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Relationships Between Land Sales Figures, Soils, and Crop Yields as a Guide for Agricultural Land Evaluation: Minnehaha County, South Dakota

Cooperative Extension Service
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Relationships between

Land Sales Figures, Soils, and Crop Yields

as a guide for agricultural land evaluation

MINNEHAHA COUNTY, SOUTH DAKOTA

Agricultural Experiment Station
and Cooperative Extension Service,
South Dakota State University, Brookings,
Soil Conservation Service
U. S. Department of Agriculture, Huron

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MINNEHAHA COUNTY

Farm sales data were supplied by Martin C. Johnson, County Director of Equalization, and compiled by George Winckler and staff of the South Dakota Department of Revenue, Pierre, Lowell Schmidt, Commissioner. Soil map drawn from field data supplied by Lorne Nestrud, Soil Conservation Service.

Many factors affect the prices paid for agricultural land.

One set of factors—including distance to market, kind of roads, size of farms, characteristics of land ownership, cultural patterns, and the skill and resources of the operator—do not lend themselves readily to analysis. Another set of factors—the kind of soil and the ability of soils to produce crops and grass—can be measured and related to land sale figures.

Data from recent land sales of unimproved agricultural land (Table 1) provide basic data to which data on soils and productivity can be related. The three kinds of soils and yield data available on a county basis to relate to land sale figures include: (1) the County Soil Map (Figure 1); (2) The County Land Inventory (Table 3); and (3) The Crop and Grass Yields (Table 5).

THE LAND SALE FIGURES

The sale figures for unimproved agricultural land in the county for the years 1967, 1968, and 1969 supplied the basic data, along with climate and agronomic data, for the Soil Map Area values given in Table 1. The procedure was to group the sales for each map area of Figure 1. The resulting values, which are shown in Table 1, then represent the average sale price of all farms or ranches in each of these map areas for the years 1967, 1968 and 1969.

The data are from bona fide transactions representing voluntary sales at market value. All sales covered by warranty deeds and contracts for warranty deeds meeting the "willing buyer, willing seller" concept were used except the following:

1. Sales between members of the immediate family and/or where the stated consideration includes the words "love and affection," interpretation of the words "immediate family" shall be from grantor or grantee to father, mother, brother, sister, son, daughter, nephew, niece or grandchild.
2. Sales between affiliated companies or corporations and to or from an officer of said company or corporation.
3. Sales by sheriff or other court officials which includes forced sales, auction sales (10-6-33), foreclosures, bankruptcies and condemnations.
4. Sales of cemetery lots.
5. Sales where life estates are retained.
6. Sales of minerals or timber *only,* or right to mine or cut.
7. Sales which include release of damage or satisfaction of indebtedness as part of the recited consideration.
8. Sales involving a trade or exchange of property.
9. Sales including personal property unless value can be determined and subtracted from selling price.
10. Sales to or from the United States of America or any federal agency, *except* sales by Veterans Administration and Federal Housing Authority or Farmers Home Administration.
11. Sales to or from any state, county, city, town, school district, special improvement district or other municipal body, or any other political subdivision or agency of either.
12. Sales to or from any railroad, telephone, electric, gas, pipeline or other utility company.
13. Sales to or from any church, lodge, parochial school, benevolent, fraternal, educational institution or any other legal tax exempt organization.
14. Sales to or by administrator. Sales can be used in some instances with written authorization from Department of Revenue. Executors, guardians, receivers or trustees in bankruptcy, decrees and referees.
15. Sales conveying an unspecified, undivided or fractional interest in property.
16. Transactions involving the consummation of contracts executed prior to the study period. Sales to be used will be from the three (3) years preceding the legal assessment date from each study.
17. Conveyances made to correct deeds previously executed unless the correcting deed makes a change in the legal description.

