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Red Willow County Test Hole Logs

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RED WILLOW COUNTY
Test-Hole Logs

Duane A. Eversoll

Nebraska Water Survey
Test-Hole Report No. 73

Conservation and Survey Division
Institute of Agriculture and Natural Resources
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October 1998
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INTRODUCTION

In 1930, the Conservation and Survey Division of the University of Nebraska and the U.S. Geological Survey began a program of cooperative groundwater studies in Nebraska. Since then test drilling by use of rotary drilling equipment has been an integral part of that program. This report contains logs of all the test holes drilled in the county under the program as well as those drilled by the Conservation and Survey Division with financial assistance from other government agencies.

The map in this report shows the location of all test holes drilled in Red Willow County from 1935 to 1997 (Figure 1).

Present techniques of test-hole logging and sampling include use of drilling mud suitable to drilling conditions, timing by stopwatch of the drilling of each 5-foot increment of depth, and removal of all cuttings from the test hole at intervals of 5 feet or less. During the drilling of the hole, cuttings from each interval are examined immediately; samples representing each 5-foot interval and each recognizable change in material are retained. After samples are washed, they are described lithologically and the color is evaluated by comparison with standard color charts. The samples then are dried, stored, and cataloged. All samples are processed and kept on open file in the offices of Conservation and Survey Division, 113 Nebraska Hall, University of Nebraska-Lincoln, 68588-0517.

Beginning in September 1951, some of the test holes have been logged electrically. Geophysical logs (e-logs) often can be used to determine formation boundaries more precisely than by field sampling, especially where differences in rock types occur at the boundary from one formation to another. Figures 2a and 2b are examples of geophysical logs from Red Willow County (test holes 20-HP-78 and 25-HP-78) with formation boundaries shown.

This publication is one of a series being issued to make more readily available the record of test holes drilled since 1930. The series of publications is made on a county basis and includes, with some exceptions, logs of all test holes drilled in each of the counties. The logs have not been reviewed for conformance with editorial standards and nomenclature. In the case of Red Willow County, descriptions of the strata done in earlier test hole reports as well as formation names have been revised where necessary in this report.

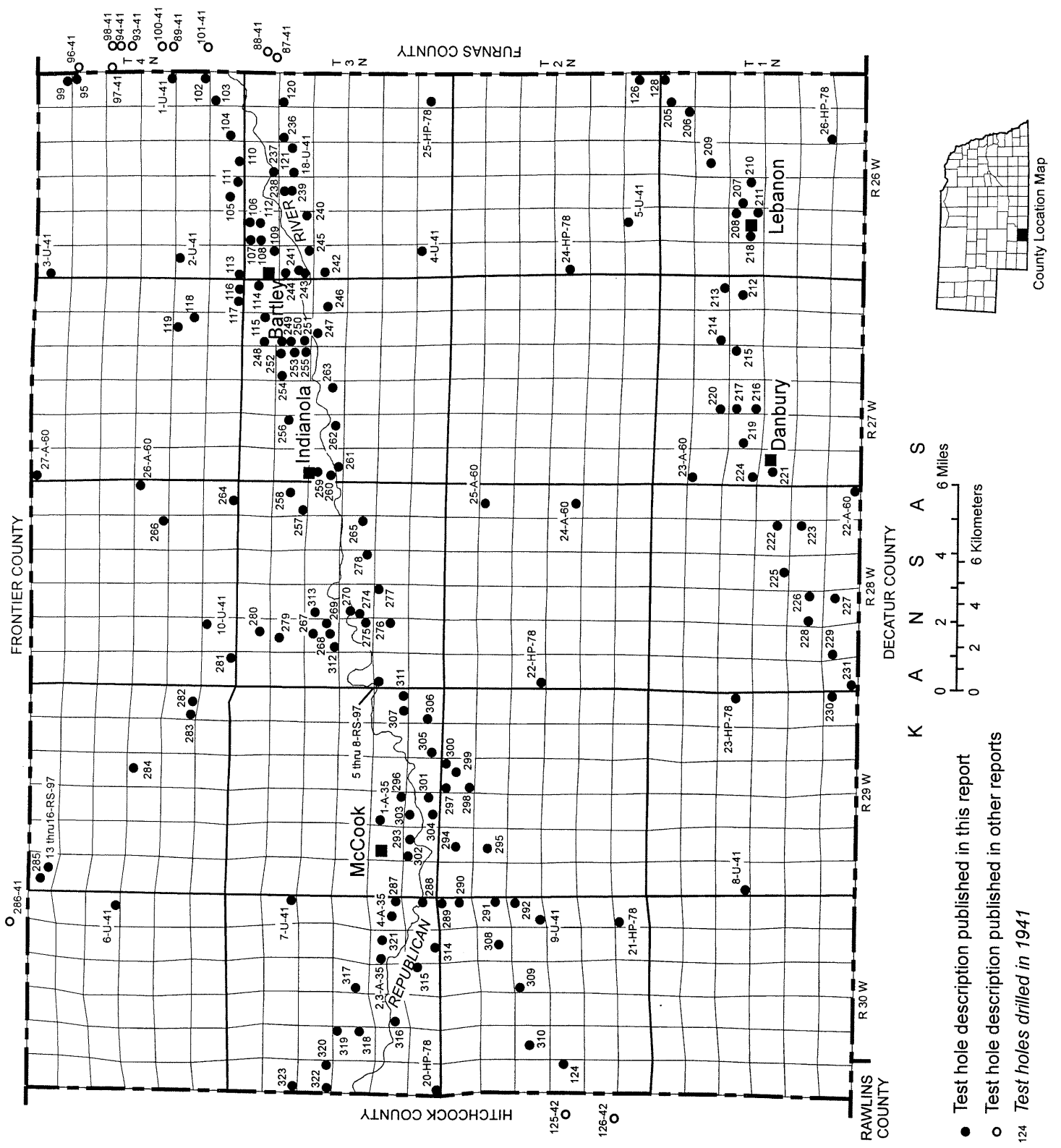


Fig. 1. Test-hole location map of Red Willow County.

Figure 2a. Red Willow County sample geophysical log (20-HP-78)

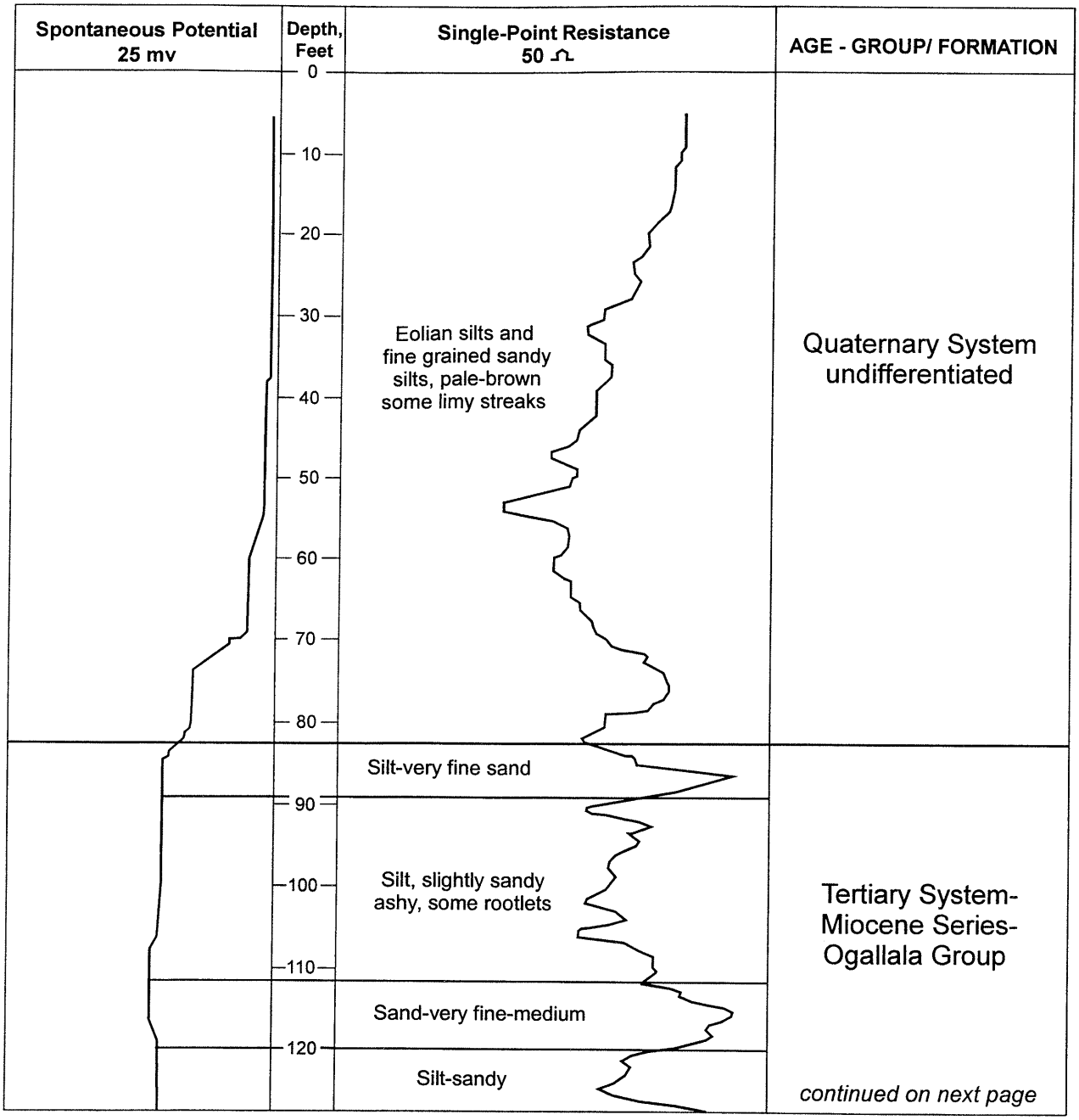


Figure 2a continued. Red Willow County sample geophysical log (20-HP-78)

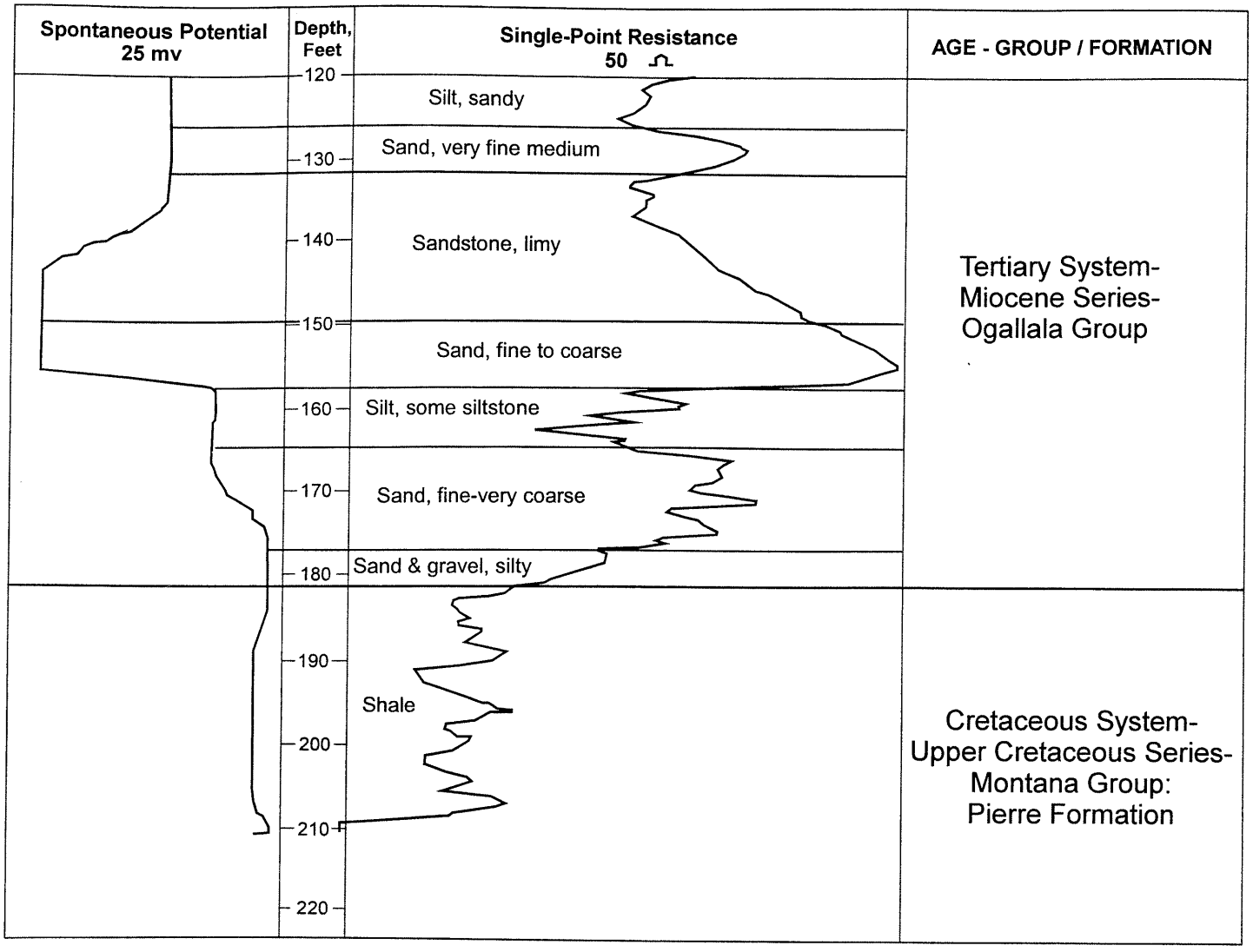


Figure 2b. Red Willow County sample geophysical log (25-HP-78)

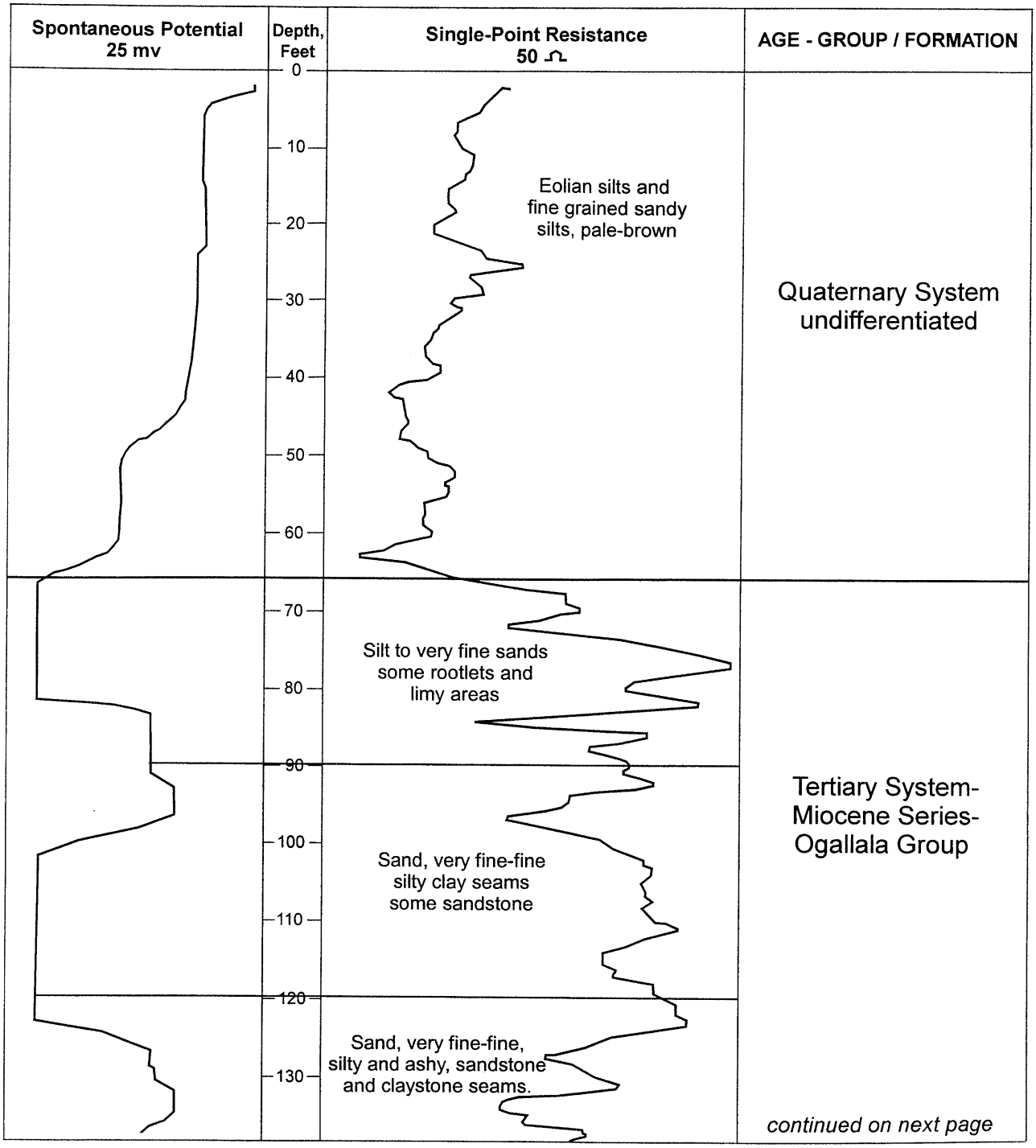
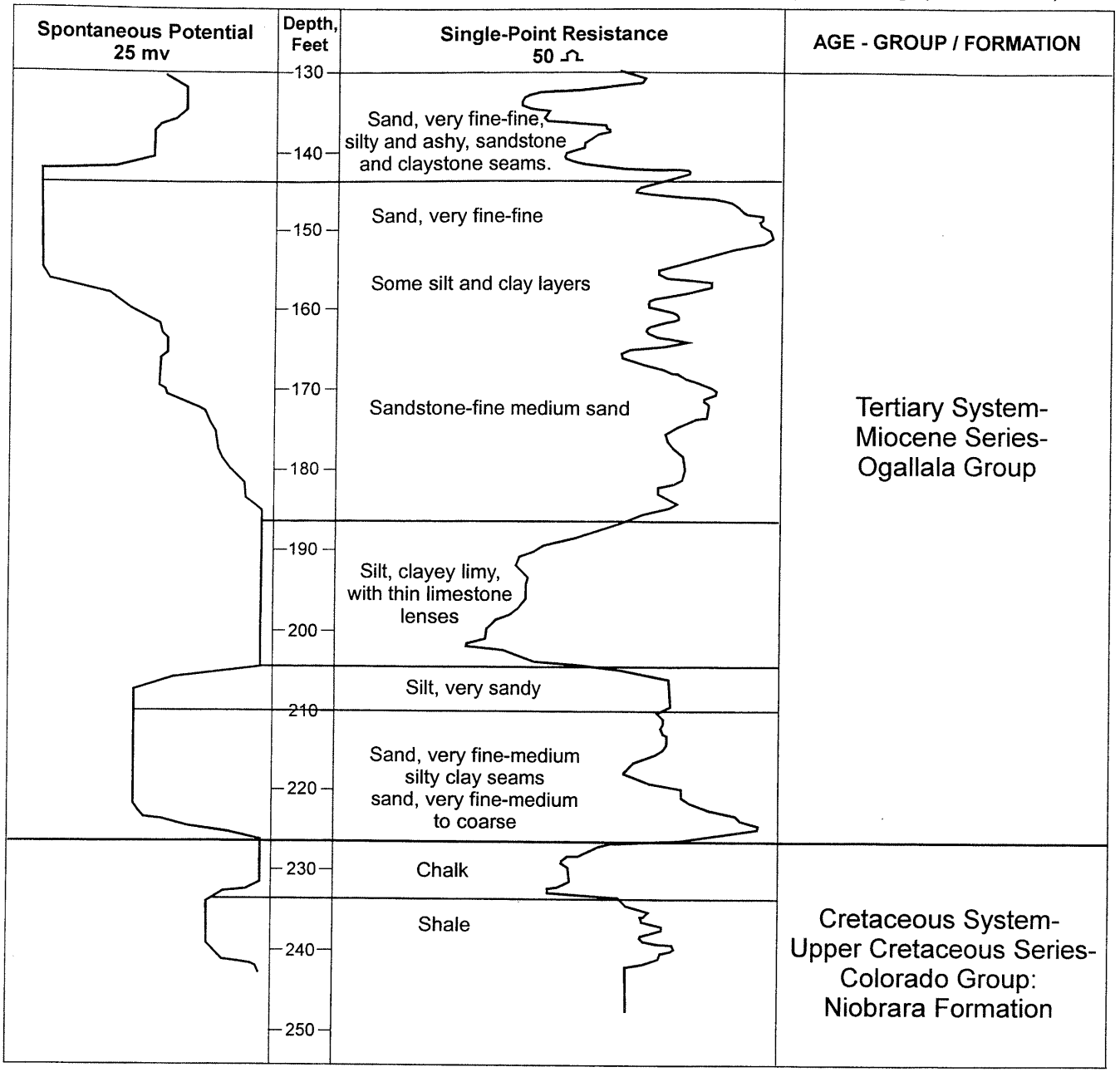


