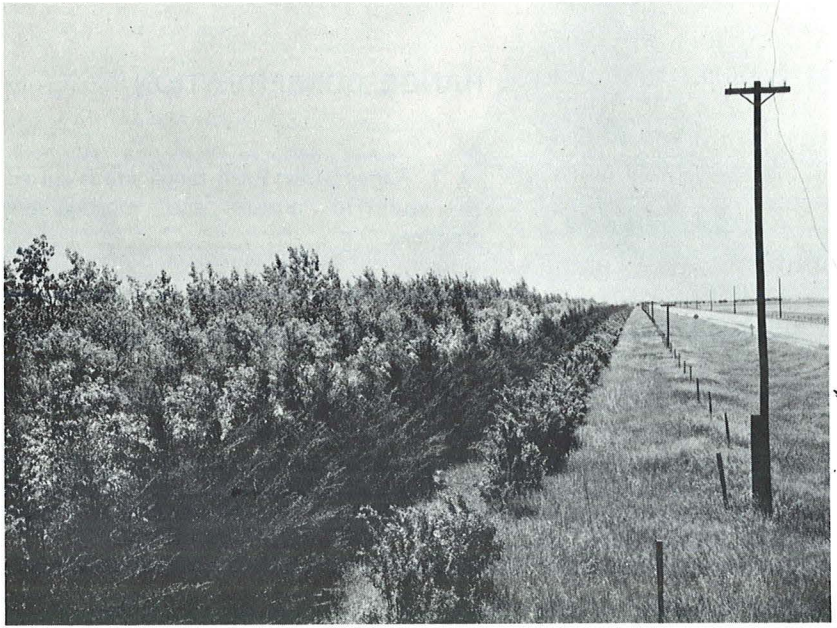
The primary requirement for good range management

RANGE CONSERVATION

1. *Range Sites:* Each range site is suited to specific grasses and management practices.

2. *Range Conditions:* Range condition is the result of management practices. Range conditions are described as excellent, good, fair and poor.