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Dr. Duane C. Acker, Director of Extension, South Dakota State University, Brookings.
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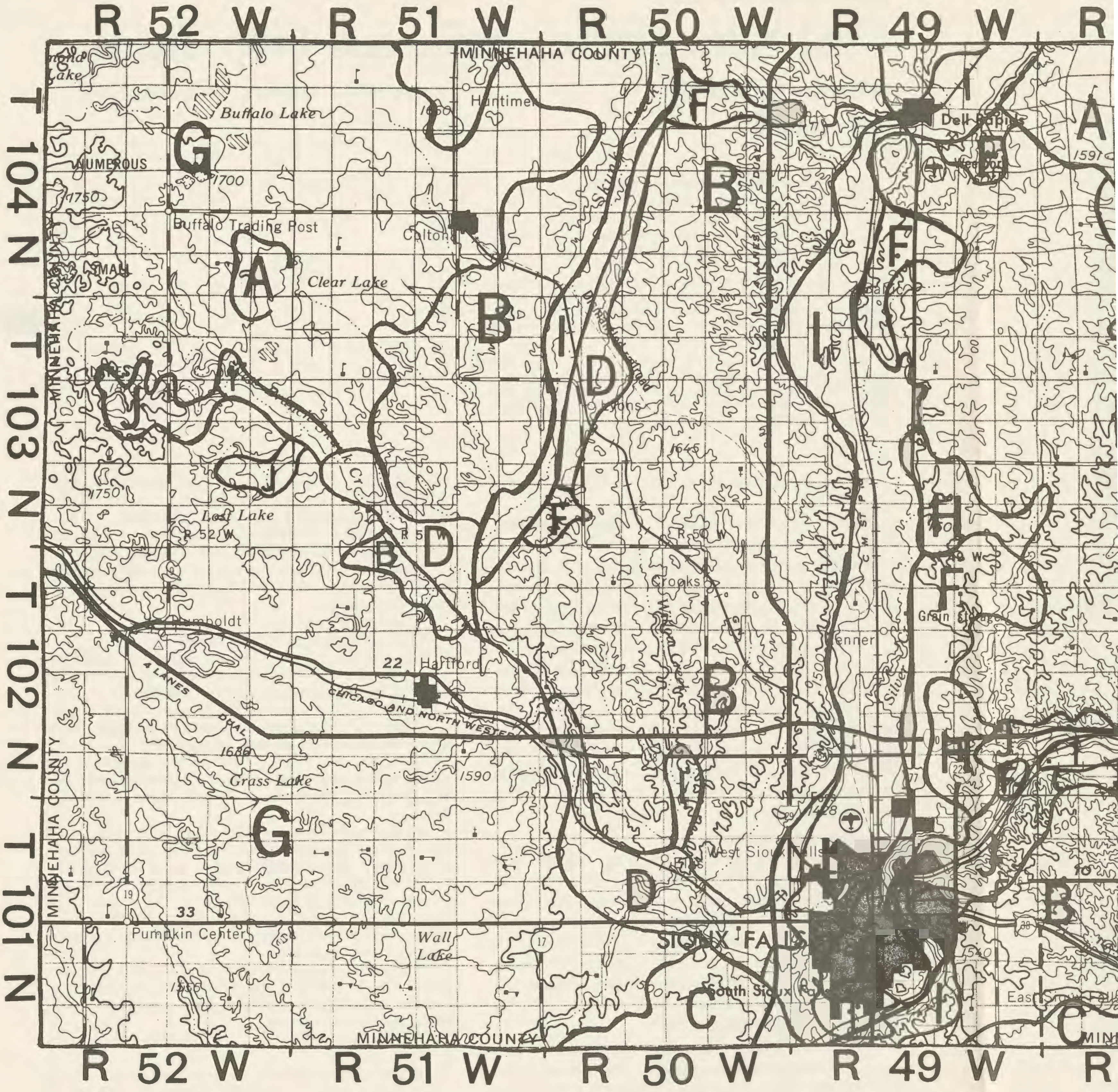


R 52 W
R 51 W
R 50 W
R 49 W
T 104 N
T 103 N
T 102 N
T 101 N
MINNEHAHA COUNTY
Buffalo Lake
NUMEROUS
Buffalo Trading Post
Clear Lake
Huntimer
Colton
Dell Rapids
Lyons
Lost Lake
Crooks
Humboldt
Hartford
Renner
CHICAGO AND NORTH WESTERN
4 LANES
Grass Lake
West Sioux Falls
Pumpkin Center
Wall Lake
SIOUX FALLS
South Sioux Falls
Grain Storage
A
B
C
D
F
G
H
I
J