Figure 2b continued. Red Willow County sample geophysical log (25-HP-78)



The method whereby the altitude of the land surface at test hole sites was determined is indicated in the heading of each log, as follows: a = altimeter, h = hand leveling, i = spirit leveling, t = estimated from topographic map. For each test hole log, the name of the 7.5 minute USGS topographic map on which the hole is located is also included in the heading.

The test-hole records accurately reflect subsurface conditions only at the locations where the test holes were drilled. Interpretive data reflecting probable subsurface conditions between test-holes are being compiled for publication in county reports and are available for inspection in the office of the Conservation and Survey Division.

Each test hole is identified by a number assigned in the field (for example #5-U-41, #297-41), and most are also identified by a number indicating their location within the land divisions of the U.S. Bureau of Land Management's survey of Nebraska. Location numbers of test holes east of the 6th principal meridian, which passes through Columbus in a north-south direction, are preceded by the capital letter A; those west of the principal meridian have no preceding letter. The first numeral indicates the township, the second the range, and the third the section. As shown in figure 3, the letters that follow the section number indicate the location of the test hole within the section, the first letter indicating the quarter section and the second letter indicating the quarter-quarter section and so on to the quarter-quarter-quarter-quarter section. The letters A, B, C, and D are applied in counterclockwise direction beginning with A in the northeast quadrant. The last numeral is the serial number of the test hole within the quarter-quarter-quarter-quarter section and is only utilized if more than one test hole is present in that area. This system of identification is also utilized by the USGS.

Another way of indicating a legal location for a test-hole is shown on figure 3. For example, 5N-4E-15CADC, could also be described as SW SE NE SW Section 15, T 5N, R4E; that is, the test hole is located in the Southwest quarter of the Southeast quarter of the Northeast quarter of the Southwest quarter of Section 15, Township 5 North, Range 4 East. This method to describe the subdivision of a section is used by most other people and agencies, including the CSD. Both methods are shown in Figure 3.

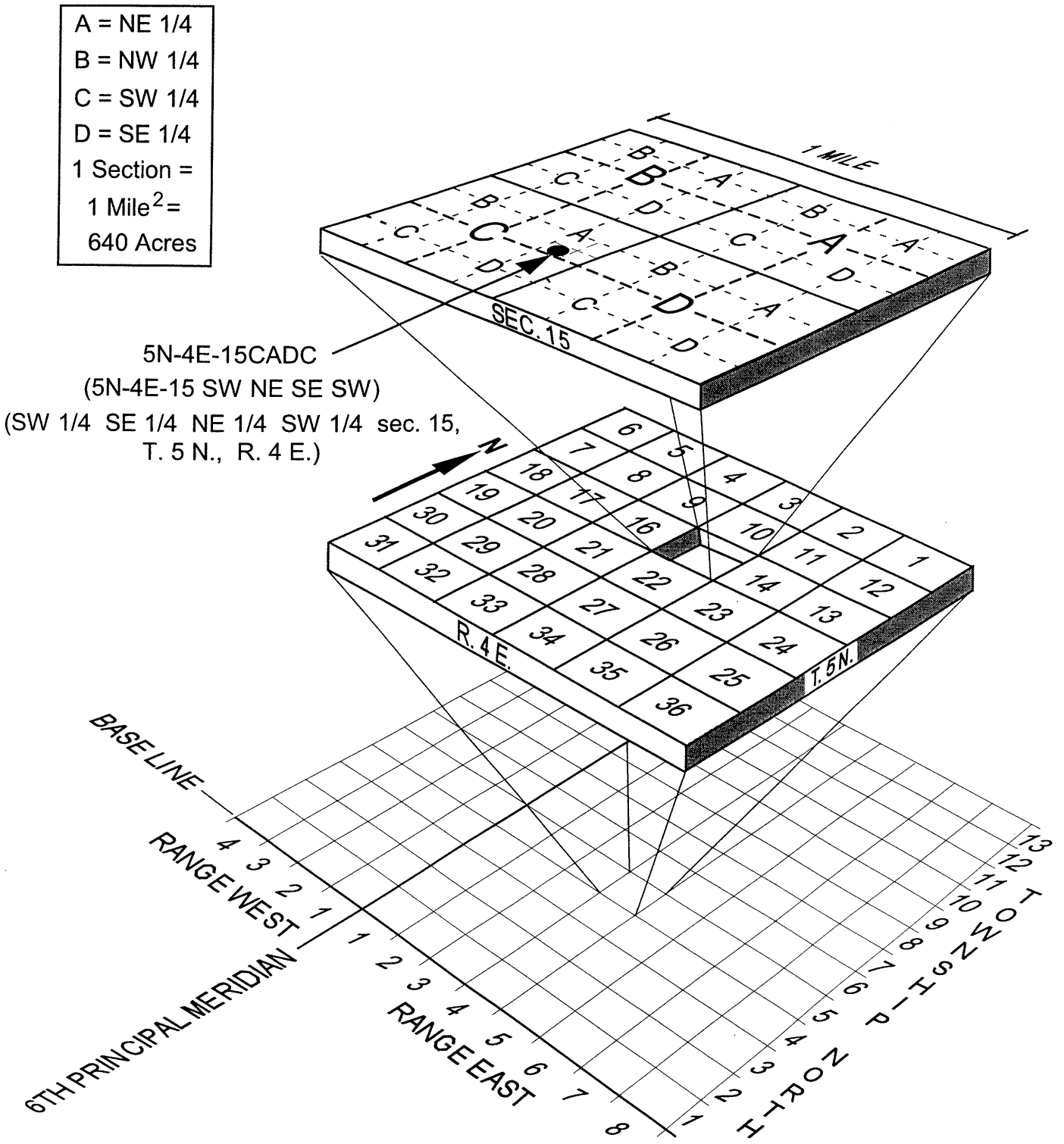


Fig. 3. System for identifying test-hole according to its location.

SELECTED REFERENCES

A few of the most recently published selected references to geology, soils and groundwater resources of Red Willow County, Nebraska, are included below. The interested reader may find citations to earlier published studies noted in these references.

Some Publications That Are Guides to
Earth Resources of Red Willow County

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Waite, H. A., Reed, E. C., and Jones, D. S., *Ground Water in the Republican River Basin in Nebraska: Part III, Red Willow and Frontier Counties, Nebraska*. Water Resources Survey, Water Supply Paper 1, Conservation and Survey Division, University of Nebraska-Lincoln, 1945.

Red Willow County
Test-Hole Table of Contents

Test-holes are arranged in this publication by township, range and section.

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Test-Hole Table of Contents

Arranged by year drilled, test-hole number.

1935

1941

1960

1978

1997

Test Hole #128-41
(1-26-1aaaa)
Red Willow County

Location: NE NE NE NE sec. 1, T. 1 N., R. 26 W.; in line with west edge of north and south road, on south edge of road.
Ground elevation: 2,347 feet (t). (Shippee 7.5 min. quadrangle)
Depth to water: 19.1 ft., (8-4-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	1.0
Clay, dark buff	1.0	23.0
Gravel, medium, red; clean	23.0	42.0
Clay, hard, tan	42.0	43.0
Gravel, medium, red; some clay and chalky material	43.0	47.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, sandy, tan	47.0	52.0
Gravel, coarse, red; some clay and broken limestone, hard brittle rock at 52 to 53 feet, buff to rusty color	52.0	74.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, cream colored, light tan, pink	74.0	83.0
Shale, khaki colored, olive drab	83.0	89.0

Test Hole #205-41
(1-26-1bcbb)
Red Willow County

Location: NW NW SW NW sec. 1, T. 1 N., R. 26 W.; 300 feet north of C. B. & Q. Railroad, on east edge of road.
Ground elevation: 2,352 feet (t). (Shippee 7.5 min. quadrangle)
Depth to water: 14.3 ft., (8-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown clay	0.0	5.0
Clay, khaki brown; not very compact	5.0	9.0
Clay, sandy, dark brown	9.0	17.0
Clay, sandy, light gray; somewhat granular	17.0	22.0
Gravel, medium, reddish green; not very compact	22.0	39.0
Gravel, medium, compact, green; contains compact green argillaceous sands	39.0	55.0
Tertiary System - Miocene Series - Ogallala Group:		
Gravel, medium, green; intermingled with very compact calcareous clays	55.0	65.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Rock	65.0	65.1

Test Hole #206-41
(1-26-2dddd)
Red Willow County

Location: SE SE SE SE sec. 2, T. 1 N., R. 26 W.; 35 feet north of north end of bridge, on west edge of road.
Ground elevation: 2,349 feet (t). (Shippee 7.5 min. quadrangle)
Depth to water: 6 ft., (8-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, black	0.0	5.0
Clay, dark brown	5.0	9.0
Gravel, fine to medium, reddish and white	9.0	16.0
Gravel, coarse, red	16.0	28.0
Clay, sandy, greenish gray	28.0	34.0
Gravel, medium to coarse; some pebbles	34.0	46.0
Sand, argillaceous; some limy material and medium gravel, quite compact	46.0	55.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, arenaceous, very compact, greenish gray	55.0	67.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, buff	67.0	68.0
Shale, very compact, dark khaki colored	68.0	69.0

Test Hole #209-41
(1-26-10bddd)
Red Willow County

Location: SE SE SE NW sec. 10, T. 1 N., R. 26 W.; 240 feet west of C. B. & Q. Railroad, on north edge of road.
Ground elevation: 2,378 feet (t). (Shippee 7.5 min. quadrangle)
Depth to water: 24.3 ft., (8-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown clayey sand.....	0.0	6.0
Sand, clayey, soft, brown to buff.....	6.0	16.0
Sand, clayey, soft, light brown.....	16.0	26.0
Sand and gravel, fine; poor sample.....	26.0	29.0
Gravel, fine to coarse, red; fairly compact.....	29.0	35.0
Tertiary System - Oligocene Series - White River Formtion:		
Sand, cemented, brownish; cuts in chips, resembles sandstone.....	35.0	42.0
Clay, sandy, brown to greenish.....	42.0	44.0
Sand, cemented, gray; hard, compact, practically sandstone.....	44.0	50.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Rock, flint, hard, tan.....	50.0	50.0

Test Hole #207-41
(1-26-16bccc)
Red Willow County

Location: SW SW SW NW sec. 16, T. 1 N., R. 26 W.; 180 feet north of southwest corner, on east edge of road.
Ground elevation: 2,390 feet (t). (Lebanon 7.5 min. quadrangle)
Depth to water: 23.5 ft., (8-25-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	2.0
Sand, clayey, buff	2.0	8.0
Sand, coarse; cemented with pinkish buff clay	8.0	13.0
Sand, coarse, and fine gravel, compact	13.0	16.0
Gravel, fine to coarse, compact; contains water-worn limy shale	16.0	20.0
Gravel, fine to coarse, reddish; clean, compact	20.0	26.0
Gravel, coarse; some flinty boulders, very hard	26.0	28.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Rock, flint, tan; very hard, drilled only a little over one inch in 20 minutes	28.0	28.1

Test Hole #210-41
(1-26-16daaa)
Red Willow County

Location: NE NE NE SE sec. 16, T. 1 N., R. 26 W.; 120 feet south of northeast corner of section, on west edge of road.
Ground elevation: 2,395 feet (t). (Lebanon 7.5 min. quadrangle)
Depth to water: 33.9 ft., (8-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Clay, blackish brown.....	0.0	2.0
Clay, sandy, dark buff; fairly compact.....	2.0	36.0
Gravel, medium to coarse, reddish brown; quite compact.....	36.0	47.0
Clay, buff.....	47.0	59.0
Tertiary System - Oligocene Series - White River Formation:		
Clay, very sandy, buff; compact, like sandstone.....	59.0	64.0
Clay, limy, quite hard, khaki colored.....	64.0	69.0
Gravel, argillaceous, limy, brown.....	69.0	81.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Rock, flinty, very hard.....	81.0	81.1

Test Hole #208-41
(1-26-17aadd)
Red Willow County

Location: SE SE NE NE sec. 17, T. 1 N., R. 26 W.; 0.3 mile north of southeast corner of quarter, 250 feet south of Beaver Creek bridge, on west edge of road.
Ground elevation: 2,382 feet (t). (Lebanon 7.5 min. quadrangle)
Depth to water: 14 ft., (8-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and gray brown clayey sand.....	0.0	6.0
Gravel, fine, reddish; compact, poor.....	6.0	18.0
Gravel, fine to coarse, greenish gray.....	18.0	26.0
Clay or shale, black, silty.....	26.0	28.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, calcareous, khaki colored to pink; breaks in chips, very hard, some flint chips.....	28.0	30.0
Shale, tannish rusty to white to pink.....	30.0	39.0
Shale, ochre colored.....	39.0	43.0
Flint, rusty to reddish.....	43.0	44.0
Shale, tan.....	44.0	48.0
Shale, pink to brick red.....	48.0	49.0

Test Hole #211-41
(1-26-17ddaa)
Red Willow County

Location: NE NE SE SE sec. 17, T. 1 N., R. 26 W.; 150 feet south of northeast corner of forty, on west edge of road.
Ground elevation: 2,419 feet (t). (Lebanon 7.5 min. quadrangle)
Depth to water: 20 ft., (8-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown sandy clay.....	0.0	6.0
Clay, sandy, dark brown to black.....	6.0	11.0
Sand, clayey, chocolate brown.....	11.0	13.0
Clay, brown to buff.....	13.0	14.0
Clay, silty, sandy, buff.....	14.0	44.0
Gravel, fine to coarse, red; fairly compact.....	44.0	54.0
Clay, sandy, brownish buff to rusty.....	54.0	56.0
Gravel, fine to coarse, reddish; fairly compact.....	56.0	65.0
Gravel, coarse; some red flinty to calcareous shale boulders.....	65.0	67.0
Clay, sandy, compact, grayish green.....	67.0	74.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, white to cream colored to pink the last few feet; sticky.....	74.0	79.0

Test Hole #218-41
(1-26-17cbaa)
Red Willow County

Location: NE NE NW SW sec. 17, T. 1 N., R. 26 W.; 0.3 mile west of southeast corner of quarter, 430 feet west of Beaver Creek bridge, on north edge of road.
Ground elevation: 2,392 feet (t). (Lebanon 7.5 min. quadrangle)
Depth to water: 10.2 ft., (8-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	4.0
Sand, clayey, silty, soft, brownish buff	4.0	9.0
Gravel, fine to coarse, reddish	9.0	17.0
Gravel, fine to medium, some coarse, gray; some silt	17.0	24.0
Silt, gray	24.0	25.0
Gravel, coarse, gray	25.0	29.0
Silt, gray	29.0	31.0
Gravel, fine to coarse, brown rusty gray; some water-worn shale, flint, loose	31.0	36.0
Gravel, compact, brown; much water-worn shale, lime, flint	36.0	39.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, tough, khaki colored to gray; very sticky	39.0	49.0