WOODLAND AND WILDLIFE

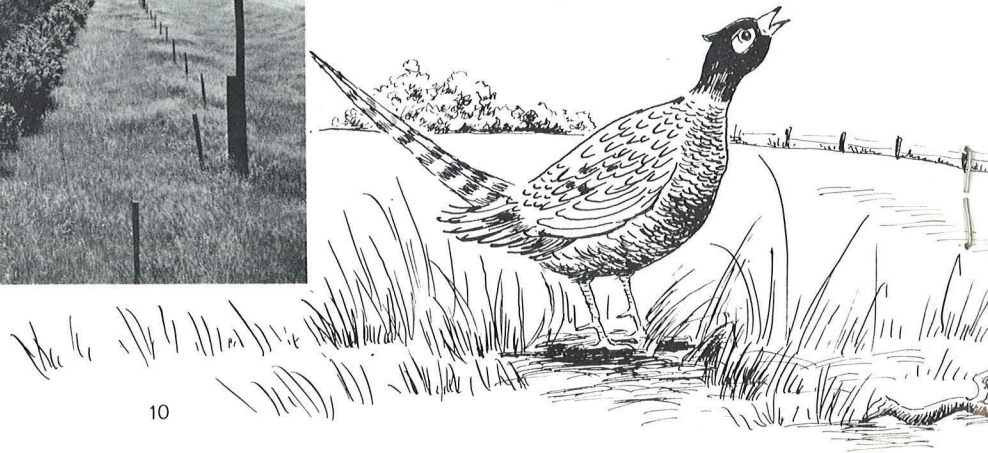


1. The soils in each county are divided into windbreak groups.

2. Species of trees adapted to the soils of each windbreak group are listed in the order of suitability.

3. Ground preparation, planting and management practices are explained for each windbreak group.

4. Soil association for producing wildlife habitat for the important species of wildlife is discussed.



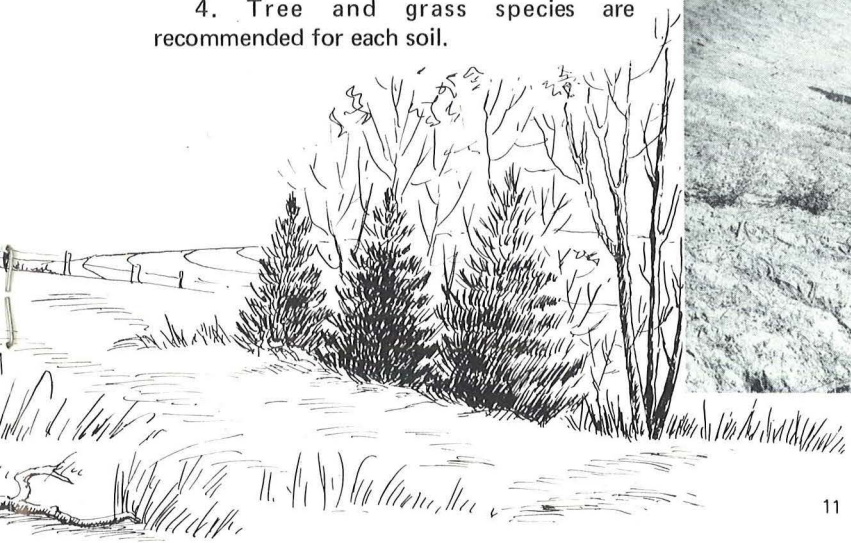
HOW CAN A SOIL SURVEY HELP YOU? ● ● ● Farmers, Ranchers, Farm Managers

1. It is a basis for developing conservation plans.

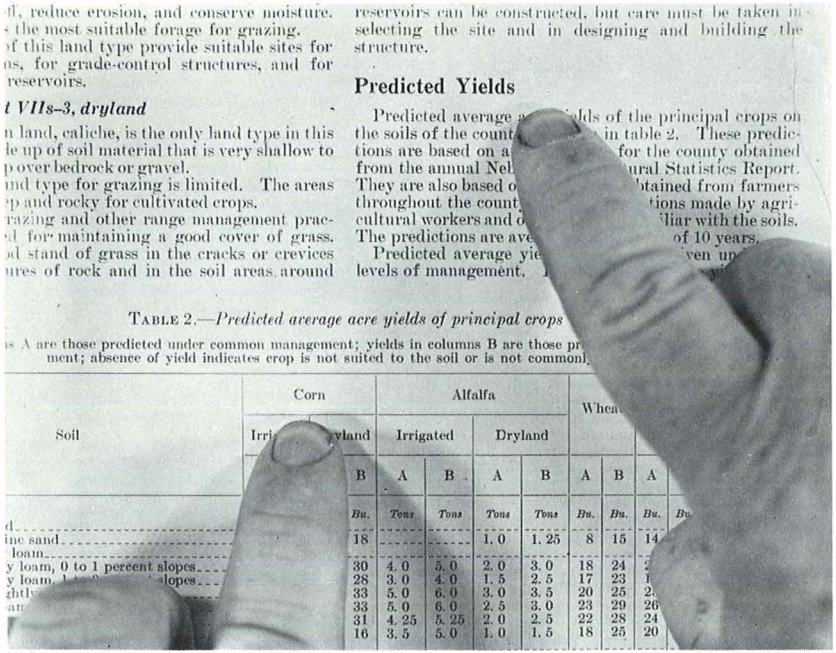
2. All soils on your farm or ranch are mapped on an aerial photograph and described with recommended management and treatment practices.

3. Yields are predicted for each soil under "ordinary" and "improved" cropping practices.

4. Tree and grass species are recommended for each soil.



BANKS, INVESTORS, LAND APPRAISERS, AND CREDIT AGENCIES



ff, reduce erosion, and conserve moisture.
s the most suitable forage for grazing.
of this land type provide suitable sites for
ns, for grade-control structures, and for
reservoirs.

t VIIs-3, dryland

n land, caliche, is the only land type in this
le up of soil material that is very shallow to
p over bedrock or gravel.
nd type for grazing is limited. The areas
p and rocky for cultivated crops.
razing and other range management prac-
d for maintaining a good cover of grass.
d stand of grass in the cracks or crevices
ures of rock and in the soil areas around

reservoirs can be constructed, but care must be taken in
selecting the site and in designing and building the
structure.

Predicted Yields

Predicted average a ds of the principal crops on
the soils of the count in table 2. These predic-
tions are based on a for the county obtained
from the annual Nel ural Statistics Report.
They are also based o btained from farmers
throughout the count tions made by agri-
cultural workers and o liar with the soils.
The predictions are ave of 10 years.
Predicted average yie ven un
levels of management.