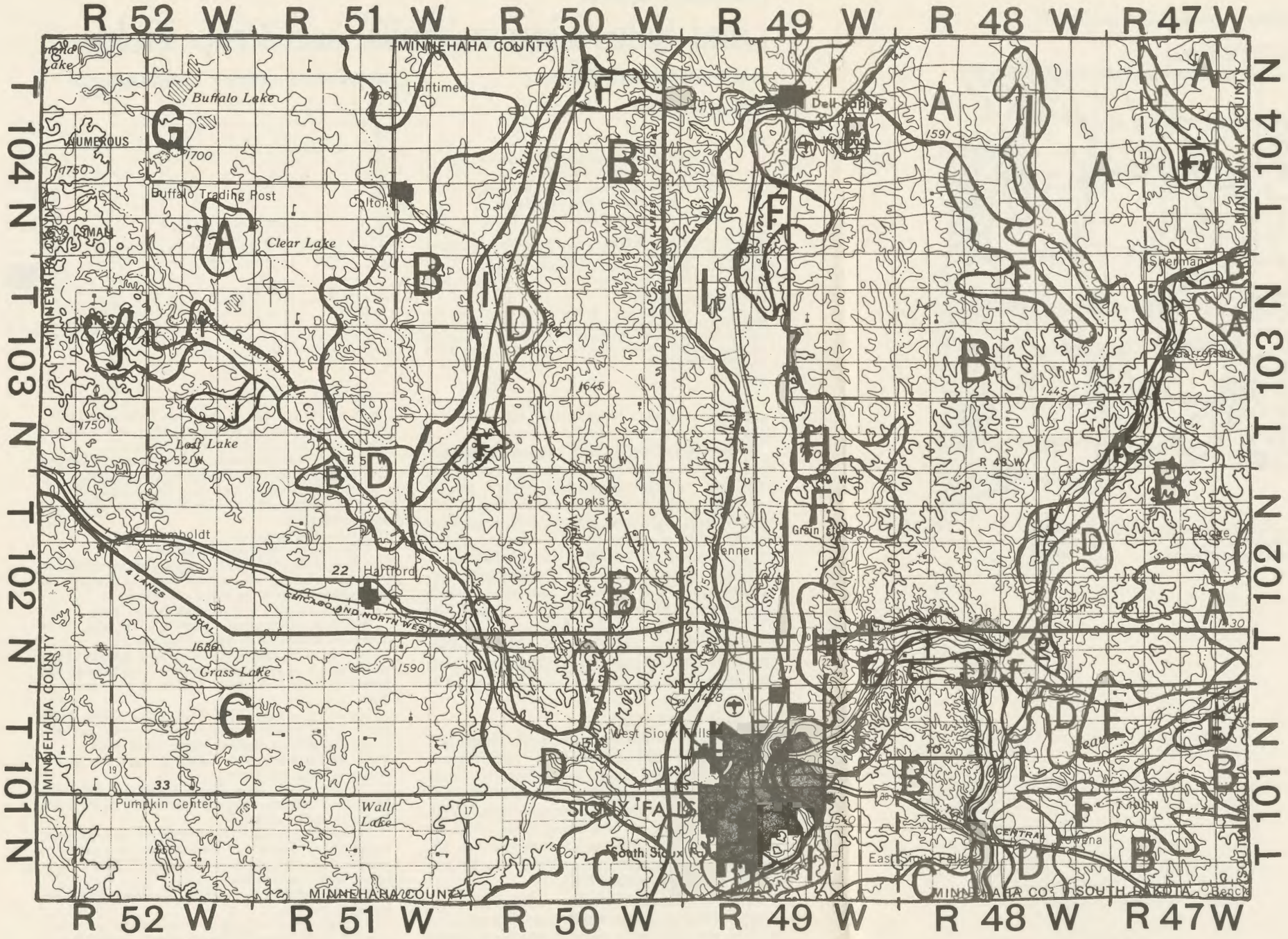