Test Hole #26-HP-78
(1-26-26cccc)
Red Willow County

Location: SW SW SW SW sec. 26, T. 1 N., R. 26 W., 70 feet east of the SW corner of the section and 22 feet north of center of county road.
Ground elevation: 2,542 feet (t). (Shippee 7.5 min. quadrangle)
Depth to water: 155 ft. est. (from W. T. map).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Topsoil, silt, brown to 2 ft then light brown to tan, weathered to 5 ft, occasional snail shells..	0.0	5.0
Silt, very sandy, fine to very fine, yellowish tan.	5.0	25.0
Silt, slightly sandy, very fine, brown, some limy streaks, (possibly Gilman Canyon?).....	25.0	28.0
Silt, slightly sandy, very fine, very pale brown, some limy streaks, very calcareous and pale brown to white between 31 to 34 ft and 37.5 to 39 ft...	28.0	42.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy, fine to very fine, very pale brown, calcareous.....	42.0	56.0
Silt, very ashy, white.....	56.0	58.0
Silt, some very fine sand, some siliceous very fine grained sandstone, very pale brown, limy below 58 ft, some very fine to fine sand.....	58.0	70.0
Silt, sandy, very fine to fine, pale brown, some lime streaks, very sandy below 75 ft.....	70.0	80.0
Siltstone, very clayey, white, slightly calcareous.	80.0	83.0
Silt, clayey, some siltstone and very fine grained sandstone, calcareous, some siliceous very fine grained, very pale brown sandstone 86 to 90 ft with intermittent lenses of very fine grained sand, clayey siltstone, white to very pale brown below 90 ft.....	83.0	108.0
Silt, very fine sand, some medium, limy white to very pale brown, calcareous, some siltstone and sandstone, very ashy between 119.5 to 121 ft.....	108.0	124.0
Sand to sandstone, very fine to fine, occasional medium.....	124.0	127.0
Silt to siltstone, slightly clayey and ashy, white to very pale brown.....	127.0	130.0
Sand and gravel, fine sand to coarse gravel, clayey and silty below 136 ft.....	130.0	143.0
Silt, clayey, some very fine sand, very pale brown, very clayey below 145 ft, some ash shards and white to very pale brown below 147 ft.....	143.0	150.0

Silt, clayey, some very fine sand, limy, some siltstone and very fine to fine sandstone lenses, occasional medium sand, very pale brown to white.	150.0	161.0
Sand, very fine to fine, very silty and moderately limy.....	161.0	165.0
Silt, sandy and slightly clayey, some siltstone, very pale brown to white.....	165.0	172.0
Sand, very fine to coarse, very silty, some fine sandstone, very coarse below 175 ft with some medium gravel.....	172.0	179.0
Siltstone to claystone, very limy and hard, white..	179.0	180.0
Sand, very fine to coarse.....	180.0	186.0
Siltstone to claystone, sandy, very pale brown with some greenish tan.....	186.0	199.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chert, light brown, some dark brown.....	199.0	199.5

Test Hole #23-A-60
(1-27-7bbba)
Red Willow County

Location: NE NW NW NW sec. 7, T. 1 N., R. 27 W.
Ground elevation: 2,595 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 150 ft. est., (7-20-60).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, sandy, very fine to fine, dark brown to gray	0.0	2.4
Silt, sandy, very fine to fine, pale brown, slightly calcareous, occasional snails and shells 9 to 10 ft, few medium sand grains below 10 ft	2.4	32.5
Silt, sandy, fine to very fine, limy streaks, pale brown to 34 ft then very pale brown, marly and white from 39.6 to 47.5 ft, some fine to coarse sand grains below 47.5 ft	32.5	51.5
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey and sandy, fine to very fine, some medium and coarse sand grains, white with some interbedded very fine to medium sandstone, light gray with some medium grains 55 to 57 ft, mottled pink and light gray 57.5 to 60 ft, marly contains siliceous lenses	51.5	61.0
Silt, very sandy and marly, sand is very fine to medium, some coarse grains, very calcareous, white, light grayish white below 67 ft, some siliceous lenses 70 to 75 ft, some rootlets and coarse sand grains, very silty to siltstone 70 to 83 ft, fine medium grained below 80 ft	61.0	83.0
Silt, clayey and sandy, very fine to fine, some siltstone and claystone lenses, light gray to white	83.0	88.0
Sand, very fine to fine	88.0	92.0
Silt, slightly clayey, slightly sandy, very fine; some manganese staining, very pale brown to slightly to moderately calcareous	92.0	94.5
Sand, very fine to fine, some medium grains, rare rootlets	94.5	95.0
Claystone and siltstone interbedded, white to olive gray, moderately calcareous, some siliceous areas, very fine to fine grained siltstone olive gray 103 to 105 ft, very sandy siltstone very fine to fine, some medium, some very fine to fine sand lenses 105 to 113 ft, occasional rootlets	95.0	115.0
Sand, very fine to medium, some coarse grains, contains some rootlets	115.0	126.0

Siltstone, very fine to fine, light gray to white, slightly clayey, marly, some very fine to fine sandstone.....	126.0	131.0
Sand, fine to coarse, some fine gravel, fine sand to fine gravel below 135 ft, some thin marly lenses and fine sand to medium gravel below 138 ft, clayey with some siltstone to sandstone very fine to fine lenses below 140 ft, very marly 152.8 to 153.8 ft, fine to coarse gravel 153.8 to 155 ft, then very fine to medium sand.....	131.0	164.0
Silt, sandy, very fine to fine, marly, contains very fine to medium sand, light gray to white to 169 ft, then very silty and slightly clayey.....	164.0	186.0
Sand, very fine to medium, some coarse sand and rare fine gravel, very silty 189.9 to 190.1 ft and 190.5 to 191.5 ft, pinkish-white.....	186.0	192.5
Clay, silty, light gray to pale brown, light gray to white 195 to 196 ft, some very fine sand below 196 ft.....	192.5	200.3
Sand and gravel, fine sand to very coarse gravel, reddish, some reworked flint and shale below 204.6 ft.....	200.3	205.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, weathered, yellow to tan, some manganese staining and some thin bentonite lenses.....	205.0	210.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, very pale brown to yellow, some white.....	210.0	217.7
Shale, slightly bentonitic, light brownish gray to 218.2 ft then very pale brown to light yellow, bluish gray below 220 ft, calcareous.....	217.7	230.0

Test Hole #220-41
(1-27-9ccbc)
Red Willow County

Location: SW NW SW SW sec. 9, T. 1 N., R. 27 W.; 0.15 mile north of southwest corner of section, 65 feet south of Beaver Creek bridge, on east edge of road.
Ground elevation: 2,442 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 11.8 ft., (8-25-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	2.0
Sand, silty, clayey, soft, brown	2.0	19.0
Gravel, fine to medium, grayish red; thin gray layer at 25 feet	19.0	28.0
Silt, gray	28.0	30.0
Tertiary System - Miocene Series - Ogallala Group:		
Gravel, fine to coarse, greenish gray	30.0	36.0
Clay, compact, tannish pink	36.0	42.0
Lime, soft, very white	42.0	48.0
Clay, tough, compact, light grayish tan	48.0	55.0
Sand, clayey, greenish gray; some coarse sand, soft.	55.0	60.0
Clay, slightly sandy, compact, gray	60.0	70.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, compact, tannish yellow for about one foot, then khaki colored to dark olive brown	70.0	74.0

Test Hole #214-41
(1-27-11ccbb)
Red Willow County

Location: NW NW SW SW sec. 11, T. 1 N., R. 27 W.; 0.2 mile north of southwest corner of section, 40 feet south of north edge of cemetery, on east edge of road.
Ground elevation: 2,446 feet (t). (Lebanon 7.5 min. quadrangle)
Depth to water: caved at 10 ft., (4-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	4.0
Clay, silty, sandy, buff	4.0	26.0
Clay, sandy, reddish buff	26.0	31.0
Sand, clayey, limy, light gray	31.0	34.0
Gravel, fine to coarse, red	34.0	38.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Rock, flinty, rusty	38.0	39.0
Rock, flint, hard, red	39.0	40.0

Test Hole #213-41
(1-27-12dccb)
Red Willow County

Location: NW SW SW SE sec. 12, T. 1 N., R. 27 W.; 0.10 mile north of southwest corner of quarter, 0.6 mile north of highway, on east side of road.
Ground elevation: 2,404 feet (t). (Lebanon 7.5 min. quadrangle)
Depth to water: 7.1 ft., (4-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	4.0
Clay, blackish brown	4.0	10.0
Gravel, fine to medium, brownish red	10.0	20.0
Gravel, fine to medium, fairly compact, green	20.0	25.0
Gravel, coarse, green and red	25.0	29.0
Gravel, medium, greenish	29.0	31.0
Clay, fairly compact, yellowish orange	31.0	39.0
Gravel, medium, greenish	39.0	41.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Clay, fairly compact, ochre yellow	41.0	45.0
Clay, salmon pink; quite compact, shale	45.0	52.0
Clay, ochre yellow; quite compact, shale	52.0	67.0
Shale, olive drab	67.0	69.0

Test Hole #212-41
(1-27-13bdad)
Red Willow County

Location: SE NE SE NW sec. 13, T. 1 N., R. 27 W.; 295 feet north of C. B. & Q. Railroad, on west edge of road.
Ground elevation: 2,409 feet (t). (Lebanon 7.5 min. quadrangle)
Depth to water: 16.5 ft., (8-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, dark brown clayey material.....	0.0	9.0
Clay, buff; very slightly sandy.....	9.0	17.0
Sand, fine to medium, reddish cast.....	17.0	27.0
Gravel, medium to coarse, white and green.....	27.0	32.0
Clay, sandy, hard, buff.....	32.0	35.0
Gravel, medium to coarse; some pebbles.....	35.0	41.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Clay, chalky, yellow ochre to bright orange.....	41.0	63.0
Shale, brown khaki colored.....	63.0	66.0
Shale, light gray-blue.....	66.0	67.0

Test Hole #215-41
(1-27-15aada)
Red Willow County

Location: NE SE NE NE sec. 15, T. 1 N., R. 27 W.; 0.15 mile south of northeast corner of section, 50 feet south of steel bridge over old channel of creek, on west edge of road.
Ground elevation: 2,426 feet (t). (Lebanon 7.5 min. quadrangle)
Depth to water: 11 ft., (8-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown clayey sand.....	0.0	5.0
Clay, silty, sandy, brown.....	5.0	11.0
Sand, silty, brown; many fossil stems.....	11.0	17.0
Silt and gravel, gray.....	17.0	21.0
Gravel, fine to coarse, grayish green.....	21.0	30.0
Clay, silty, black.....	30.0	32.0
Gravel, fine to coarse, loose, greenish grayish red.	32.0	40.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, ochre to yellow to red.....	40.0	47.0
Shale, red.....	47.0	49.0

Test Hole #216-41
(1-27-16ccbc)
Red Willow County

Location: SW NW SW SW sec. 16, T. 1 N., R. 27 W.; 0.1 mile north of southwest corner of section, 315 feet north of concrete bridge over small drainage, 0.4 mile south of railroad, on east edge of road.
Ground elevation: 2,460 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 27.9 ft., (8-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	4.0
Clay, sandy, brown to buff	4.0	27.0
Sand, silty, gray; rusty streaks	27.0	49.0
Sand and gravel, fine, very compact, silty	49.0	56.0
Gravel, fine to coarse, slightly compact, red	56.0	69.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, greenish gray; some embedded fine gravel, tough, sticky	69.0	82.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Clay, greenish gray, dark green streaks; tough, sticky, shale	82.0	85.0
Shale, tough, khaki colored to dark brownish	85.0	88.0

Test Hole #217-41
(1-27-16bbcc)
Red Willow County

Location: SW SW NW NW sec. 16, T. 1 N., R. 27 W.; 0.25 mile north of railroad, on east edge of road.
Ground elevation: 2,437 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 8.9 ft., (8-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	4.0
Clay, sandy, brownish buff	4.0	8.0
Sand and gravel, fine, reddish	8.0	16.0
Gravel, fine to medium, greenish gray	16.0	19.0
Gravel, gray; much silty clay, wood fragments at 19 feet	19.0	26.0
Gravel, fine to coarse, loose, grayish red	26.0	34.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, hard, sticky, greenish gray	34.0	36.0
Clay, tough, sticky, tan	36.0	38.0
Clay, sandy, reddish brown; hard, looks like sandstone	38.0	43.0
Clay, sandy, compact, brownish gray	43.0	48.0
Clay, tough, sticky, greenish gray	48.0	60.0
Clay, tough, sticky, greenish gray; tougher than above	60.0	66.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, tan to green	66.0	67.0
Shale, tough, khaki colored to dark brownish black	67.0	69.0

Test Hole #219-41
(1-27-17bccc)
Red Willow County

Location: SW SW SW NW sec. 17, T. 1 N., R. 27 W.; 0.48 mile north of southwest corner of section, 390 feet south of bridge over small drainage, on west edge of road.
Ground elevation: 2,449 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 9.5 ft., (8-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	4.0
Sand, silty, soft, brown	4.0	14.0
Sand and fine gravel, silty	14.0	17.0
Gravel, fine to coarse, greenish and red, silty clay layer at 24 feet	17.0	33.0
Gravel, fine to coarse; black and gray silt, either thin seams or present throughout	33.0	37.0
Gravel, coarse, loose, brownish gray	37.0	44.0
Gravel, fine to coarse, brown	44.0	50.0
Sand and fine gravel, red; limy sand concretions, caliche sand grains cemented with lime, fairly loose	50.0	71.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, sandy, compact, light brown to tan to gray	71.0	77.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, ochre to light grayish tan at base	77.0	79.0

Test Hole #224-41
(1-27-18ccdd)
Red Willow County

Location: SE SE SW SW sec. 18, T. 1 N., R. 27 W.; .25 mile east of southwest corner of section, 270 feet west of farm lane to the north, on north edge of road.
Ground elevation: 2,453 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 3.4 ft., (8-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	3.0
Sand, silty, soft, brown	3.0	8.0
Sand, silty, soft, brownish gray	8.0	14.0
Gravel, fine to medium, loose, red	14.0	20.0
Gravel, fine to medium, greenish, red; dirty, silty clay layer at 20 feet	20.0	28.0
Silt, black	28.0	30.0
Gravel, fine to coarse, reddish gray, loose	30.0	37.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, weathered, light green	37.0	38.0
Shale, ochre, a few red streaks	38.0	45.0
Shale, khaki to dark olive brown	45.0	48.0

Test Hole #221-41
(1-27-19bddc)
Red Willow County

Location: SW SE SE NW sec. 19, T. 1 N., R. 27 W.; 315 feet west of railroad, on east and west road just west of highway, on north side of road.
Ground elevation: 2,461 feet (t). (Danbury 7.5 min. quadrangle)
Depth to Water: 13.6 ft., (8-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	3.0
Clay, silty, brownish black	3.0	10.0
Clay, sandy, brownish black	10.0	24.0
Clay, sandy, brownish black, some fossilized material	24.0	31.0
Gravel, medium, reddish brown; not very compact	31.0	38.0
Flinty layer, olive green boulder?	38.0	39.0
Gravel, coarse, reddish brown; quite loose	39.0	48.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, weathered, khaki brown	48.0	59.0
Shale, olive drab	59.0	65.0
Shale, black	65.0	68.0

Test Hole #225-41
(1-28-22dccc)
Red Willow County

Location: SW SW SW SE sec. 22, T. 1 N., R. 28 W.; 50 feet east of southwest corner of quarter on north edge of road.
Ground elevation: 2,497 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 27.4 ft., (8-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown sandy soil.....	0.0	5.0
Clay, silty, sandy, buff.....	5.0	28.0
Sand, clayey, grayish buff.....	28.0	38.0
Gravel, fine to coarse, red; fairly compact.....	38.0	50.0
Boulders or gravel, embedded in clay.....	50.0	51.0
Gravel, fine, medium, coarse, compact, reddish.....	51.0	60.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light gray to tan to rusty brown; tough, compact, sticky.....	60.0	68.0

Test Hole #222-41
(1-28-23daad)
Red Willow County

Location: SE NE NE SE sec. 23, T. 1 N., R. 28 W.; 550 feet south of northeast corner of quarter, on west edge of road.
Ground elevation: 2,477 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 19.1 ft., (8-28-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and dark brown sandy clay.....	0.0	5.0
Sand, soft, clayey, buff.....	5.0	20.0
Sand, clayey, buff to brown; small amount of gravel.	20.0	27.0
Sand and fine gravel, very compact, gray.....	27.0	30.0
Gravel, fine to coarse, reddish; slightly compact...	30.0	44.0
Gravel, fine, medium, coarse, reddish; some water-worn shale, fairly compact,.....	44.0	54.0
Cretaceous System - Upper Cretaceous Series - Montana Goup:		
Pierre Formation:		
Shale, plastic, tough, light gray.....	54.0	55.0
Shale, rusty colored to gray; very sticky, tough, plastic.....	55.0	59.0

Test Hole #223-41
(1-28-26adaa)
Red Willow County

Location: NE NE SE NE sec. 26, T. 1 N., R. 28 W.; 0.25 mile south of northeast corner of section, 0.1 mile north of highway, 0.1 mile south of present channel of Beaver Creek, on west edge of road.
Ground elevation: 2,467 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 4.2 ft., (8-28-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and dark brown clayey soil.....	0.0	5.0
Sand, clayey, soft, brown.....	5.0	9.0
Sand, clayey, gray; some fine gravel, loose.....	9.0	13.0
Sand and fine gravel, silty, gray.....	13.0	18.0
Gravel, fine to coarse, loose; greenish grayish red.	18.0	30.0
Gravel, fine to coarse, green, gray, red; more coarse than above.....	30.0	35.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, hard, olive gray to dark gray, slight greenish cast.....	35.0	39.0

Test Hole #226-41
(1-28-28daad)
Red Willow County

Location: SE NE NE SE sec. 28, T. 1 N., R. 28 W.; 0.38 mile north of southeast corner of section, on west edge of road.
Ground elevation: 2,477 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 12.5 ft., (8-28-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	4.0
Sand, fine, clayey, brownish buff	4.0	9.0
Sand, soft, clayey, dark brownish gray	9.0	14.0
Gravel, fine to medium, reddish, loose; much sand	14.0	18.0
Clay, silty, gray	18.0	20.0
Gravel, fine to coarse, grayish red	20.0	27.0
Silt, dark gray	27.0	29.0
Gravel, fine to coarse, reddish gray	29.0	37.0
Gravel, fine to coarse, compact, reddish brown	37.0	39.0
Cretaceous System - Upper Cretaceous Series - Montana Goup:		
Pierre Formation:		
Shale, light gray, rusty streaks giving part of shale a tan color; tough, plastic, sticky	39.0	48.0