TABLE 2.—*Predicted average acre yields of principal crops*

s A are those predicted under common management; yields in columns B are those pr
ment; absence of yield indicates crop is not suited to the soil or is not commonl

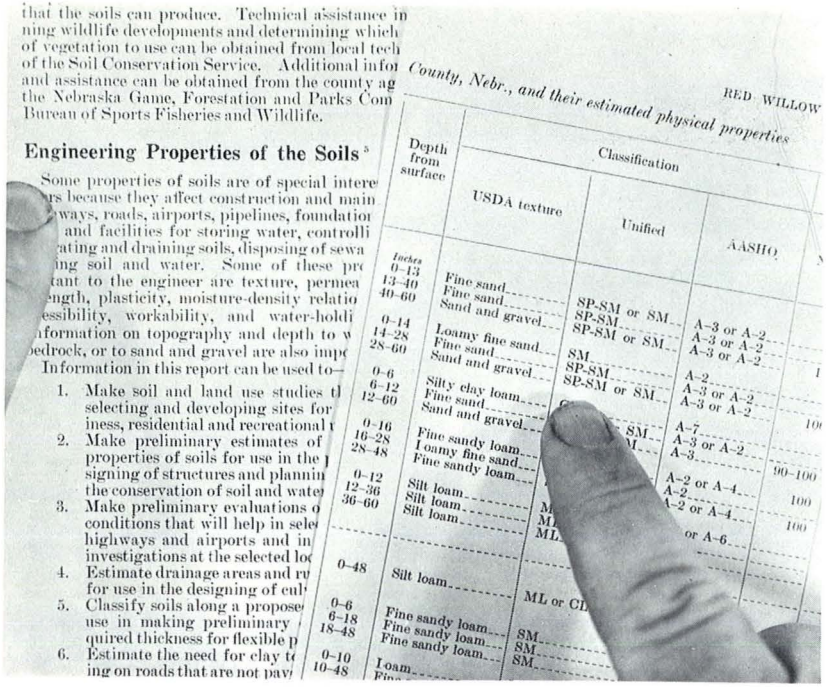
Soil	Corn		Alfalfa				Whea		
	Irri yland		Irrigated		Dryland				
	B	A	B	A	B	A	B	A	
	Bu.	*Tons*	*Tons*	*Tons*	*Tons*	*Bu.*	*Bu.*	*Bu.*	*Bu*
d									
ine sand	18			1.0	1.25	8	15	14	
loam									
y loam, 0 to 1 percent slopes	30	4.0	5.0	2.0	3.0	18	24		
y loam, slopes	28	3.0	4.0	1.5	2.5	17	23	1	
ght	33	5.0	6.0	3.0	3.5	20	25	2	
ar	33	5.0	6.0	2.5	3.0	23	29	26	
	31	4.25	5.25	2.0	2.5	22	28	24	
	16	3.5	5.0	1.0	1.5	18	25	20	

1. The survey has the location and description of all soils in the county.
2. It is a source of information for determining earning capacity of different soils for credit purposes or investments.
3. It contains information that can be used in determining feasibility of building sites.

COUNTY EXTENSION AGENTS, VO AG INSTRUCTORS AND OTHER EDUCATIONAL LEADERS

1. The soil survey is a basis for making recommendations on soil management, crop varieties, grass and tree species.
2. It can help in making fertilizer recommendations.
3. Research personnel can use the soil survey information in planning future research projects.
4. It is an excellent textbook for training land judging teams.

ENGINEERS STUDY SOILS TOO



that the soils can produce. Technical assistance in
ning wildlife developments and determining which
of vegetation to use can be obtained from local tech
of the Soil Conservation Service. Additional infor
and assistance can be obtained from the county ag
the Nebraska Game, Forestation and Parks Com
Bureau of Sports Fisheries and Wildlife.

Engineering Properties of the Soils [5]

Some properties of soils are of special intere
rs because they affect construction and main
ways, roads, airports, pipelines, foundatior
and facilities for storing water, controlli
ating and draining soils, disposing of sewa
ing soil and water. Some of these pro
tant to the engineer are texture, permea
ngth, plasticity, moisture-density relatio
essibility, workability, and water-holdi
nformation on topography and depth to w
edrock, or to sand and gravel are also impo
Information in this report can be used to—

1. Make soil and land use studies t
selecting and developing sites for
iness, residential and recreational
2. Make preliminary estimates of
properties of soils for use in the
signing of structures and plannin
the conservation of soil and wate
3. Make preliminary evaluations o
conditions that will help in sele
highways and airports and in
investigations at the selected lo
4. Estimate drainage areas and ru
for use in the designing of cul
5. Classify soils along a propose
use in making preliminary
quired thickness for flexible p
6. Estimate the need for clay t
ing on roads that are not pav