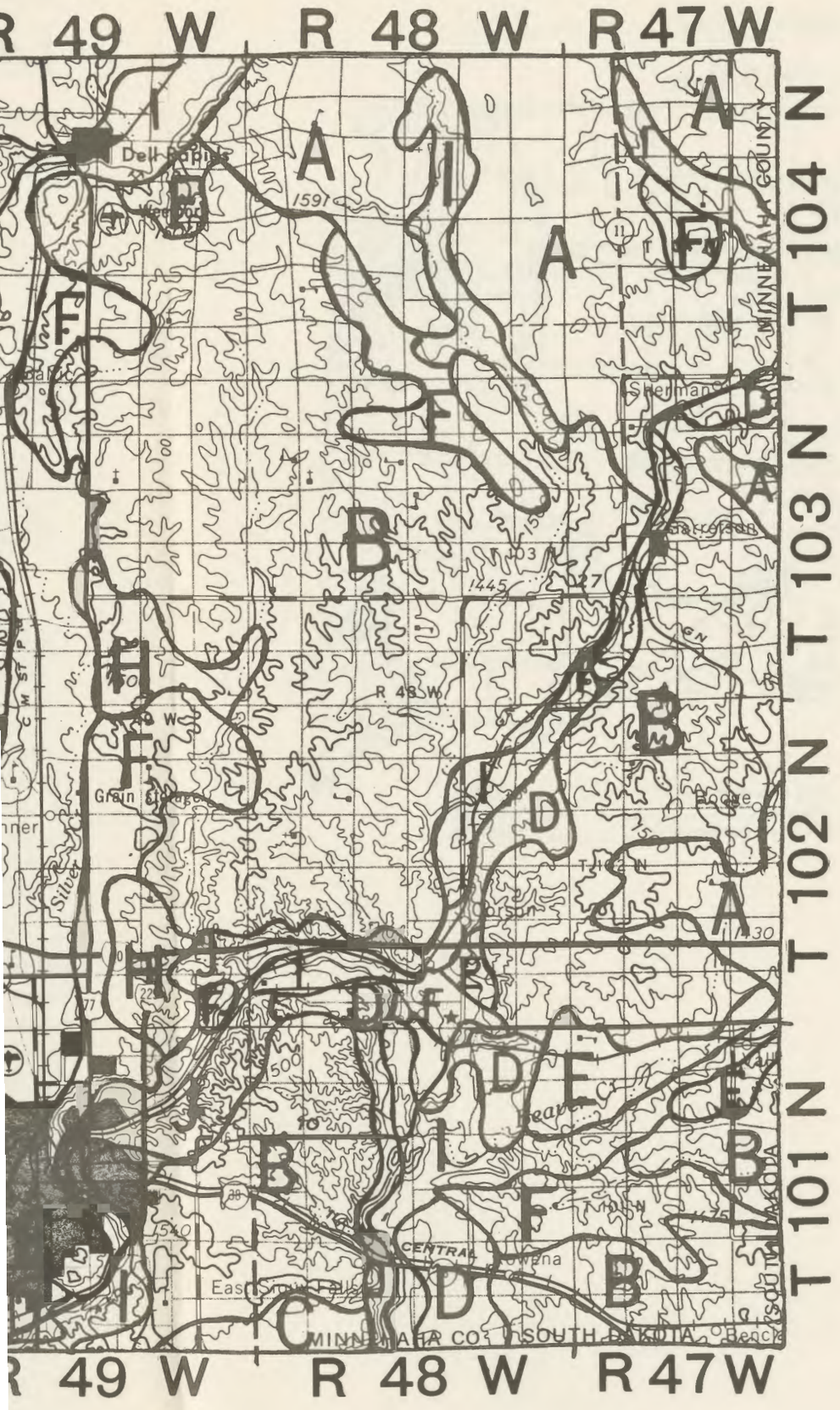