Test Hole #228-41
(1-28-28cbbc)
Red Willow County

Location: SW NW NW SW sec. 28, T. 1 N., R. 28 W.; 0.43 mile north of southwest corner of section, on east edge of road.
Ground elevation: 2,532 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 47.0 ft., (8-28-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	5.0
Sand, silty, clayey, buff; loess-like	5.0	27.0
Sand, silty, clayey, dark buff; loess-like	27.0	35.0
Sand, clayey, reddish buff	35.0	41.0
Sand, clayey, coarse, soft, grayish buff	41.0	43.0
Gravel, fine to coarse, red; somewhat compact, some black gravel	43.0	55.0
Gravel, medium to coarse, some fine, red; some black gravel	55.0	60.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, tough, plastic, sticky, tan to light gray	60.0	65.0

Test Hole #231-41
(1-28-31cccc)
Red Willow County

Location: SW SW SW SW sec. 31, T. 1 N., R. 28 W.; 60 feet north of southwest corner of section, on east edge of road.
Ground elevation: 2,515 feet (t). (McCook SE 7.5 min. quadrangle)
Depth to water: 6.5 ft., (8-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown sandy soil to brown buff sandy clay.....	0.0	9.0
Sand, clayey, soft, buff.....	9.0	14.0
Sand and fine gravel; very poor sample.....	14.0	16.0
Gravel, fine to coarse, loose, reddish.....	16.0	20.0
Gravel, medium to coarse, reddish, some green.....	20.0	25.0
Gravel, coarse, very loose, greenish, some red.....	25.0	30.0
Gravel, coarse, greenish and red; slightly finer than above, loose.....	30.0	34.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, tough, compact, dark lead gray.....	34.0	38.0

Test Hole #229-41
(1-28-32bcbc)
Red Willow County

Location: SW NW SW NW sec. 32, T. 1 N., R. 28 W.; 0.35 mile south of northwest corner of section, just south of where creek used to cross road, on east edge of road.
Ground elevation: 2,504 feet (t). (McCook SE 7.5 min. quadrangle)
Depth to water: 6.9 ft., (8-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, dark brown sandy soil.....	0.0	4.0
Sand, clayey, light brown.....	4.0	8.0
Sand, clayey, grayish brown; somewhat granular, sticky.....	8.0	14.0
Silt, sand; poor sample.....	14.0	18.0
Gravel, fine to medium, some coarse, reddish; fair..	18.0	27.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light gray, rusty streaks, upper part has tan color; very tough, plastic, sticky.....	27.0	36.0

Test Hole #227-41
(1-28-33adba)
Red Willow County

Location: NE NW SE NE sec. 33, T. 1 N., R. 28 W.; 0.1 mile south of railroad at Marion depot, 180 feet north of road intersection.
Ground elevation: 2,507 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 28.8 ft., (8-28-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and dark brown sandy soil.....	0.0	5.0
Clay, silty, sandy, soft, buff; loess-like.....	5.0	18.0
Sand, clayey, soft, brown.....	18.0	23.0
Clay, sandy, dark brown; old soil.....	23.0	25.0
Clay, sandy, compact, grayish buff.....	25.0	30.0
Sand and fine gravel; poor sample.....	30.0	32.0
Gravel, fine to coarse, red.....	32.0	45.0
Gravel, fine to coarse, red; clay seam at 45 feet...	45.0	50.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light bluish gray, rusty streaks give tan color; tough, plastic.....	50.0	55.0
Shale, dark bluish gray; tough, plastic, sticky.....	55.0	59.0

Test Hole #22-A-60
(1-28-36dddd)
Red Willow County

Location: SE SE SE SE sec. 36, T. 1 N., R. 28 W., north side of Nebraska-Kansas state line, 4 feet east and 11 feet south of aluminum painted fence post.
Ground elevation: 2,624 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 155.4 ft., (7-20-60).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, some very fine sand, brown, organic to .5 ft.	0.0	2.5
Silt to very fine sand, grayish brown, possibly Brady soil	2.5	3.0
Silt, coarse, blocky, some ash shards, very pale brown, slightly clayey, contains some very fine sand below 10.5 ft, few ash shards	3.0	25.0
Silt, slightly clayey, some very fine sand, Gilman Canyon?, light gray brown	25.0	29.5
Silt, moderately clayey, some very fine to fine sand, very pale brown, some iron stain	29.5	35.0
Silt, moderately clayey, very fine to fine sand, very sandy below 37 ft with fine sand to coarse gravel	35.0	43.5
Tertiary System - Miocene Series - Ogallala Group:		
Sand and gravel, marly, light gray to white, fine sand to very coarse gravel, some silt moderately clayey, pinkish brown between 44 and 48 ft, then white and very marly	43.5	50.0
Sandstone to siltstone, very fine to medium sand, white with some light brown	50.0	58.0
Silt, moderately clayey, pale brown, some limy limestone pieces, moderately sandy below 65 ft	58.0	68.0
Sand, fine to very coarse, some fine to medium gravel and pieces of limestone	68.0	70.0
Silt to siltstone, pinkish white to very pale brown, some fine to medium sandstone, light pinkish brown, some interbedded sand very fine to fine, some rootlets	70.0	87.0
Silt to siltstone, some fine sandstone interbedded with fine to medium sand	87.0	96.0
Sand, fine to very coarse, some medium gravel to 100 ft then very fine to fine sand with few coarse grains, contains reworked limestone and medium to coarse gravel below 108 ft	96.0	114.0
Silt, slightly clayey and sandy, olive gray, rootlets, some interbeds of very fine to fine sand .5 thick	114.0	119.0

Sand very fine to fine interbedded with white silts, slightly clay and sandy.....	119.0	130.0
Sand fine to coarse, some medium gravel 135 to 140 ft, contains hard siltstone to limestone lenses at 131 and 139 ft.....	130.0	155.0
Siltstone to claystone interbedded with marly sand and gravel, white.....	155.0	170.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, weathered, very light gray, iron stained, pale tan 170 to 172 ft, dark gray below 183 and black below 185 ft.....	170.0	190.0

Test Hole #23-HP-78
(1-29-13addd)
Red Willow County

Location: SE SE SE NE sec. 13, T. 1 N., R. 29 W., 110 feet north of the SE corner of NE quarter section on west edge of road about 10 feet west of center of the county road.
Ground elevation: 2,660 feet (t). (McCook SE 7.5 min. quadrangle)
Depth to water: 126 ft., (e-log & W.T. map) (8-14-78).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, silt, sandy and slightly clayey, dark grayish brown.....	0.0	3.0
Silt, very sandy, fine to coarse sand 3 to 5 feet then fine to very fine, yellowish brown, lime streaks from 5 to 10 ft.....	3.0	32.0
Silt, very sandy to very fine to fine, some lime streaks, brown to 35 ft (possibly Gilman Canyon?), limy and whitish pale brown between 38 and 41 ft.	32.0	53.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, very sandy, pale brown, very calcareous, sand is very fine to fine, some rare medium, some manganese staining.....	53.0	66.0
Sand and gravel, fine sand to coarse gravel, silty with fine sand between 70 to 71 ft.....	66.0	74.0
Silt, very sandy, sand is very fine to fine, becoming very sandy below 78 ft, sand is fine to medium.....	74.0	84.0
Silt, very sandy and very limy, sand is very fine to fine with some medium, light brown, very limy and grayish white between 85 and 92 ft and 96 to 101 ft, some interbedded sandstone very fine to fine.....	84.0	114.0
Sand, very fine to very coarse, some medium gravel 114 to 123 ft.....	114.0	123.0
Sandstone, very fine to fine, some medium, some calcareous, light gray, very silty between 128 and 131 ft.....	123.0	133.0
Sand and gravel, medium sand to coarse gravel, greenish tint, some thin sandstone and silty lenses and some manganese stained grains.....	133.0	153.0
Silt, some very fine sand between 153 and 163 ft, limy, pale brown to whitish brown.....	153.0	186.0
Sand, very fine to medium, slightly silty.....	186.0	190.0
Sand and gravel, fine sand to coarse gravel, some reworked shale.....	190.0	198.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Shale, yellowish tan to orange tan, clayey, weathered.....	198.0	214.0
Shale, gray to dark gray.....	214.0	215.0
Shale, black.....	215.0	220.0

Test Hole #8-U-41
(1-29-18cccc)
Red Willow County

Location: SW SW SW SW sec. 18, T. 1 N., R. 29 W.; 225 feet east of southwest corner of section, on north edge of road.
Ground elevation: 2,792 feet (t). (McCook SW 7.5 min. quadrangle)
Depth to water: 127 ft., (9-23-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, buff; gastropod shells	0.0	15.0
Silt, buff; slightly harder than above	15.0	33.0
Silt, sandy, reddish brown; limy concretions after 38 feet	33.0	45.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, silty, limy, whitish brown	45.0	52.0
Sand, silty, reddish brown	52.0	68.0
Sand, silty, clayey, reddish; some lime	68.0	71.0
Silt and sand, limy, whitish	71.0	78.0
Sand, clayey, coarse, red	78.0	80.0
Gravel, fine to medium, red	80.0	89.0
Sandstone, hard, reddish, brown; limy streaks, reddish sand	89.0	102.0
Sand, clayey, reddish	102.0	105.0
Sandstone, brittle, reddish brown to slightly gray	105.0	112.0
Clay, fine, indurated, grayish green; cuts small chips	112.0	115.0
Clay, indurated, or siltstone, hard, light brown	115.0	121.0
Sand, clayey, brownish green	121.0	125.0
Sandstone, fairly hard, dark reddish brown	125.0	133.0
Gravel, fine, reddish	133.0	134.0
Sandstone, clayey, soft, brownish tan	134.0	138.0
Clay, sand and fine gravel, soft	138.0	145.0
Gravel, fine to medium, loose, clear reddish	145.0	150.0
Sandstone, hard, compact, reddish brown	150.0	154.0
Sandstone, limy, whitish buff	154.0	162.0
Limestone, impure, grayish tan; shines when wet, very hard, had to force pipe	162.0	168.0
Clay, sandy, soft, grayish brown	168.0	175.0
Clay, sticky, greenish gray; some hard clay particles	175.0	185.0
Clay, sandy, hard, dark brown, chocolate colored; chips like sandstone	185.0	193.0
Clay, sandy, greenish gray; hard, cuts like sandstone	193.0	197.0
Sand, clayey, 30ft, light reddish tan and greenish gray	197.0	201.0
Silt, clayey, light green	201.0	215.0
Clay, firm, pink and pale green mottled	215.0	222.0

Clay, light gray, greenish tinge, and sandy clay....	222.0	226.0
Clay, grayish brown; soft sandy clay, contains harder concretions.....	226.0	233.0
Clay, compact, reddish brown to pink; firm and hard.	233.0	237.0
Gravel, medium, poorly sorted, angular grains; probably contains thin band of clay.....	237.0	245.0
Clay, soft, light brown; sticky, gritty.....	245.0	254.0
Clay, compact, consolidated, hard, light brown and green.....	254.0	256.0
Gravel; associated with light grayish brown silty and sandy clay.....	256.0	261.0
Gravel, medium, poorly sorted, angular grains, red grains abundant.....	261.0	265.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, buff and drab to medium gray; white Bentonite at about 275 feet.....	265.0	280.0

Test Hole #230-41
(1-29-36aadd)
Red Willow County

Location: SE SE NE NE Sec 36, T. 1 N., R. 29 W.; 0.2 mile south of northeast corner of section, on west edge of road.
Ground elevation: 2,535 feet (t). (McCook SE 7.5 min. quadrangle)
Depth to water: 25.7 ft., (8-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown loamy sand.....	0.0	9.0
Clay, silty, sandy, buff; loess-like, contains shells.....	9.0	30.0
Sand, soft, silty, clayey, buff; loess-like, contains shells.....	30.0	36.0
Sand, silty, light greenish gray; some gravel.....	36.0	40.0
Gravel, fine to coarse, red; poor.....	40.0	43.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light grayish tan, rusty colored streaks; tough, plastic, sticky.....	43.0	49.0

Test Hole #24-HP-78
(2-26-19bcbc)
Red Willow County

Location: SW NW SW NW sec. 19, T. 2 N., R. 26 W., 92 feet from west road, 57 ft from west fence, 44 feet from north fence, .65 mile from north south section road.
Ground elevation: 2,595 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 195 ft. (est. from W.T. map) (8-15-78).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly sandy, gray black.....	0.0	3.0
Silt, slightly sandy, very fine to fine, very pale brown, calcareous.....	3.0	29.0
Silt, slightly sandy, very fine to fine, slightly clayey, pale brown to brown, paleosol (Gilman Canyon), slightly calcareous; reddish brown below 31 ft.....	29.0	38.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, sandy, slightly clayey, some limy streaks, very pale brown to white, yellowish gray 43 to 44 ft, very sandy and reddish yellow below 48 ft, sand is very fine to fine, some medium grains, some siliceous streaks, very sandy fine to medium below 55 ft.....	38.0	58.0
Sand, very fine to coarse, some gravel fine to medium below 60 ft, silty between 62 to 64 ft....	58.0	70.0
Sandstone, very limy, some limestone streaks, light gray to white, some claystone 72 to 74 ft, reddish yellow siltstone 75 to 76 ft, some limestone and claystone 76 to 80 ft, silt and siltstone 82 to 89 ft with some limestone lenses, very limy, some limestone below 90 ft.....	70.0	94.0
Silt, siltstone, sandy, very limy, limestone lens 99 to 101 ft and 110 to 111 ft, white to very pale brown, clayey 107 to 109 ft.....	94.0	111.0
Silt, sandy, mostly very fine to fine, some medium, very limy, pale yellow to white, very limy.....	111.0	129.0
Sandstone and siltstone, very fine to fine sand, some medium, calcareous.....	129.0	135.0
Silt, sandy, very fine to fine, very limy 137 to 138 ft, pale yellow to white, some rootlets 133 to 135 ft.....	135.0	143.0
Silt, some siltstone, sandy, limy, very pale brown to white, reddish below 153 to 160 ft, slightly clayey lens 152 to 154 ft, sandstone very fine to fine 105 to 176 ft, white, silty below 176 ft, some clay below 182 ft.....	143.0	184.0

Silt, very clayey, very pale brown, white and calcareous below 188 ft, sandy very fine to fine below 188 ft	184.0	198.0
Silt, very clayey, some siltstone and light grayish white, some very fine to fine sand	198.0	208.0
Clay, silty and limy, white, some claystone and siliceous cemented siltstone, very fine sandstone	208.0	210.0
Silt and clay, some reworked chalk, white	210.0	212.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, yellowish brown	212.0	213.0
Chert or flint, pinkish red to light brown	213.0	214.0

Test Hole #5-U-41
(2-26-32abbb)
Red Willow County

Location: NW NW NW NE sec. 32, T. 2 N., R. 26 W.; 575 feet west of house on north side of road, on south edge of road.
Ground elevation: 2,573 feet (t). (Lebanon 7.5 min. quadrangle)
Depth to water: caved at 190.6 ft., (9-15-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil and yellowish buff silt	0.0	29.0
Soil, clayey, dark reddish brown	29.0	30.0
Silt, clayey, brownish buff	30.0	33.0
Silt, clayey, limy, light yellowish; less limy with depth	33.0	39.0
Silt, clayey, very limy, nearly white	39.0	41.0
Silt, reddish; less clay, some soil	41.0	46.0
Silt, firm, massive, brown; somewhat sandy	46.0	49.0
Silt, clayey, limy, soft, light gray	49.0	52.0
Silt, sandy, slightly reddish brown	52.0	66.0
Silt, clayey, limy, light yellow	66.0	68.0
Silt, clayey, light buff	68.0	74.0
Silt, clayey, limy, light buff	74.0	77.0
Silt, clayey, reddish brown	77.0	78.0
Silt, clayey, limy, light gray	78.0	79.0
Clay, reddish brown, silt	79.0	83.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, clayey, sandy, limy, whitish buff	83.0	85.0
Sandstone, fine, limy, hard, greenish gray	85.0	86.0
Limestone, hard, dense, white; or indurated limy clay	86.0	87.0
Sand, fine, soft, silty, light green	87.0	94.0
Silt and clay, limy, sandy, light grayish white	94.0	96.0
Sandstone, limy, fine, silty, light grayish brown	96.0	98.0
Sandstone, silty, fine, light gray; concretions of light gray dense, hard brittle lime, some sand	98.0	102.0
Sandstone, hard, fine, brown	102.0	103.0
Sandstone, fine, silty, hard, limy, whitish gray; some dense compact lime	103.0	104.0
Silt, clayey, grayish whitish greenish; compact but softer, some sand	104.0	107.0
Silt, compact, white grayish green; some sand grains	107.0	124.0
Sandstone, soft, light brown; fine silty gravel	124.0	127.0
Sandstone, dense, light grayish brown; similar to that above but very hard	127.0	131.0
Sandstone, fine, brown; hard and compact	131.0	136.0
Silt, limy, clayey, light or whitish gray; fine sand grains 137 to 139 feet, hard translucent lime or limy clay	136.0	139.0

Sand, silty, soft, brown; some hard brown sandstone and perhaps concretions of harder material.....	139.0	141.0
Sand, fine, soft, grayish brown; some translucent limy hard bodies.....	141.0	180.0
Sand, coarse pale pink and pale green; similar to above.....	180.0	186.0
Clay, soft, limy, white; hard translucent brittle masses, probably concretions.....	186.0	192.0
Sand, fine, silty, light greenish gray to 196 feet; less limy, greener to 198 feet; less limy, greenish gray to 202 feet; limy, nearly white to 207 feet; less lime to 208 feet; harder where most limy, some concretions.....	192.0	208.0
Gravel, medium to coarse, well-sorted; much clear quartz, some green, red and black pebbles, sharp, slightly finer and greener below.....	208.0	237.0
Silt, clayey, sandy, soft, limy, light or whitish green.....	237.0	238.0
Gravel, poorly sorted, or rubble of chipped chert from Niobrara and other hard angular fragments of ill sorted size.....	238.0	241.0
Clay, tan and olive green; some pebbles.....	241.0	242.0
Gravel, fine; some sharp fragments.....	242.0	251.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chert, yellowish tan, at top of Niobrara.....	251.0	252.0