County, Nebr., and their estimated physical properties

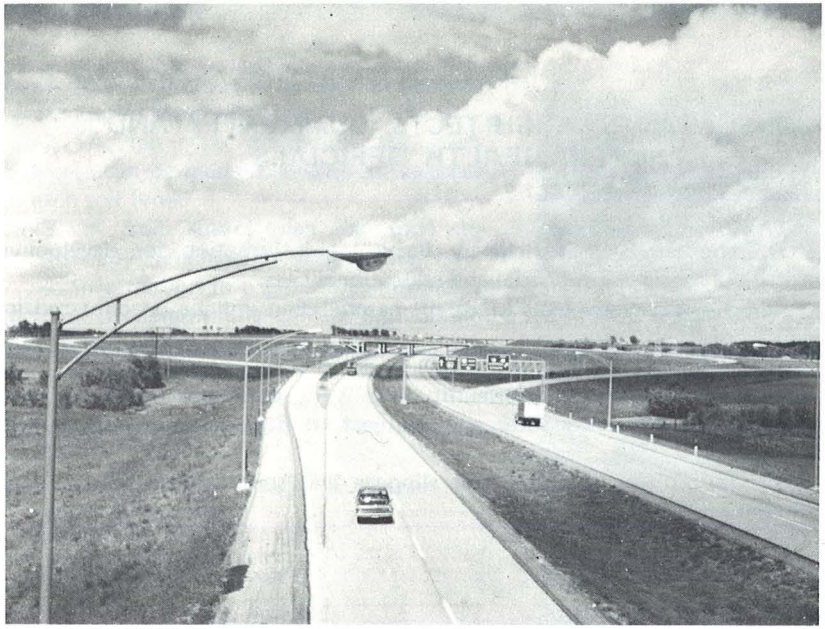
RED WILLOW

Depth from surface	Classification			
	USDA texture	Unified	AASHO	
Inches				
0–13	Fine sand	SP-SM or SM	A-3 or A-2	
13–40	Fine sand	SP-SM	A-3 or A-2	
40–60	Sand and gravel	SP-SM or SM	A-3 or A-2	
0–14	Loamy fine sand	SM	A-2	1
14–28	Fine sand	SP-SM	A-3 or A-2	
28–60	Sand and gravel	SP-SM or SM	A-3 or A-2	
0–6	Silty clay loam	C		10
6–12	Fine sand	SM	A-7	
12–60	Sand and gravel	M	A-3 or A-2	
0–16	Fine sandy loam		A-3	90–100
16–28	Loamy fine sand		A-2 or A-4	
28–48	Fine sandy loam		A-2	100
0–12	Silt loam	M	A-2 or A-4	100
12–36	Silt loam	M	or A-6	
36–60	Silt loam	ML		
0–48	Silt loam	ML or CL		
0–6	Fine sandy loam	SM		
6–18	Fine sandy loam	SM		
18–48	Fine sandy loam	SM		
0–10	Loam			
10–48	Fine			

1. Engineering tests on major soils are performed by the Nebraska Department of Roads.

2. Tables show information for each soil such as:

a. depth
b. percentage passing through different size sieves
c. runoff
d. permeability
e. available water capacity
f. shrink-swell potential
g. many other features



HIGHWAY DEPARTMENTS

1. A soil survey helps highway engineers locate routes.

2. A soil survey gives information on how soils will compact.

3. A soil survey is a guide to sources of fill, sand, or gravel and their suitability as a road sub-grade.

4. A soil survey rates soils for susceptibility to frost action.

CONSULTANTS, ARCHITECTS, COMMUNITY AND PUBLIC HEALTH OFFICIALS

1. The survey can help by furnishing information for developing residential, business, industrial and recreational sites.
2. The survey explains kinds of material that will be encountered in excavations.
3. The survey will help in locating sand and gravel deposits.
4. The survey discusses suitability of soils for septic tank fields.
5. A soil survey denotes areas subject to flooding and possibly wet basements.
6. The survey discusses soil slippage and soil stability for building foundations.

TAX ASSESSORS, MUNICIPAL AND OTHER OFFICIALS

1. A soil survey can be used to develop acre values for each kind of soil.

2. A fair tax evaluation for each property can be made according to the acres of each soil type.

3. A soil survey can be used to scientifically zone land for various uses.

4. Information in a soil survey also helps officials in determining private and public building and development plans.

If your new county soil survey is not yet published and you wish to know something about the soils on your farm or ranch—contact the local Soil Conservation Service Office.