Figure 1. General Soil Map

MINNEHAHA COUNTY

A. Deep silty clay loam soils on nearly level to gently sloping loess uplands.
B. Deep silty to clayey soils on nearly level to sloping loess uplands.
C. Deep silty soils on nearly level glacial uplands and in gentle swales.
D. Loamy and silty soils with gravelly and sandy subsoils or substrata on nearly level stream terraces.
E. Deep clayey moderately well drained soils on stream terraces.
F. Deep sandy loam soils on nearly level to undulating slopes.
G. Deep silty and loamy soils on gently undulating to rolling slopes.
H. Deep loamy well drained soils on gently undulating to rolling glacial uplands.
I. Deep loamy to clayey soils on moderately well to poorly drained bottomlands.
J. Thin loamy and gravelly soils on hilly glacial uplands and on stream terraces.
K. Rock outcrops and shallow soils over rock.



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E. Deep clayey moderately well drained soils on stream terraces.

F. Deep sandy loam soils on nearly level to undulating slopes.

G. Deep silty and loamy soils on gently undulating to rolling slopes.

H. Deep loamy well drained soils on gently undulating to rolling glacial uplands.

I. Deep loamy to clayey soils on moderately well to poorly drained bottomlands.

J. Thin loamy and gravelly soils on hilly glacial uplands and on stream terraces.

K. Rock outcrops and shallow soils over rock.

18. Transactions involving real estate in more than one county, unless values are listed separately for each property.

19. Quit claim deeds. However, these are good in some instances, namely: Lead, S.D.; tax deeds; mortgage releases; and deeds showing exactly the same name for grantor and grantee.

20. When property changes its classification because of its new use (Example: agricultural to residential), when two (2) or more classes of property were sold as one parcel and only one stated consideration was shown; when a small parcel was sold out of a larger parcel where only one assessment previously existed.

21. Sales of property with physical change necessitating change in assessed value should not be used. Lots shall be used for one (1) year if the improvement was made after the sale.

THE SOIL MAP

A general soil map of the county is shown in Figure 1. Each map area is identified by a letter symbol described in the accompanying legend. The map areas are called soil associations which means that usually several soils are grouped together to make up the map unit. The soil associations divide the county into major physiographic areas. The acreages of the Soil Map Areas are given in Table 2.

THE LAND INVENTORY DATA

The second kind of data relating to Land Sale Figures available on a county basis is the Land Inventory. In these data the individual soils have been grouped into higher categories called Land Use Capability Subclasses. The basis for grouping is the degree and kind of limitation the soil has for agriculture (Reference: Land Capability Classification, USDA Handbook 10, 1962). The acres of land in the capability subclasses are shown in Table 3.

The inventory data shown in Table 3 come from the Conservation Needs Inventory (Basic Statistics of the National Inventory of Soil and Water Conservation Needs 1962) or, if available, from the detailed county soil survey. The inventory acreage usually is less than the total county acreage, since water areas, urban areas, and Federal land are not included.

THE CROP AND GRASS YIELDS

Crop and grass yield predictions (for average management) made for the soils of South Dakota by state and federal agencies have been for many years part of the basic data for published soil surveys. The use of the computer has facilitated the grouping of these data into yields by capability subclasses. The procedure was to select the dominant crops for the area of the state represented by the county. Yields for the four or five principal crops for subclasses of the first four capability classes were summarized and a crop rating determined based on the relative ability of the soils in each subclass to produce crops. The land subclass having the highest yields of the important locally grown crops was given a rating of 100% and the other subclasses rated down from this. This is how the crop ratings of Table 5 were developed.

The next step was to develop pasture or range ratings for the non-crop subclasses of classes 5, 6 and 7. Because class 8 is non-agricultural land no productivity ratings for it were developed. Land in class 4 is equally suited for crops or pasture so the crop rating and the grass yield for the subclasses of class 4 were used to derive a "balance point" ratio. For example, if the comparative crop rating for the subclasses of class 4 was 50 and the grass yield on these same subclasses was 5000 pounds, the ratio of 50:5,000=.01. The grass yields of the subclasses of classes 5, 6 and 7 then were multiplied by this ratio to arrive at the ratings for these subclasses. These pasture or range ratings, shown in Table 5 are in balance with the crop ratings of the subclasses of the first four land classes.

INTEGRATION OF LAND SALE FIGURES, SOIL MAP, LAND INVENTORY AND YIELD DATA

The Land Sale figures (Table 1) multiplied by the acreages of the map areas (Table 2) results in a county value (Table 4). This value represents the conditions prevailing in 1967, 1968 and 1969 qualified by the statements discussed in the above paragraph on "Land Sale Figures."