Test Hole #126-41
(2-26-36addd)
Red Willow County

Location: SE SE SE NE sec. 36, T. 2 N., R. 26 W.; 0.45 mile south of northeast corner of section, east of row of cottonwood trees, on west edge of road.
Ground elevation: 2,348 feet (t). (Shippee 7.5 min. quadrangle)
Depth to water: 23.9 ft., (8-4-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and dark brown clay.....	0.0	13.0
Clay, sticky, soft, buff; sandy and softer in lower part.....	13.0	36.0
Gravel, medium, coarse, loose, red.....	36.0	44.0
Clay, sandy, compact, light buff.....	44.0	45.0
Gravel, medium, coarse, red; some clay and lime, compact.....	45.0	49.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, sandy, light grayish tan; some gravel.....	49.0	53.0
Clay, like above but darker in color.....	53.0	63.0
Clay, sandy, hard, cream colored to light tan; some gravel, probably cave.....	63.0	71.0
Rock, hard, brittle, and coarse gravel, yellowish...	71.0	75.0
Clay, sandy, rusty tan with rusty streaks; compact, sticky.....	75.0	91.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Rock, hard, solid, chips greenish; too hard to drill, flinty.....	91.0	91.1

Test Hole #25-A-60
(2-28-12baaa)
Red Willow County

Location: NE NE NE NW sec. 12, T. 2 N., R. 28 W., 59 feet south and 26 feet east of power pole painted silver on west side of north-south county road. 17 feet south of north section line and 13 feet west of half section line.
Ground elevation: 2,588 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: 138 ft. (7-25-60).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey, roadfill and topsoil to .5 ft and light brownish gray, blocky, clayey and pale brown below 1.0 ft.....	0.0	2.0
Silt, slightly clayey, light yellowish brown, some ash shards and snail shells, some very fine sand below 3.5 ft.....	2.0	10.0
Silt, slightly clayey with some very fine-medium sand, light yellowish brown, some ash shards, pale brown-light yellowish brown below 32.5 ft, some worm burrows.....	10.0	34.0
Silt, moderately clayey, medium to coarse silt, some very fine sand, blocky, some worm burrows, brown to pale brown to 38.5 (Loveland?) then pale brown with some limy lenses and fine to medium sand, light pale brown-white and marly between 46.3 and 47.5 ft; 56.5-58.5 and 61-62 ft, more fine to medium sand below 62 ft.....	34.0	64.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very sandy fine to medium, some fine to medium sandstone between 65.4 and 66.3 ft, then silt, slightly clayey and sandy with some very fine to fine sandstone and marl.....	64.0	67.0
Sandstone, very fine to fine, some thin limestone lenses, also some interbedded lenses of clayey, pinkish silt between 71 and 73.5 ft, very sandy fine to medium below 73.5 ft.....	67.0	75.0
Sand, slightly silty, very fine to medium, some rootlets.....	75.0	77.5
Silt, slightly clayey some silt-claystone light brown to 78.6 then olive green to light gray, contains white marl layer 81 to 81.3 ft, then light greenish gray to pale yellowish white, sandy very fine to medium below 83.4 ft.....	77.5	90.0

Sand, very fine to fine, some medium grains, very calcareous and very marly; interbedded very fine to fine sandstone, many rootlets below 95 ft, some coarse sand and sandstone below 115 ft, light gray to white.....	90.0	119.0
Siltstone to limestone, marly, very ashy with lenses of volcanic ash, white, some rootlets.....	119.0	122.0
Sand and sandstone, very fine to medium, contains rootlets, slightly silty, calcareous, light greenish gray, less sandstone between 125 and 136.3 ft, very marly between 136.3 and 138 ft....	122.0	145.0
Sand, very fine to medium trace of coarse.....	145.0	153.0
Sandstone, very fine to fine, calcareous, silty contains rootlets, light greenish gray to light gray.....	153.0	165.0
Sand, very fine to fine, trace medium, rootlets....	165.0	175.0
Sandstone, very fine to fine, silty, light gray, some rootlets.....	175.0	179.0
Sand, very fine to fine, silty, marly and very silty below 180 ft, some medium to coarse below 185 ft.....	179.0	190.0
Sandstone to siltstone, very fine sandstone, very marly and silty, light gray, some rootlets.....	190.0	195.0
Sand, fine to very coarse some fine to medium gravel, some reworked sandstone and siltstone (Note: Drilled into very hard rock at 200.8 ft - unable to penetrate, possibly Niobrara flint)....	195.0	200.8

Test Hole #22-HP-78
(2-28-18cccc)
Red Willow County

Location: SW SW SW SW sec. 18, T. 2 N., R. 28 W., 16 feet north of fence line and 74 feet east of county road.
Ground elevation: 2,660 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 160 ft. est. (8-11-78).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly sandy, topsoil, light gray, some humus material	0.0	2.0
Silt, fine to coarse, some very fine sand, brownish yellow, occasional ash shard, calcareous	2.0	35.0
Silt to very fine sand, some coarse sand, pale brown	35.0	37.0
Silt, some very fine to medium sand, occasional coarse sand, limy	37.0	39.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, some fine to very fine sand, white to light gray, occasional rootlets, very calcareous, slightly cemented, silty sandstone lenses at 42 and 49 ft, shells at 50 to 52 ft	39.0	52.0
Sand, very fine to coarse, some fine gravel, silty and limy, very silty 60 to 62 ft, fine to medium sandstone between 70 and 72 ft, light gray to white, some rootlets	52.0	72.0
Siltstone to claystone, very limy and hard, white	72.0	73.0
Sandstone and siltstone, fine siltstone to coarse sandstone, light gray and limy, few rootlets	73.0	77.0
Silt and very fine to fine sand, olive to light gray	77.0	88.0
Silt, very clayey, pinkish white, some layers of siltstone and claystone, limy, some silty sand layers 100 to 102 ft	88.0	101.0
Claystone and siltstone, pinkish white, some silt and clay, calcareous, light olive to white below 107 ft	101.0	117.0
Silt to very fine sand, light olive to white, very limy, some medium to coarse sand	117.0	132.0
Sand, fine to medium, silty, some fine to medium sandstone between 135 and 140 ft, some rootlets, clean 170 to 175 ft and 185 to 205 ft	132.0	205.0
Sand, very fine to medium, very silty and limy, light olive to white, very calcareous	205.0	214.0
Sand, fine to medium, some thin seams of very silty, limy sand, pale olive, some fine to medium gravel grains 220 ft becoming coarser below 222 ft with some silty sand seams	214.0	226.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Clay, weathered shale, light yellow to gray to light orange becoming light gray below 234 ft and black below 235 ft.....	226.0	242.0

Test Hole #24-A-60
(2-28-24cdad)
Red Willow County

Location: SE NE SE SW sec. 24, 2 N., R. 28 W., On west side of N-S road and 25 ft east and 1.6 ft south of silver painted fence post. 992 ft north of south section line and 7 ft west of half section line.
Ground elevation: 2,683 feet (t) (Danbury 7.5 min. quadrangle)
Depth to water: 231.4 ft., (7-27-60).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly sandy fine to very fine, light yellowish brown, roadfill to 0.7? blocky below 0.7 ft.....	0.0	1.5
Silt, slightly sandy fine to very fine, light yellowish brown.....	1.5	3.5
Silt, some very fine to fine sand, light gray to very pale brown, slightly coarser below 7 ft, snail fragments 10 to 15 ft.....	3.5	15.0
Silt to very fine sand, very pale brown, slightly clayey below 24 ft and very sandy below 25 ft....	15.0	31.0
Silt, very slightly clayey, some very fine sand light yellowish brown to 33.5 ft, then pale brown.....	31.0	36.0
Silt, some very fine sand, very slightly clayey, contains marly seams, white to very pale brown, compact with some very small voids.....	36.0	60.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, silty and clayey, very fine some coarse grains, marly and calcareous, very pale brown, white and clayey between 65 ft and 68.5 ft, clean below 68.5 with trace of fine to medium gravel...	60.0	75.0
Sand, very fine to fine, very silty, pink to reddish yellow, some whitish-pale brown, lime cemented layers between 78 and 79.5 ft, very sandy - very fine to fine, consolidated and reddish-yellow 80 to 81 ft, pale brown to light yellow and marly below 81 ft.....	75.0	85.0
Sandstone, very fine to medium, marly, contains rootlets, very pale brown, very marly with some clay and white to very pale brown below 89 ft....	85.0	91.0
Sand, fine to coarse, lime cemented some very fine to medium sandstone between 95 and 97.5 and 103 and 106 ft, white to pale brown.....	91.0	106.0
Silt, clayey, pink, some limy layers and thin claystone seams, light gray below 117 ft.....	106.0	119.0

Silt to very fine sand, light greenish-gray, some thin marl layers, very fine to fine sandstone, 126 to 129 ft, pinkish white with some siltstone below 129 ft	119.0	135.5
Silt, very marly, some siltstone and claystone seams, contains very fine to fine and occasional coarse sand below 141 ft	135.5	143.5
Silt to very fine and coarse sand, marly, pink to very pale brown, some claystone-limestone seams, less sand below 155 ft	143.5	160.0
Sand very fine to medium, some sandstone lenses, very marly between 167 to 170 ft, pinkish pale brown to pale brown	160.0	190.0
Silt to very fine to fine sand, whitish gray, some interbedded marly fine sandstone, some rootlets, very marly with trace very fine to medium sand below 207.5 ft	190.0	210.0
Sand, very fine to fine, slightly silty, olive to light gray, very marly below 218.5 ft	210.0	225.0
Sand, fine to coarse, light gray, contains marly silt layers 230 to 231 and 240 to 241 ft, some reworked siltstone and fine sandstone	225.0	241.0
Sand, fine to very coarse, some very coarse gravel, some silty marl lenses below 245 ft	241.0	249.5
Silt, slightly clayey with some very fine sand, pale yellow, ashy, some siltstone fragments	249.5	251.5
Sand, very fine to fine, very silty and slightly clayey, some interbedded marl and siltstone lenses	251.5	279.3
Silt, slightly clayey, some very fine sand, calcareous, very pale brown, some siltstone and sandstone fragments	279.3	282.5
Sand, very fine, medium some 10% coarse, contains rare reworked fragments of siltstone, very silty pale brown between 285 to 286 ft, and a white to light gray clayey silt between 288.8 and 290 ft; sand and gravel interbedded with clayey silt between 290 and 295 ft with rare reworked silt-claystone fragments	282.5	295.0
Silt, slightly clayey and very sandy-very fine to fine, light gray to pale brown	295.0	300.0
Sand and gravel, fine to very coarse sand and fine to very coarse gravel, few reworked silt-claystone and shale fragments	300.0	300.7
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, chalkrock, yellowish-white to 308.8 ft then pale brown to light yellowish-brown to 315 ft, then bluish gray	300.7	330.0

Test Hole #297-41
(2-29-3bbaa)
Red Willow County

Location: NE NE NW NW sec. 3, T. 2 N., R. 29 W.; on south side of road.
Ground elevation: 2,462 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 12.3 ft., (10-20-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark brown.....	0.0	10.0
Clay, sandy, buff tan.....	10.0	15.0
Sand, very fine, to medium gravel, gray.....	15.0	30.0
Gravel, medium to coarse, gray.....	30.0	40.0
Sand, medium to coarse, gray.....	40.0	52.0
Sand, very fine, red, to medium gravel.....	52.0	81.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray to black.....	81.0	84.0

Test Hole #298-41
(2-29-3cccb)
Red Willow County

Location: NW SW SW SW sec. 3, T. 2 N., R. 29 W.; 100 feet south of quarter line, on east side of road.
Ground elevation: 2,488 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 25 ft., (10-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark brown	0.0	8.0
Clay, sandy, buff tan	8.0	23.0
Silt, dark brown	23.0	27.0
Clay, sandy, tan	27.0	31.0
Silt, sandy, grayish tan	31.0	37.0
Sand, very fine, to medium gravel, red	37.0	56.0
Cretaceous System, Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, speckled, light gray	56.0	58.0
Shale, black	58.0	59.0

Test Hole #299-41
(2-29-3acdd)
Red Willow County

Location: SE SE SW NE sec. 3, T. 2 N., R. 29 W.; 200 feet west of quarter line, on north side of road.
Ground elevation: 2,495 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 38.7 ft., (10-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:s		
Road fill and black sandy soil.....	0.0	6.0
Clay, sandy, tan to grayish buff.....	6.0	50.0
Gravel, fine to medium, red.....	50.0	54.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, black.....	54.0	59.0

Test Hole #300-41
(2-29-3aaaa)
Red Willow County

Location: NE NE NE NE sec. 3, T. 2 N., R. 29 W.; 25 feet west of east section line, 10 feet south of north section line, on south side of road.
Ground elevation: 2,459 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 13 ft., (10-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and black sandy soil.....	0.0	8.0
Clay, sandy, tan.....	8.0	20.0
Gravel, medium to very coarse, gray.....	20.0	29.0
Gravel, coarse, red.....	29.0	31.0
Gravel, very fine to very coarse, red.....	31.0	59.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, black.....	59.0	63.0

Test Hole #294-41
(2-29-5bddd)
Red Willow County

Location: SE SE SE NW sec. 5, T. 2 N., R. 29 W.; 50 feet west of center of section, on north side of road.
Ground elevation: 2,486 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 19.4 ft., (10-20-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, tan to brown.....	0.0	20.0
Gravel, medium, red; dirty.....	20.0	31.0
Gravel, medium, gray.....	31.0	43.0
Gravel, fine to medium, red; clean.....	43.0	59.0
Sand, very fine to coarse, red.....	59.0	86.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray.....	86.0	89.0

Test Hole #295-41
(2-29-8bdaa)
Red Willow County

Location: NE NE SE NW sec. 8, T. 2 N., R. 29 W.; 50 feet west of highway, 30 feet north of irrigation ditch.
Ground elevation: 2,518 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: caved at 52.5 ft., (10-20-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark grayish brown	0.0	5.0
Clay, sandy, tan	5.0	41.0
Clay, sandy, dark gray	41.0	45.0
Clay, sandy, tan	45.0	52.0
Gravel, fine to medium, red	52.0	76.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray	76.0	79.0

Test Hole #289-41
(2-30-1aaaa)
Red Willow County

Location: NE NE NE NE sec. 1, T. 2 N., R. 30 W.; 100 feet south of corner, on west side of road.
Ground elevation: 2,485 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 8.1 ft., (10-20-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, black.....	0.0	4.0
Clay, sandy, buff yellow.....	4.0	12.0
Sand, fine to coarse, gray.....	12.0	21.0
Sand, very fine to coarse, red; some compact streaks	21.0	59.0
Gravel, fine to medium, red.....	59.0	62.0
Sand, very fine, red.....	62.0	71.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray.....	71.0	79.0

Test Hole #290-41
(2-30-1ddaa)
Red Willow County

Location: NE NE SE SE sec. 1, T. 2 N., R. 30 W.; 120 feet south of northeast corner of forty, on west side of road.
Ground elevation: 2,503 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 25.9 ft., (10-20-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark brown.....	0.0	10.0
Clay, sandy, buff tan.....	10.0	21.0
Sand, very fine to coarse, red; very fine to medium sand predominating.....	21.0	72.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray.....	72.0	79.0

Test Hole #308-41
(2-30-11caaa)
Red Willow County

Location: NE NE NE SW sec. 11, T. 2 N., R. 30 W.; 15 feet south of half section line, on west side of road.
Ground elevation: 2,523 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 20 ft., (10-27-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark brown to black	0.0	3.0
Clay, sandy, tannish yellow	3.0	37.0
Clay, sandy, grayish tan	37.0	42.0
Clay, sandy, blue	42.0	48.0
Gravel, medium, gray; very dirty, much blue clay	48.0	54.0
Gravel, medium to coarse, green	54.0	57.0
Gravel, medium to very coarse, green; dirty, some gray clay and reworked shale	57.0	60.0
Shale, sandy, light grayish blue	60.0	64.0
Gravel, medium to coarse, green; clean	64.0	65.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, black	65.0	69.0

Test Hole #291-41
(2-30-12daaa)
Red Willow County

Location: NE NE NE SE sec. 12, T. 2 N., R. 30 W.; 50 feet south of half section line, on west side of road.
Ground elevation: 2,513 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 32.9 ft., (10-20-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark brown	0.0	8.0
Clay, sandy, buff tan	8.0	36.0
Gravel, medium to coarse, red	36.0	43.0
Gravel, medium to coarse, green	43.0	48.0
Gravel, medium to coarse, gray	48.0	58.0
Clay, sandy, bluish gray	58.0	59.0
Sand, very fine, gray; streaks of bluish gray clay	59.0	89.0
Gravel, medium to coarse, gray; some clay	89.0	91.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, medium gray to dark	91.0	95.0

Test Hole #292-41
(2-30-13aadd)
Red Willow County

Location: SE SE NE NE sec. 13, T. 2., R. 30 W.; 0.24 mile south of north section line, on west side of road.
Ground elevation: 2,520 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 23.6 ft., (10-20-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and black sandy soil.....	0.0	7.0
Clay, sandy, buff tan.....	7.0	21.0
Clay, sandy, black.....	21.0	32.0
Clay, sandy, light yellowish gray.....	32.0	40.0
Clay, sandy, bluish gray.....	40.0	77.0
Gravel, medium to coarse, green.....	77.0	83.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, medium gray.....	83.0	89.0

Test Hole #9-U-41
(2-30-13ccdc)
Red Willow County

Location: SW SE SW SW sec. 13, T. 2 N., R. 30 W.; 0.15 mile east of southwest corner of section, on north edge of road.
Ground elevation: 2,640 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: caved at 78.5 ft., (9-23-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and buff silt	0.0	39.0
Silt, reddish buff	39.0	48.0
Clay, silty to sandy, limy, reddish buff	48.0	54.0
Sand, clayey, reddish buff; limy concretions	54.0	59.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very limy, to sandy clay, white; hard, limy concretions	59.0	64.0
Sand, clayey, pale greenish; upper part sandstone	64.0	68.0
Sandstone, hard, light tannish gray	68.0	74.0
Gravel, medium, well-sorted; clear quartz gravel	74.0	80.0
Sandstone, light brown	80.0	84.0
Sand, clayey, pale green; cuts like sandstone	84.0	88.0
Sand, or sandstone, clayey, light tan	88.0	90.0
Sandstone, tan; cuts in small fragments	90.0	93.0
Sand, silty to clayey, soft, tan	93.0	96.0
Sandstone, light tan; hard, small chips	96.0	98.0
Clay, sandy, light tan; indurated, hard, fine grained, cuts small chips	98.0	103.0
Clay, sandy, light tan to dark tan; indurated, hard, fine grained, more sand after 105 feet	103.0	108.0
Gravel, fine to coarse, clear quartz, red, green grains, some brown	108.0	114.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, tough, light gray stained rusty colored; cuts easily	114.0	142.0
Shale, gray to dark bluish black; tough, rubbery, some bentonite from 154 to 160 feet	142.0	160.0

Test Hole #309-41
(2-30-15bbbb)
Red Willow County

Location: NW NW NW NW sec. 15, T. 2 N., R. 30 W.; 40 feet south of north line, 100 feet east of west line, on south side of road.
Ground elevation: 2,545 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 26.4 ft., (10-27-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil, sandy, black to dark brown.....	0.0	7.0
Clay, sandy, tan to grayish tan.....	7.0	48.0
Gravel, medium to coarse, red; dirty.....	48.0	51.0
Gravel, medium to coarse, green; fairly clean.....	51.0	54.0
Clay, sandy, blue.....	54.0	66.0
Gravel, fine, red; dirty, some gray clay.....	66.0	67.0
Gravel, medium to very coarse, gray; some gray clay at top.....	67.0	73.0
Gravel, fine to medium, gray.....	73.0	77.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, medium, gray.....	77.0	79.0

Test Hole #310-41
(2-30-17addd)
Red Willow County

Location: SE SE SE NE Sec. 17, T. 2 N., R. 30 W.; about on center line of section, 100 feet south of creek bridge, west side of road.
Ground elevation: 2,545 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 19.8 ft., (10-27-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and brown sandy soil	0.0	8.0
Clay, sandy, tan	8.0	18.0
Clay, sandy, brown	18.0	26.0
Gravel, fine to medium, red	26.0	28.0
Clay, sandy, gray	28.0	41.0
Sand, very fine, red	41.0	43.0
Gravel, medium to coarse, green	43.0	52.0
Sand, fine, gray	52.0	54.0
Gravel, medium to coarse, gray	54.0	58.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, medium gray to black	58.0	59.0

Test Hole #124-41
(2-30-19adaa)
Red Willow County

Location: NE NE SE NE sec. 19, T. 2 N., R. 30 W., 300 feet southeast of east steel bridge, 12 feet north of center road.
Ground elevation: 2,572 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 32.7 ft., (9-19-42).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Loam, sandy, and silt	0.0	6.0
Clay, sandy, yellow	6.0	16.0
Clay, yellow	16.0	56.0
Clay, yellow, and sand	56.0	65.0
Gravel, fine to medium; lime and clay	65.0	67.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark	67.0	74.0

Test Hole #21-HP-78
(2-30-36bbbb)
Red Willow County

Location: NW NW NW NW sec. 36, T. 2 N., R. 30 W., 9.6 feet from fence 26 feet from north road, 59 feet from west road. Located on south side of road.
Ground elevation: 2,725 ft. (t). (McCook SW 7.5 min. quadrangle)
Depth to water: 135 ft. ± 10 est. (7-3-78).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Topsoil, silt, slightly clayey, some very fine sand, brown to light brown, light brown to light gray below 3 ft.....	0.0	5.0
Silt, very sand, fine to very fine, yellowish tan to very pale brown, rare snail shell fragments...	5.0	23.0
Silt, very sandy, very fine to fine silt, very pale brown, very slightly clayey.....	23.0	30.0
Silt, very sandy, very fine to fine, very pale brown, very slightly clayey.....	30.0	43.0
Silt, slightly sandy and clayey, pale brown to light yellowish brown.....	43.0	45.0
Silt, slightly sandy to fine sand, slightly clayey, limy white, very pale brown below 45.5 ft, calcareous, some coarse sand grains, very limy below 56 ft.....	45.0	57.0
Silt, very sandy to fine to very fine, reddish brown to reddish yellow.....	57.0	61.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, very fine to fine, pinkish white, calcareous.	61.0	66.0
Sand, very fine to fine, very silty, white to light gray, very limy, some thin limestone seams and thin sandstone layers.....	66.0	98.0
Sandstone, very fine to medium sand, light gray....	98.0	104.0
Silt, clayey, some claystone 107 to 108 ft, pinkish white, calcareous, very limy below 108 ft.....	104.0	112.0
Sand, fine to very coarse, some fine to medium gravel, silty, very silty below 115 ft.....	112.0	116.0
Silt, fine to coarse, some very fine sand, calcareous, very pale brown, some limestone seams, ashy 120 to 133 ft, some very fine silt lenses, few medium to coarse gravel grains and slightly sandy below 141 ft.....	116.0	143.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, light gray to yellow, calcareous, weathered, light gray 165 ft becoming darker gray to black below 171 ft.....	143.0	181.0

Test Hole #237-41
(3-26-3ccdc)
Red Willow County

Location: SW SE SW SW sec. 3, T. 3 N., R. 26 W.; 0.25 mile east of southwest corner of section, on north edge of road.
Ground elevation: 2,294 feet (t). (Wilsonville NW 7.5 min. quadrangle
Depth to water, 7.3 ft., (9-1-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and dark brownish black clayey sand.....	0.0	6.0
Gravel, fine to coarse, red.....	6.0	12.0
Gravel, fine to coarse, red, some green; loose.....	12.0	20.0
Gravel, fine to coarse, red; loose, mostly coarse...	20.0	26.0
Gravel, fine to coarse, compact, red.....	26.0	35.0
Gravel, fine to medium, some coarse, compact.....	35.0	41.0
Gravel, coarse, loose, red.....	41.0	44.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, very tough, sticky, gray.....	44.0	50.0
Clay, sticky, softer than above, gray.....	50.0	69.0

Test Hole #106-41
(3-26-5abab)
Red Willow County

Location: NW NE NW NE sec. 5, T. 3 N., R. 26 W.; 0.34 mile west of northeast corner of section 130 feet west of drainage, on south edge of road.
Ground elevation: 2,335 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: 34.2 ft., (7-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, brown sandy clay.....	0.0	5.0
Clay, sandy, light brown.....	5.0	20.0
Clay, dark brown.....	20.0	25.0
Gravel, fine to medium, sandy, compact, red.....	25.0	30.0
Gravel, medium, red, and sandy light tan clay.....	30.0	35.0
Gravel, fine to medium, red; some clay.....	35.0	42.0
Gravel, fine, red; compact, much clay.....	42.0	50.0
Gravel, fine, red; compact, much yellow, clay.....	50.0	75.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, light tan, some whitish color.....	75.0	79.0

Test Hole #107-41
3-26-5bbbb
Red Willow County

Location: NW NW NW NW sec. 5, T. 3 N., R. 26 W.; 175 feet south of northwest corner of section, on east edge of road.
Ground elevation: 2,352 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: 42.3 ft. (7-28-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	5.0
Clay, brown	5.0	35.0
Clay, sandy, tan; some gravel	35.0	40.0
Gravel, fine to medium, red; compact, much clay	40.0	65.0
Gravel, medium, red; compact, some yellow clay	65.0	95.0
Gravel, medium to coarse, red; some clay, not as compact as above	95.0	98.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, whitish to tan	98.0	99.0

Test Hole #108-41
(3-26-5bccc)
Red Willow County

Location: SW SW SW NW sec. 5., T. 3 N., R. 26 W.; 0.2 mile north of highway, on east edge of road.
Ground elevation: 2,340 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: 29.2 ft., (7-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, dark brown.....	0.0	5.0
Clay, sandy., buff to darker.....	5.0	25.0
Gravel, medium to coarse, red; some clay.....	25.0	40.0
Gravel, fine to medium, red; some yellow clay, somewhat tight.....	40.0	67.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, greenish gray to yellowish.....	67.0	75.0

Test Hole #112-41
(3-26-5acdd)
Red Willow County

Location: SE SE SW NE sec. 5, T. 3 N., R. 26 W.; 300 feet north of southeast corner, 85 feet south of railroad, on west side of the quarter mile roadway.
Ground elevation: 2,306 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: 3 ft., (8-4-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Loam, sandy, black.....	0.0	3.0
Sand, red.....	3.0	20.0
Gravel, fine to medium, red; good, clean, some lime.	20.0	45.0
Gravel, medium to coarse, red; more compact than above, some limy concretions.....	45.0	56.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, soft, cream colored to yellow tan.....	56.0	59.0

Test Hole #109-41
(3-26-6dddd)
Red Willow County

Location: SE SE SE SE sec. 6, T. 3 N., R. 26 W.; northwest corner of intersection.
Ground elevation: 2,318 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 9.6 ft., (7-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Clay, buff	0.0	9.0
Gravel, medium to coarse, red	9.0	19.0
Gravel, coarse, green	19.0	30.0
Gravel, medium to coarse, red and green	30.0	45.0
Gravel, coarse, red; loose	45.0	65.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, yellow, ochre to tan	65.0	66.0

Test Hole #241-41
(3-26-7cbab)
Red Willow County

Location: NW NE NW SW sec. 7, T. 3 N., R. 26 W.; 0.15 mile east and 140 feet south of northwest corner, on east edge of road.
Ground elevation: 2,322 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 7.7 ft., (9-8-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and fine sand, compact	0.0	4.0
Sand and fine to coarse gravel, red; clean	4.0	10.0
Silt, gray, and fine gravel	10.0	13.0
Silt, gray; some gray gravel, dirty, compact	13.0	20.0
Sand, fine, gray	20.0	30.0
Gravel, fine, grayish red	30.0	32.0
Gravel, fine to coarse, red; clean, loose	32.0	46.0
Gravel, fine to coarse, red; compact	46.0	55.0
Gravel, coarse, red; good	55.0	60.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, compact, olive brown	60.0	65.0

Test Hole #243-41
(3-26-7cbdc)
Red Willow County

Location: SW SE NW SW sec. 7, T. 3 N., R. 26 W.; 0.15 mile east and 0.23 mile south of northwest corner of quarter, 0.2 mile north of south edge of river bridge, on east edge of road.
Ground elevation: 2,322 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: caved at 8 ft., (9-8-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	5.0
Gravel, fine to coarse, mostly fine to medium, red	5.0	30.0
Gravel, fine to medium	30.0	35.0
Gravel, fine to coarse, red	35.0	41.0
Sand and fine to medium gravel, red	41.0	45.0
Gravel, fine to coarse, red	45.0	51.0
Clay, sandy, reworked shale and gravel	51.0	55.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, weathered, cream colored	55.0	58.0
Shale, cream colored	58.0	61.0
Shale, dark olive brown; tough, compact	61.0	68.0

Test Hole #244-41
(3-26-7bbab)
Red Willow County

Location: NW NE NW NW sec. 7, T. 3 N., R. 26 W.; 0.15 mile east and 225 feet south of northwest corner of quarter, on west side of road.
Ground elevation: 2,326 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 10.9 ft., (9-8-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, black loam	0.0	5.0
Clay, slightly sandy, brownish black	5.0	6.0
Clay, quite sandy, brownish gray	6.0	7.0
Gravel, medium to coarse, brown	7.0	10.0
Gravel, fine, brown; same organic material	10.0	16.0
Gravel, medium to coarse, reddish brown	16.0	29.0
Gravel, coarse, brown	29.0	38.0
Gravel, fine to medium, brownish red	38.0	54.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, yellowish buff	54.0	57.0
Shale, olive drab	57.0	59.0

Test Hole #245-41
(3-26-7dddd)
Red Willow County

Location: SE SE SE SE sec. 7, T. 3 N., R. 26 W.; 8 feet north of road, 45 feet east of bridge over drainage, 120 feet west of section line.
Ground elevation: 2,330 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 18.5 ft., (9-8-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark brown, and buff sand.....	0.0	7.0
Sand, clayey, buff.....	7.0	13.0
Silt, grayish buff.....	13.0	16.0
Silt, gray, and fine gray gravel.....	16.0	18.0
Gravel, fine to medium, reddish gray.....	18.0	21.0
Gravel, fine to coarse, red.....	21.0	29.0
Gravel, fine to medium, some coarse; some water-worn sandy clay.....	29.0	60.0
Gravel, as above; more water-worn clay and shale....	60.0	68.0
Sand, clayey, soft, tan; may have some gravel.....	68.0	75.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, soft, yellow.....	75.0	77.0
Shale, sticky, light grayish tan.....	77.0	79.0

Test Hole #240-41
(3-26-8ddad)
Red Willow County

Location: SE NE SE SE sec. 8, T. 3 N., R. 26 W.; 0.15 mile north of southeast corner of section, on west edge of road.
Ground elevation: 2,322 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 20.1 ft., (9-1-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown sandy soil	0.0	5.0
Sand, brownish buff	5.0	10.0
Clay, sandy, dark brown	10.0	12.0
Sand, clayey, buff gray; compact	12.0	17.0
Gravel, fine to medium	17.0	20.0
Sand, reddish; poor sample (losing water)	20.0	29.0
Gravel, fine to coarse, reddish	29.0	35.0
Clay, sandy, light grayish tan	35.0	43.0
Gravel, fine to medium, greenish red; compact	43.0	60.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, sticky, compact, khaki colored; thin limy layer at 62 feet	60.0	70.0
Clay, sandy, brown, khaki colored; some red embedded sand	70.0	75.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, cream colored to whitish gray to tan; compact, sticky	75.0	84.0
Shale, dark olive gray; compact, tough	84.0	86.0

Test Hole #238-41
(3-26-9abbb)
Red Willow County

Location: NW NW NW NE sec. 9, T. 3 N., R. 26 W.; 0.45 mile west of northeast corner of section, near road corner, on south edge of road.
Ground elevation: 2,305 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 10.5 ft., (9-1-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand and dark brown sandy soil	0.0	4.0
Sand, clayey, compact, grayish brown	4.0	8.0
Gravel, fine to coarse, red; clean	8.0	15.0
Gravel, fine to medium, some coarse, red; some gray silt seams	15.0	25.0
Gravel, fine to medium, some coarse, red	25.0	31.0
Gravel, fine to coarse, red	31.0	44.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, greenish gray first few inches then light khaki colored	44.0	55.0
Clay, sandy, hard, dark khaki to reddish brown; cuts into chips	55.0	57.0
Clay, sticky, light khaki	57.0	63.0
Clay, sandy, reddish brown; compact, cuts chips like sandstone	63.0	68.0
Clay, sticky, yellow brown	68.0	71.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, lime, sticky, whitish gray	71.0	78.0
Shale, whitish gray to cream colored; compact, very sticky	78.0	85.0
Shale, light gray to dark olive brown to almost black; hard, compact	85.0	89.0

Test Hole #239-41
(3-26-9accc)
Red Willow County

Location: SW SW SW NE sec. 9, T. 3 N., R. 26 W.; 300 feet north of southwest corner of quarter, just north of curve, on east edge of road.
Ground elevation: 2,310 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 13.2 ft., (9-1-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark brown.....	0.0	7.0
Gravel, fine to coarse, clean, red.....	7.0	20.0
Gravel, fine to coarse, red; some silty clay.....	20.0	25.0
Gravel, fine to coarse, red; some water-worn shale..	25.0	33.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, compact, light khaki colored.....	33.0	43.0
Clay, sandy, hard like sandstone; thin layers of limestone at 43 and 45 feet.....	43.0	45.0
Clay, compact, light khaki colored, light brownish yellow.....	45.0	61.0
Clay, sandy, hard, brown, khaki colored; cuts into chips like soft sandstone.....	61.0	70.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Clay or shale, sticky, tan.....	70.0	74.0
Shale, sticky, very limy, whitish gray to tan.....	74.0	79.0

Test Hole #121-41
(3-26-10addd)
Red Willow County

Location: SE SE SE NE sec. 10, T. 3 N., R. 26 W.; on west edge of road.
Ground elevation: 2,314 feet (t). (Wilsonville NW 7.5 min. quadrangle)
Depth to water: 28 ft., (8-4-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	5.0
Clay, sandy, buff	5.0	24.0
Gravel, medium to coarse, loose, red; clean, some lime	24.0	53.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, sandy, hard, light tan or khaki colored; some gravel, fairly good seam of gravel at 60 feet and at 90 feet	53.0	105.0
Gravel, very coarse, red; some pieces of limy material	105.0	119.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation: (not reached)		

Test Hole #18-U-41
(3-26-10bccd)
Red Willow County

Location: SE SW SW NW sec. 10, T. 3 N., R. 26 W.; 0.1 mile east of southwest corner of quarter, 8 feet north of fence.
Ground elevation: 2,318 feet (t). (Wilsonville NW 7.5 min. quadrangle)
Depth to water: 26.4 ft., (10-7-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil	0.0	5.0
Silt, dark brown; soil and dirty gravel	5.0	8.0
Gravel, fine, reddish; dirty	8.0	11.0
Silt, buff, and silty clay	11.0	23.0
Gravel, fine to coarse, red	23.0	41.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, compact, gray	41.0	48.0
Clay, soft, tan	48.0	52.0
Clay, tannish brown; hard indurated tan clay seams	52.0	71.0
Clay, sandy, tannish brown, compact; hard sandy lime lenses or concretions	71.0	79.0
Clay, compact, tan to brown	79.0	83.0
Clay, compact, tan, hard indurated pinkish tan clay	83.0	87.0
Sandstone, soft, dark brown	87.0	92.0
Gravel, fine to medium, some coarse, reddish; some water-worn shale and clay	92.0	97.0
Gravel, fine to coarse, mostly red; has water-worn shale and clay	97.0	101.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, cream colored to pink to slightly grayish tan	101.0	106.0
Shale, compact, dark olive gray	106.0	110.0