The yield data on crops and grass were summarized by land subclass and put on a comparative rating basis for land subclasses (Table 5). Crop and grass yields were brought into balance by use of a "balance point factor."

A dollar rating called a **Conceptual Dollar Value** (CDV) can be calculated for the land subclasses, Table 5. The CDVs are so-called because these are dollar values for the land subclasses which are conceptual units of classification. The CDVs are a reflection both of the Land Sales Figures and the Crop and Grass yielding abilities of the land. They were determined for the county as follows: The land subclass with a 100% crop or grass rating was called "x." A computer then solved for "x" so that the sum of the products of the land subclasses and "x" or a percentage of "x" (depending upon the yield rating) equalled the county value as determined by the Land Sale Figures.

The CDVs actually apply best for the central part of a county. The CDV's are based in part on land sale figures which reflect climate and climate changes gradually rather than abruptly at county lines. Therefore, the CDVs of adjacent counties should be noted to achieve smooth value transitions. The range of the CDVs in Table 5 represents the range of township CDVs in the county, which permits smooth transitions with adjoining counties.

USING CDVs AS A GUIDE FOR AGRICULTURAL LAND EVALUATION

Soil types making up a farm or ranch are placed into the appropriate land subclass. The acreages of each of the land subclasses then are multiplied by the CDV of the subclass to arrive at a dollar value for each subclass. These values are totaled for a first approximation value of the farm or ranch.

The accompanying state map shows the relationship of agricultural regions and land sales figures.

Table 1. Map Area Values From Land Sale Figures

Map Area	Dollars Per Acre	Map Area	Dollars Per Acre
A	225	G	188
B	250	H	190
C	218	I	214
D	210	J	183
E	205	K	175
F	198		

Table 2. Acreages of Map Areas

Map Area	Acres
A	30,720
B	188,810
C	6,400
D	16,640
E	3,840
F	23,680
G	182,000
H	5,120
I	44,800
J	7,680
K	1,920

Table 3. County Land Inventory

Land Sub-class	Acres	Land Sub-class	Acres
1	90,833	4e	45,381
2c	-	4w	12,459
2e	133,125	4s	-
2w	-	5w	46,667
2s	26,180	6e	4,094
3c	-	6s	-
3e	115,618	7e	5,774
3w	12,224	7s	10,083
3s	8,028	8*	1,144

*Class 8 land is included in land inventory but, since it is essentially non-agricultural land, no yields are shown for it in Table 5.

Table 4. County Value from Land Sale Figures and Soil Map Acreages

Map Area	Acreage	Sale Figure Value Dollars/Acre	County Value (Dollars)
A	30,720	225	6,912,000
B	188,810	250	47,202,500
C	6,400	218	1,395,200
D	16,640	210	3,494,400
E	3,840	205	787,200
F	23,680	198	4,688,640
G	182,000	188	34,216,000
H	5,120	190	972,800
I	44,800	214	9,587,200
J	7,680	183	1,405,440
K	1,920	175	336,000
	Total		110,997,380

Table 5. Comparative Crop and Grass Ratings* and Conceptual Dollar Values (CDVs)

Land Sub-class	Crop Rating %	Grass Rating %	Conceptual Dollar Values and Range**	
1	100	-	275	(220-290)
2c	-	-	-	-
2e	90	-	247	(198-261)
2w	82	-	225	(180-238)
2s	92	-	253	(202-267)
3c	-	-	-	-
3e	73	-	200	(161-212)
3w	75	-	206	(165-218)
3s	65	-	178	(143-189)
4e	60	60	165	(132-174)
4w+	68	68	178	(150-197)
4s	49	49	135	(108-142)
5w+	-	64	176	(141-186)
6e	-	31	85	(68-90)
6s	-	28	77	(62-81)
7e	-	29	80	(64-84)
7s	-	22	60	(48-64)