Test Hole #236-41
(3-26-11bbbb)
Red Willow County

Location: NW NW NW NW sec. 11, T. 3 N., R. 26 W.; 60 feet south of corner, on east edge of road.
Ground elevation: 2,294 feet (t). (Wilsonville NW 7.5 min. quadrangle)
Depth to water: 9.5 ft., (9-1-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, dark brown sandy clay and buff clayey sand	0.0	10.0
Sand and fine gravel, red	10.0	14.0
Sand and fine to medium gravel, red	14.0	25.0
Gravel, fine to coarse, compact, red	25.0	28.0
Gravel; some water-worn shale and brown sandy clay, compact, red	28.0	32.0
Gravel, fine to medium, compact, red	32.0	45.0
Gravel, slightly coarser than above, compact, red	45.0	49.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, sticky, light khaki colored	49.0	58.0
Rock	58.0	59.0
Clay, sandy, dark khaki; some embedded gravel	59.0	69.0
Gravel, fine, compact, reddish; some sandy clay	69.0	73.0
Clay, sandy, khaki colored	73.0	75.0
Gravel, fine to medium, compact, red; some lime and shale	75.0	86.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, cream colored to light grayish tan	86.0	92.0
Shale, tough, dark olive brown	92.0	95.0

Test Hole #120-41
(3-26-12bbbb)
Red Willow County

Location: NW NW NW NW sec. 12, T. 3 N., R. 26 W.; 40 feet east of corner on south edge of road.
Ground elevation: 2,312 feet (t). (Wilsonville NE 7.5 min. quadrangle)
Depth to water: 37.7 ft., (8-4-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, clayey, brown.....	0.0	4.0
Clay, sandy, light brown.....	4.0	20.0
Gravel, fine, red, and fine sand, compact.....	20.0	30.0
Gravel, coarse, red; clean, loose, some lime.....	30.0	50.0
Tertiary System - Miocene Series - Ogallala Group:		
Gravel, medium, red; rather compact, much lime.....	50.0	80.0
Gravel, medium to coarse, red.....	80.0	93.0
Gravel, very coarse, red; seam of yellowish tan clay at 99 feet.....	93.0	111.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, cream colored at first becoming dark tan or khaki.....	111.0	119.0

Test Hole #242-41
(3-26-18bcab)
Red Willow County

Location: NW NE SW NW sec. 18, T. 3 N., R. 26 W.; 900 feet south and 0.15 mile east of northwest corner of section, 90 feet east of road to north, on north edge of east and west road.
Ground elevation: 2,329 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 12.6 ft., (9-8-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown sandy soil.....	0.0	5.0
Sand, clayey, buff.....	5.0	8.0
Silt, gray.....	8.0	12.0
Sand and fine to coarse gravel, red.....	12.0	20.0
Gravel, fine to coarse, red.....	20.0	25.0
Gravel, fine to coarse, less fine than above, red...	25.0	30.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, hard, gray; cemented, cuts in chips, like sandstone.....	30.0	34.0
Sandstone, hard; gray.....	34.0	35.0
Gravel, fine to medium, some coarse, much fine, red.	35.0	45.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, sticky, yellowish tan, white.....	45.0	47.0
Shale, tan to light olive brown.....	47.0	51.0
Shale, hard, compact, dark olive brown.....	51.0	59.0

Test Hole #4-U-41
(3-26-31aaba)
Red Willow County

Location: NE NW NE NE sec. 31, T. 3 N., R. 26 W.; 0.16 mile west of northeast corner, on south edge of road.
Ground elevation: 2,527 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 159.5 ft., (9-15-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, light yellow or buff, loess; abundant gastropod shells	0.0	38.0
Silt, clayey, reddish buff, dark brown at top, paler with depth; loess	38.0	57.0
Silt, clayey, light tan, lime nodules and soft lime; loess	57.0	67.0
Silt, clayey, browner; less lime	67.0	69.0
Silt, lighter colored; more lime	69.0	75.0
Silt; generally less lime	75.0	88.0
Silt, sandier; concretions and soft lime	88.0	103.0
Sand, massive, clayey, tan; associated with sandy, clayey silt	103.0	112.0
Silt, clayey; mixed with sand grains and thin beds of fine gravel	112.0	116.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, fine, silty, massive, light gray	116.0	124.0
Clay, indurated, compact, limy, white about two feet then green clayey silt, soft but limy; also contains green hard indurated clay, dense and brittle, almost vitreous	124.0	132.0
Clay, indurated, hard, vitreous, dense, white and pale green	132.0	138.0
Clay, soft, light gray to white and light brown; some silt and grains of sand, alternating hard and soft zones	138.0	158.0
Sand, silty, massive, soft, greenish yellow; coarser and softer than above	158.0	177.0
Silt, clayey, limy, light gray to white; sand grains	177.0	178.0
Clay, limy, vitreous, light or whitish green; chips in sample from 177 to 179 feet	178.0	179.0
Clay, light greenish gray; grains of silt or fine sand	179.0	185.0
Clay, limier, paler colored; some scattered pebbles of fine gravel	185.0	192.0
Gravel, medium, pink and green pebbles	192.0	199.0
Silt, sandy, limy white; fairly soft, compact, much lime, probably some clay	199.0	204.0
Gravel, medium; more red grains than in gravel from 192 to 199 feet	204.0	209.0

Gravel, cemented, similar to that above.....	209.0	213.0
Silt, sandy, clayey, light grayish whitish green; much lime, compact but not very hard.....	213.0	215.0
Gravel, medium, many pink and red pebbles, few green	215.0	218.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, soft, white.....	218.0	224.0
Shale, light gray to iron gray.....	224.0	230.0

Test Hole #25-HP-78
(3-26-36bcbb)
Red Willow County

Location: NW NW SW NW sec. 36, T. 3 N., R. 26 W., 95 feet from west road, 102 feet north of south fence, .3 mile south of north section line and 95 feet east of west section line.
Ground elevation: 2,510 feet (t). (Wilsonville NW 7.5 min. quadrangle)
Depth to water: 160 ft. (est. from water table contour map 1979).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey and sandy, topsoil to 1 ft dark brown, then light brown.....	0.0	5.0
Silt, some very fine sand, very pale brown, some ash shards and snail shells.....	5.0	20.0
Silt, some very fine sand, very pale brown to reddish yellow, sandy between 25 and 30 ft.....	20.0	42.0
Silt, slightly clayey, light brown to reddish yellow, paleosol, some very fine sand.....	42.0	48.0
Silt, some very fine sand, very pale brown, some open burrows, sandier between 58 and 60 ft.....	48.0	65.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, slightly clayey, pale brown, calcareous, some marl.....	65.0	76.0
Silt, very limy, some very fine sand, slightly clayey, white.....	76.0	80.0
Silt to very fine sand, very fine sandstone-siltstone below 81 ft, very calcareous, white, contains rootlets.....	80.0	87.0
Silt, some very fine sand, limy, white to very pale brown.....	87.0	90.0
Sand, very fine to fine, very pale brown to yellow, limy, few rootlets, slightly clayey between 97-100 ft.....	90.0	120.0
Sand, very fine to fine, light gray to olive with yellowish brown to pale brown sandstone, silty and clayey between 133 to 142 ft with thin seams of white to very pale brown claystone and limestone between 136 to 143.5 ft.....	120.0	143.5
Sand, very fine to fine, very silty, some sandstone lenses, light gray to olive, ashy, very ashy between 148-158 ft, some thin seams of claystone.	143.5	158.0
Silt, slightly clayey, some very fine to fine sandy layers, white, calcareous and limy, very sandy between 170 and 175.5 ft.....	158.0	175.5
Sandstone to sand fine to medium, light gray to white, less sandstone below 100 ft.....	175.5	187.5
Silt, clayey some siltstone, white, very caclareous and limy.....	187.5	193.0

Clay very silty, slightly sandy very fine to fine, light gray to olive, limy, calcareous and limestone lenses and light gray to white between 200 and 205 ft	193.5	205.0
Silt, very sandy and slightly clayey, sand is very fine to fine with some coarse grains, light gray to white	205.0	210.0
Sand, very fine to medium, few coarse grains, light gray	210.0	214.0
Silt and clay, some very fine to fine sand, light gray to white	214.0	215.5
Sand, very fine to medium, pale brown to light gray, very limy and silty below 217.5 ft	215.5	221.0
Sand, very fine to medium, becoming coarser below 225 ft, ranging from medium to very coarse sand	221.0	228.5
Cretaceous - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chalk, white	228.5	233.0
Shale, chalky light gray to 235 ft then pale brown calcareous	233.0	245.0

Test Hole #114-41
(3-27-1addd)
Red Willow County

Location: SE SE SE NE sec. 1, T. 3 N., R. 27 W.; 75 feet south of intersection, on west edge of road.
Ground elevation: 2,348 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: caved at 28.5 ft., (8-4-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and grayish brown clay.....	0.0	10.0
Clay, sandy, buff.....	10.0	25.0
Gravel, medium to coarse, red; about one-fourth blackish gravel.....	25.0	35.0
Gravel, medium to coarse, red; clean.....	35.0	45.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, soft, tan with some yellow ochre.....	45.0	49.0

Test Hole #115-41
(3-27-2daad)
Red Willow County

Location: SE NE NE SE sec. 2, T. 3 N., R. 27 W.; 0.1 mile south of northeast corner of quarter, 0.12 mile south of cross road, on west edge of road.
Ground elevation: 2,355 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: 20.8 ft., (8-4-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and sandy clay, dark brown.....	0.0	7.0
Clay, sandy, buff.....	7.0	18.0
Gravel, medium, red; loose, clean.....	18.0	27.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, soft, tan.....	27.0	40.0
Shale, harder than above, yellow ochre.....	40.0	49.0

Test Hole #248-41
(3-27-2cbcc)
Red Willow County

Location: SW SW NW SW sec. 2, T. 3 N., R. 27 W.; 0.23 mile north of southwest corner of quarter, on east side of highway.
Ground elevation: 2,358 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: 19.2 ft., (9-8-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	4.0
Clay, sandy, slate brown; containing some calcareous fossilized material	4.0	11.0
Silt, sandy, brownish black	11.0	14.0
Clay, sandy, buff gray	14.0	16.0
Gravel, medium, reddish brown; not very compact	16.0	21.0
Gravel, medium to coarse; some grains covered with black carbonaceous material	21.0	22.0
Clay, light khaki, and coarse to medium gravel, brown	22.0	23.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, yellowish brown	23.0	25.0
Shale, olive drab	25.0	29.0

Test Hole #256-41
(3-27-8adda)
Red Willow County

Location: NE SE SE NE sec. 8, T. 3 N., R. 27 W.; 0.1 mile north of southeast corner, on west side of road.
Ground elevation: 2,373 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: 25.1 ft., (9-16-41.)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, dark gray to drab, soil	0.0	13.0
Soil, sandy, clayey, light buff	13.0	20.0
Gravel, fine to medium coarse, red	20.0	37.0
Sand, fine	37.0	45.0
Gravel, medium, red; some fine sand	45.0	49.0
Clay, greenish yellow	49.0	51.0
Clay, greenish gray; some green gravel	51.0	58.0
Gravel, medium to coarse, red	58.0	62.0
Gravel, medium to coarse, green	62.0	63.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, buff to gray	63.0	69.0

Test Hole #252-41
(3-27-10aabb)
Red Willow County

Location: NW NW NE NE sec. 10, T. 3 N., R. 27 W.; about 30 feet south of corner.
Ground elevation: 2,352 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 4.7 ft., (9-8-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, silty	0.0	2.0
Gravel, fine, brownish red	2.0	7.0
Gravel, fine to medium, grayish green	7.0	17.0
Gravel, fine to medium; some fine sand	17.0	19.0
Gravel, same as above but sand not so evident	19.0	21.0
Gravel, fine, brown; some fine sand	21.0	24.0
Gravel, medium, brownish red	24.0	32.0
Gravel, fine, brown; some fine sand	32.0	37.0
Gravel, medium, brown	37.0	40.0
Sand, fine, brown; some reddish brown gravel	40.0	45.0
Gravel, fine to medium, reddish brown; some fine sand	45.0	55.0
Sand, fine, brown	55.0	65.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, dark olive gray	65.0	69.0

Test Hole #253-41
(3-27-10dacc)
Red Willow County

Location: SW SW NE SE sec. 10, T. 3 N., R. 27 W.; 216 feet north and 66 feet west of windmill, just east of north and south fence.
Ground elevation: 2,340 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 6.5 ft., (9-8-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, fine, and sandy soil	0.0	4.0
Gravel, fine, medium, coarse, brown	4.0	9.0
Gravel, coarse, grayish green; streaks of gray clay.	9.0	12.0
Gravel, medium to fine, green to gray; some limy pebbles	12.0	35.0
Gravel, medium to fine, red	35.0	50.0
Sand, very fine, red to gray	50.0	63.0
Gravel, medium to fine, red	63.0	65.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, brown	65.0	66.0

Test Hole #254-41
(3-27-10bbcc)
Red Willow County

Location: SW SW NW NW sec. 10, T. 3 N., R. 27 W.; 0.25 mile south of northwest corner of quarter, on east side of road.
Ground elevation: 2,355 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 11.9 ft., (9-8-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, sandy, gray	0.0	9.0
Sand, fine; some clay streaks	9.0	12.0
Gravel, fine to medium, gray	12.0	20.0
Gravel, fine to medium, red	20.0	41.0
Sand, fine, red	41.0	64.0
Sand, medium to fine	64.0	67.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, gray speckled, some buff	67.0	69.0

Test Hole #255-41
(3-27-10ddcc)
Red Willow County

Location: SW SW SE SE sec. 10, T. 3 N., R. 27 W.; 140 feet north of southwest corner of forty, on east side of fence.
Ground elevation: 2,338 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 5.6 ft., (9-15-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, fine, silty, brown	0.0	2.0
Gravel, fine, brown; not compact	2.0	8.0
Gravel, fine to medium, green and brown intermingled	8.0	9.0
Gravel, medium to coarse, green	9.0	13.0
Gravel, fine, green	13.0	14.0
Gravel, medium to coarse, greenish brown	14.0	17.0
Gravel, fine to medium, greenish brown; some fine sand from 19 to 25 feet	17.0	25.0
Gravel, fine to medium, brown; some fine sand throughout	25.0	40.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, brownish olive drab	40.0	49.0

Test Hole #249-41
(3-27-11bbbc)
Red Willow County

Location: SW NW NW NW sec. 11, T. 3 N., R. 27 W.; 0.1 mile south of northwest corner of quarter, on east edge of road.
Ground elevation: 2,336 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 4.4 ft., (9-8-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and buff sand.....	0.0	5.0
Gravel, fine to medium, red.....	5.0	10.0
Gravel, fine to coarse, red; good.....	10.0	23.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, hard, dark gray to black, white specks.....	23.0	29.0

Test Hole #250-41
(3-27-11bccc)
Red Willow County

Location: SW SW SW NW sec. 11, T. 3 N., R. 27 W.; 350 feet north of southwest corner of quarter, on east side of road.
Ground elevation: 2,339 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 5.1 ft., (9-8-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, and fine to coarse red gravel.....	0.0	7.0
Gravel, fine to coarse, grayish red.....	7.0	16.0
Gravel, fine to coarse, red.....	16.0	21.0
Gravel, mostly coarse, red; some water-worn lime....	21.0	29.0
Gravel, fine to medium, some coarse, slightly compact; some water-worn shale and water-worn limy Ogallala lithics.....	29.0	42.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, khaki to olive brown colored.....	42.0	45.0
Shale, compact, dark gray.....	45.0	47.0

Test Hole #251-41
(3-27-11ccbb)
Red Willow County

Location: NW NW SW SW sec. 11, T. 3 N., R. 27 W.; 240 feet south of northwest corner of forty, 20 feet east of fence.
Ground elevation: 2,335 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 4.6 ft., (9-8-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, fine, and fine sand.....	0.0	4.0
Gravel, fine, medium, coarse, greenish grayish red; clean.....	4.0	18.0
Sand, fine; some fine to medium gravel, loose.....	18.0	25.0
Gravel, fine to medium, some coarse, red; very loose.....	25.0	30.0
Gravel, fine to medium, some coarse, much fine, red.	30.0	40.0
Gravel, fine to medium, red; very loose, drilled like coarse gravel.....	40.0	64.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, tough, dark olive gray to almost black.....	64.0	66.0

Test Hole #246-41
(3-27-13bcad)
Red Willow County

Location: SE NE SW NW sec. 13, T. 3 N., R. 27 W.; 0.2 mile east of west line of section, 100 feet east of bridge over drainage, on north edge of road.
Ground elevation: 2,355 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 30.6 ft., (9-8-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	4.0
Loam, clayey, blackish brown	4.0	10.0
Clay, sandy, blackish brown	10.0	16.0
Clay, sandy, dark khaki brown	16.0	28.0
Gravel, medium, brown; quite porous; clay seam at 36 feet about 6 inches thick	28.0	40.0
Clay, sandy, light brown; some medium brown gravel, quite compact	40.0	47.0
Clay, sandy, calcareous; red with medium brown gravel, quite compact	47.0	50.0
Clay, sandy, and medium brown gravel, compact	50.0	59.0
Gravel, medium, reddish brown	59.0	61.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, buff	61.0	62.0
Shale, buff gray	62.0	65.0

Test Hole #247-41
(3-27-14baca)
Red Willow County

Location: NE SW NE NW sec. 14, T. 3 N., R. 27 W.; 0.12 mile west of bridge over drainage, 0.55 mile west of road to south, on north edge of road, just east of trail to south.
Ground elevation: 2,359 feet (t). (Danbury NE 7.5 min. quadrangle)
Depth to water: 28.5 ft., (9-4-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, grayish black loam	0.0	9.0
Loam, clayey, dark gray	9.0	14.0
Clay, slightly sandy, buff to tan	14.0	29.0
Gravel, fine to medium, reddish	29.0	37.0
Gravel, medium to coarse	37.0	40.0
Gravel, fine, white to red	40.0	55.0
Gravel, medium to coarse, red	55.0	61.0
Gravel, fine to medium, buff to gray; some sandy limy clay	61.0	70.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, limy, light buff; some gravel	70.0	75.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, limy, buff to gray	75.0	78.0
Shale, olive drab	78.0	79.0