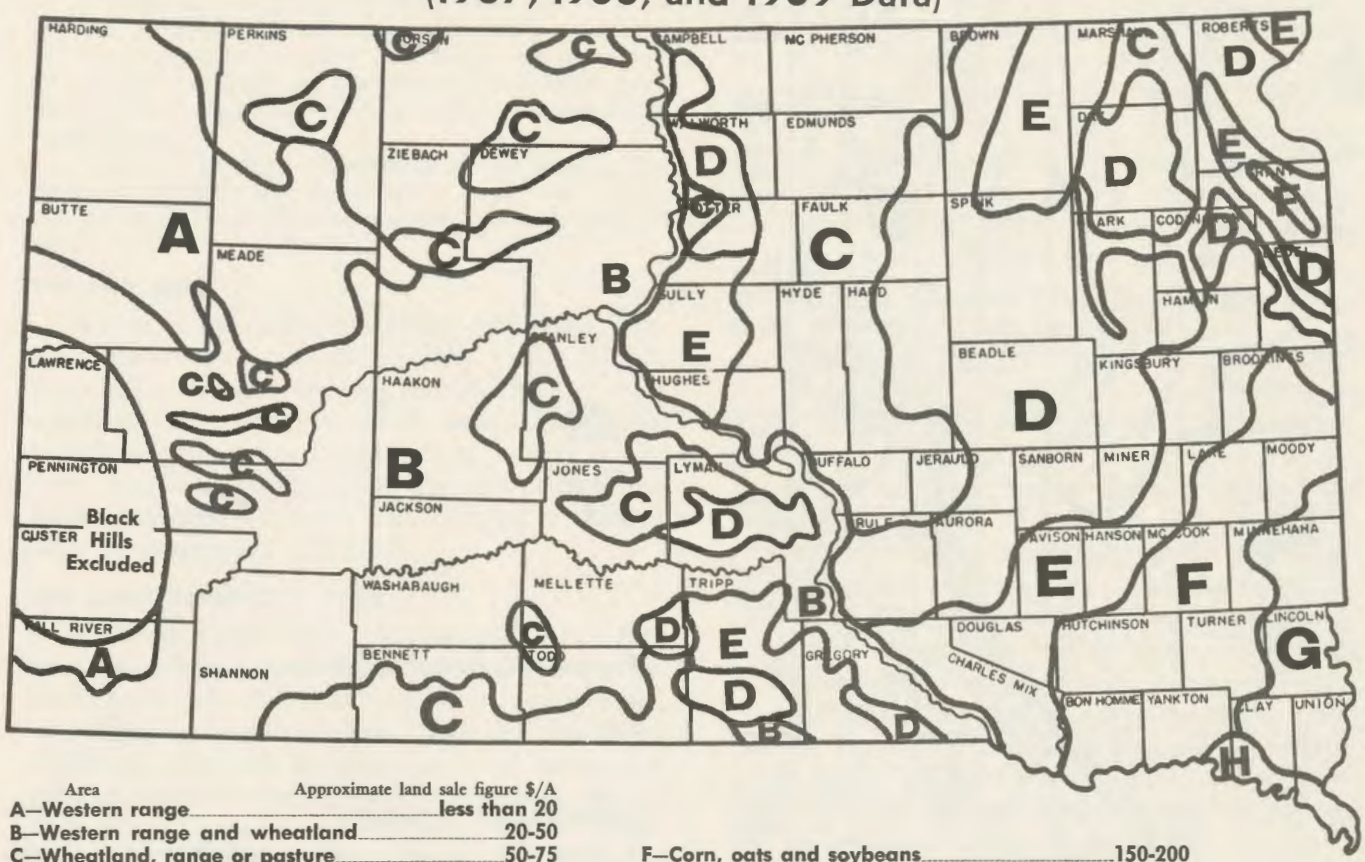
*Yield data were from soil series. Data were summarized for land subclass by computer.

+Although these wetlands are productive for grass, seasonal inaccessability of sites and stock trampling may reduce ratings.

**Range represents the range of township CDVs in the county calculated to permit smooth value transitions with adjoining counties.

Agricultural Areas and Land Sales Figures, Generalized.

(1967, 1968, and 1969 Data)



Area	Approximate land sale figure $/A
A—Western range	less than 20
B—Western range and wheatland	20-50
C—Wheatland, range or pasture	50-75
D—Mixed grains and general	75-100
E—General agriculture	100-150
F—Corn, oats and soybeans	150-200
G—Corn, soybeans	more than 200
H—Missouri River bottomland	200-500