Test Hole #263-41
(3-27-16daba)
Red Willow County

Location: NE NW NE SE sec. 16, T. 3 N., R. 27 W.; 150 feet west of bridge, on south side of road.
Ground elevation: 2,359 feet (t). (Danbury 7.5 min. quadrangle)
Depth to water: 16.3 ft., (9-30-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil and road fill, silty, brown	0.0	7.0
Clay, light buff, yellow; some limy streaks	7.0	24.0
Silt, sandy, grayish buff; compact, some streaks of magnetite	24.0	35.0
Sand, shaly, brownish green; some streaks of compact brownish green shale	35.0	36.0
Clay, limy, white to buff gray	36.0	39.0
Gravel, medium to coarse, green	39.0	47.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Clay, shaly, light yellow	47.0	50.0
Shale, light gray to buff	50.0	55.0
Shale, olive drab to chocolate brown	55.0	59.0

Test Hole #262-41
(3-27-17dbdd)
Red Willow County

Location: SE SE NW SE sec. 17, T. 3 N., R. 27 W.; 0.05 mile west of southeast corner of forty, on south side of road.
Ground elevation: 2,368 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: 10.3 ft., (9-30-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark gray soil	0.0	7.0
Sand, silty, fine	7.0	11.0
Sand, fine, and fine red gravel	11.0	13.0
Gravel, fine to coarse, clean, red	13.0	17.0
Gravel, coarse, red; streaks of medium gray to black sandy silt	17.0	20.0
Gravel, medium to coarse, clean, red	20.0	25.0
Sand, medium, and coarse red gravel	25.0	27.0
Sand, very fine, red	27.0	45.0
Gravel, medium to coarse, red	45.0	47.0
Sand, very fine, red	47.0	58.0
Gravel, medium, green; some pieces of yellow to ochre colored shale	58.0	65.0
Gravel, coarse, red; some light yellow to yellowish gray sandy clay	65.0	71.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, dark olive drab to yellowish green	71.0	74.0
Shale, dark gray	74.0	77.0

Test Hole #259-41
(3-27-18bbda)
Red Willow County

Location: NE SE NW NW sec. 18, T. 3 N., R. 27 W.; 700 feet south of northeast corner of quarter, on west edge of road.
Ground elevation: 2,375 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: 10 ft., (9-23-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown soil	0.0	6.0
Clay, sandy, silty, buff	6.0	14.0
Sand and fine gravel, reddish brown	14.0	18.0
Gravel, fine to medium, mostly gray; some gray silt, dirty	18.0	27.0
Gravel, coarse, grayish red	27.0	29.0
Gravel, fine to medium, very loose, red	29.0	37.0
Gravel, coarse, red; flint boulders at 37 feet	37.0	39.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, hard, steel gray, white specks	39.0	45.0

Test Hole #260-41
(3-27-18cbad)
Red Willow County

Location: SE NE NW SW sec. 18, T. 3 N., R. 27 W.; 0.1 mile south of northwest corner of forty, on east edge of road.
Ground elevation: 2,368 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: caved at 7 ft., (9-23-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and brown soil.....	0.0	5.0
Clay, silty, light brown.....	5.0	8.0
Gravel, fine to coarse, red.....	8.0	25.0
Gravel, fine to medium.....	25.0	49.0
Sand, very fine, gray to red; some fine shale particles, probably Niobrara shale at 59 feet.....	49.0	59.0

Test Hole #261-41
(3-27-18cddc)
Red Willow County

Location: SW SE SE SW sec. 18, T. 3 N., R. 27 W.; 110 feet east of road intersection, south of river bridge, on north edge of road.
Ground elevation: 2,372 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: caved at 9.2 ft., (9-30-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and brown sandy soil	0.0	6.0
Soil, light brown to buff	6.0	8.0
Soil, sandy, gray	8.0	9.0
Gravel, fine to medium, clean, red	9.0	13.0
Gravel, medium to coarse, gray; some gray sandy clay streaks, dirty	13.0	15.0
Clay, sandy, gray	15.0	19.0
Sand, fine, red	19.0	23.0
Gravel, medium to coarse, clean, red	23.0	29.0
Sand, fine, red	29.0	33.0
Gravel, medium to fine, red; some fine sand	33.0	40.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, medium, grayish buff to black	40.0	46.0

Test Hole #280-41
(3-28-5dbcc)
Red Willow County

Location: SW SW NW SE sec. 5, T. 3 N., R. 28 W.; 4 mile south of center line of section, on east edge of road.
Ground elevation: 2,448 feet (t). (Quick SE 7.5 min. quadrangle)
Depth to water: 29.7 ft., (10-14-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and black sandy soil	0.0	8.0
Soil, sandy, medium, brown	8.0	10.0
Clay, sandy, tan	10.0	31.0
Clay, sandy, grayish buff	31.0	33.0
Gravel, fine to medium, red	33.0	41.0
Clay, sandy, tan	41.0	46.0
Gravel, medium to coarse, green	46.0	55.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, light green; clay and fine green sand	55.0	60.0
Gravel, fine to very coarse, green	60.0	69.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Rock, quartzitic, dark green	69.0	69.1

Test Hole #279-41
(3-28-8badd)
Red Willow County

Location: SE SE NE NW sec. 8, T. 3 N., R. 28 W.; 0.2 mile south of north section line, 300 feet north of bridge, on west side of road.
Ground elevation: 2,422 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 7.8 ft., (10-14-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, black	0.0	5.0
Soil, sandy, dark brown	5.0	13.0
Silt, very fine, and red sand	13.0	21.0
Clay, sandy, medium gray	21.0	33.0
Gravel, fine to medium, red	33.0	50.0
Gravel, fine to medium, red; harder, limy pieces	50.0	60.0
Shale, black; streaks of bentonite	60.0	64.0
Gravel, coarse, red	64.0	66.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, black	66.0	69.0

Test Hole #257-41
(3-28-12cccc)
Red Willow County

Location: SW SW SW SW sec. 12, T. 3 N., R. 28 W.; 51 feet north and 57 feet east of southwest corner of section, on north side of highway.
Ground elevation: 2,406 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: 30.1 ft., (9-15-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, brown.....	0.0	25.0
Soil, light brown.....	25.0	28.0
Gravel, fine to medium coarse, red.....	28.0	40.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, limy, white.....	40.0	41.0
Shale, light green.....	41.0	48.0
Shale, yellow.....	48.0	55.0
Shale, yellowish gray.....	55.0	69.0

Test Hole #258-41
(3-28-12acdd)
Red Willow County

Location: SE SE SW NE sec. 12, T. 3 N., R. 28 W.; 0.23 mile west of southeast corner of NE 1/4, on north side of road.
Ground elevation: 2,405 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: 21.9 ft., (9-15-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Clay, sandy, blackish brown	0.0	8.0
Clay, sandy, brownish black	8.0	11.0
Clay, slightly sandy, brownish buff	11.0	15.0
Clay, sandy, buff gray	15.0	24.0
Gravel, brown	24.0	25.0
Clay, sandy, buff gray	25.0	26.0
Silt, sandy, grayish black	26.0	39.0
Sand, fine, grayish green	39.0	40.0
Silt, sandy, blackish gray	40.0	46.0
Gravel, mixed, fine	46.0	48.0
Silt, sandy, blackish gray	48.0	52.0
Gravel, mixed, fine	52.0	54.0
Silt, sandy, blackish gray	54.0	67.0
Gravel, fine to medium, brown	67.0	75.0
Gravel, coarse, green	75.0	77.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, grayish black	77.0	81.0

Test Hole #313-41
(3-28-16bcad)
Red Willow County

Location: SE NE SW NW sec. 16, T. 3 N., R. 28 W.; 75 feet south of creek bridge, on west side of road.
Ground elevation: 2,405 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: 8.8 ft., (10-27-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and medium brown sandy soil.....	0.0	8.0
Gravel, medium to coarse, green.....	8.0	11.0
Gravel, medium, gray; very dirty.....	11.0	13.0
Gravel, medium to coarse, green.....	13.0	14.0
Tertiary System - Miocene Series - Ogallala Group:		
Chalk or lime, medium hard, white.....	14.0	15.0
Clay, sandy, yellowish green to green; streaks of hard lime, flinty concretions.....	15.0	24.0
Clay, sandy, buff tan.....	24.0	31.0
Clay, sandy, buff green.....	31.0	35.0
Gravel, medium, green.....	35.0	39.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, orange yellow, and brownish green quartzite..	39.0	39.5

Test Hole #267-41
(3-28-17abcc)
Red Willow County

Location: SW SW NW NE sec. 17, T. 3 N., R. 28 W.; 0.2 mile south of north section line, on east side of road.
Ground elevation: 2,422 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 28.7 ft., (10-7-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, gravelly, and dark brown sandy soil.....	0.0	6.0
Clay, sandy, buff.....	6.0	14.0
Clay, sandy, tan; streaks of indurated clay.....	14.0	17.0
Sand, fine, red.....	17.0	19.0
Clay, sandy, light green.....	19.0	22.0
Clay, sandy, medium, grayish blue.....	22.0	28.0
Clay, sandy, dark gray to medium blue.....	28.0	46.0
Gravel, medium to coarse, green.....	46.0	68.0
Gravel, medium to very coarse, red.....	68.0	72.0
Gravel, fine, green.....	72.0	74.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, speckled, buff to bluish gray.....	74.0	79.0

Test Hole #268-41
(3-28-17dbcc)
Red Willow County

Location: SW SW NW SE sec. 17, T. 3 N., R. 28 W.; 0.2 mile south of northwest corner of quarter, on east side of road.
Ground elevation: 2,418 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 12.5 ft., (10-7-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil and roadfill, sandy, dark grayish brown.....	0.0	7.0
Clay, very sandy, light buff.....	7.0	18.0
Sand, fine to medium, red.....	18.0	42.0
Sand, coarse, and fine green gravel.....	42.0	46.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, speckled, buff to dark olive drab.....	46.0	49.0

Test Hole #269-41
(3-28-17dadd)
Red Willow County

Location: SE SE NE SE sec. 17, T. 3 N., R. 28 W.; 50 feet north of southeast corner of forty, on west side of road.
Ground elevation: 2,405 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: caved at 8 ft., (10-7-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and buff sandy silt.....	0.0	3.0
Sand, very fine, red.....	3.0	15.0
Sand, fine to coarse, gray.....	15.0	27.0
Sand, very fine, reddish gray.....	27.0	39.0
Sand, very fine, to medium red gravel.....	39.0	63.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, speckled, grayish buff to dark gray.....	63.0	69.0

Test Hole #312-41
(3-28-17cccc)
Red Willow County

Location: SW SW SW SW sec. 17, T. 3 N., R. 28 W.; 50 feet south of railroad, on east side of trail.
Ground elevation: 2,429 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 15.1 ft., (10-27-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Top soil, sandy, dark brown	0.0	4.0
Soil, sandy, gray buff	4.0	7.0
Silt, black to dark brown	7.0	8.0
Clay, sandy, grayish buff	8.0	10.0
Clay, sandy, grayish yellow	10.0	14.0
Clay, gray	14.0	17.0
Gravel, medium to coarse, red	17.0	21.0
Sand, fine, red	21.0	22.0
Clay, sandy, grayish yellow to yellow green	22.0	28.0
Sand, fine, green, and medium green gravel	28.0	35.0
Gravel, medium to coarse, green	35.0	37.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Clay, indurated, yellowish green	37.0	38.0
Shale, yellow to light gray	38.0	39.0

Test Hole #275-41
(3-28-20ddaa)
Red Willow County

Location: NE NE SE SE sec. 20, T. 3 N., R. 28 W.; 0.2 mile north of southeast corner of quarter, on west side of road.
Ground elevation: 2,407 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: 6.2 ft., (10-11-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill, black sandy soil.....	0.0	3.0
Soil, sandy, light tan.....	3.0	6.0
Sand, fine, red.....	6.0	12.0
Gravel, medium, to very coarse, grayish green.....	12.0	31.0
Sand, fine, red, and medium to coarse red gravel....	31.0	53.0
Cretaceous System, Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, buff to dark gray.....	53.0	59.0

Test Hole #270-41
(3-28-21bcab)
Red Willow County

Location: NW NE SW NW sec. 21, T. 3 N., R. 28 W.; 100 feet north of river bridge, on west side of road.
Ground elevation: 2,405 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: caved at 8.1 ft., (10-7-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine, red.....	0.0	9.0
Sand, medium, gray, streaks of very fine sand.....	9.0	49.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, hard, dark gray to black.....	49.0	52.0

Test Hole #274-41
(3-28-21cbbb)
Red Willow County

Location: NW NW NW SW sec. 21, T. 3 N., R. 28 W.; on east side of road.
Ground elevation: 2,407 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: 6.6 ft., (10-11-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, gravel and buff sandy soil.....	0.0	3.0
Sand, very fine, and medium gravel, red.....	3.0	9.0
Gravel, medium, gray; streaks of black sandy silt...	9.0	10.0
Clay, sandy, light gray.....	10.0	11.0
Sand, fine, to medium gray gravel.....	11.0	26.0
Gravel, coarse, gray.....	26.0	35.0
Sand, fine, red, to fine red gravel.....	35.0	65.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, grayish buff to dark gray.....	65.0	69.0

Test Hole #278-41
(3-28-22ddad)
Red Willow County

Location: SE NE SE SE sec. 22, T. 3 N., R. 28 W.; 200 feet west of east line, on south side of road.
Ground elevation: 2,410 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: 21.5 ft., (10-11-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown sandy soil.....	0.0	10.0
Soil, silty, black.....	10.0	14.0
Clay, sandy, tan to buff.....	14.0	18.0
Clay, sandy, light buff gray.....	18.0	25.0
Sand, very fine to medium, reddish gray.....	25.0	28.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, limy, very fine to medium; cemented gray sand, streaks of white clay, hard streaks.....	28.0	44.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Flint or chert, very hard, greenish brown.....	44.0	44.2

Test Hole #265-41
(3-28-23dadb)
Red Willow County

Location: NW SE NE SE sec. 23, T. 3 N., R. 28 W.; 600 feet west of east section line, on south edge of road.
Ground elevation: 2,392 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: 19.9 ft., (9-30-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and brown sandy soil.....	0.0	17.0
Silt, brown to gray; some lime fragments.....	17.0	20.0
Silt, sandy, light brown to buff.....	20.0	39.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, silty, soft pink to green.....	39.0	44.0
Clay, sandy, white to light pink gray; some gravel stones.....	44.0	50.0
Gravel, medium, green; clean.....	50.0	53.0
Cretaceous System - Upper Cretaceous - Colorado Group:		
Niobrara Formation:		
Rock, quartzitic, hard, green.....	53.0	53.1

Test Hole #277-41
(3-28-28aaaa)
Red Willow County

Location: NE NE NE NE sec. 28, T. 3 N., R. 28 W.; 100 feet west of section corner, on south side of road.
Ground elevation: 2,425 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: 30.6 ft., (10-11-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown soil.....	0.0	4.0
Clay, sandy, tan.....	4.0	8.0
Silt, sandy, fine, brown.....	8.0	10.0
Clay, buff green.....	10.0	21.0
Sand, very fine.....	21.0	29.0
Sand, fine, and medium to coarse red gravel.....	29.0	39.0
Gravel, medium to very coarse, red.....	39.0	44.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, yellow to dark olive drab.....	44.0	49.0

Test Hole #276-41
(3-28-29addd)
Red Willow County

Location: SE SE SE NE sec. 29, T. 3 N., R. 28 W.; 120 feet north of half section line, on west side of road.
Ground elevation: 2,444 feet (t). (Indianola 7.5 min. quadrangle)
Depth to water: 33.4 ft., (10-11-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown soil	0.0	7.0
Clay, silty, light tan to buff	7.0	33.0
Gravel, fine to medium, red	33.0	39.0
Clay, sandy, tan	39.0	44.0
Gravel, fine to coarse, red	44.0	62.0
Clay, sandy, grayish yellow	62.0	66.0
Gravel, very coarse, red	66.0	69.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, sandy, yellowish green	69.0	76.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Clay, limy, whitish yellow; some hard streaks	76.0	77.0
Rock, cherty, hard, white	77.0	77.3

Test Hole #5-RS-97
(3-28-30bbaa)
Red Willow County

Location: NE NE NW NW sec. 30, T. 3 N., R. 28 W., approximately 250 feet south and 1,240 feet east of northwest corner.
Ground elevation: 2,427 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 7.4 ft. (9-25-97).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to coarse; slightly silty.....	0.0	6.0
Silt, moderately clayey, moderately sandy, gray; sand is very fine to medium.....	6.0	8.0
Sand, very fine to very coarse; contains gray sandy silt layers from 10.0 to 14.0 ft.....	8.0	15.0
Sand, very fine to medium.....	15.0	20.0
Sand, very fine to coarse.....	20.0	25.0
Sand and gravel, very fine sand to fine gravel; below 50.0 ft, some reworked Ogallala and Cretaceous shale gravel (lithic gravel); some medium gravel below 55.0 ft.....	25.0	61.0
Gravel, very sandy; coarse sand to medium gravel; some fine to medium sand; trace coarse gravel.....	61.0	65.0
Gravel, moderately sandy; very coarse sand to coarse gravel; trace very coarse gravel below 70.0 ft....	65.0	74.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, gray, very calcareous.....	74.0	80.0

Test Hole #6-RS-97
(3-28-30bbaa)
Red Willow County

Location: NE NE NW NW sec. 30, T. 3 N., R. 28 W., approximately 250 feet south and 1,160 feet east of northwest corner.
Ground elevation: 2427 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 7.9 ft. (9-25-97).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium, some coarse sand.....	0.0	7.0
Silt, moderately clayey, moderately sandy, grayish brown; sand is very fine to very coarse...	7.0	9.0
Sand and gravel; very fine sand to fine gravel; trace medium to coarse gravel from 40 to 45.0 ft..	9.0	50.0
Sand and gravel; coarse sand to medium gravel.....	50.0	55.0
Sand and gravel; medium sand to fine gravel, some medium gravel.....	55.0	60.0
Sand and gravel; fine sand to medium gravel, trace coarse gravel; some coarse gravel below 70.0 ft...	60.0	74.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, dark gray, very calcareous.....	74.5	81.0

Test Hole #7-RS-97
(3-28-30bbaa)
Red Willow County

Location: NE NE NW NW sec. 30, T. 3 N., R. 28 W., approximately 170 feet south and 1,270 feet east of northwest corner.
Ground elevation: 2,427 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 8.2 ft. (9-25-97).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium, slightly silty.....	0.0	5.0
Sand, very fine to very coarse; some very fine gravel.....	5.0	10.0
Sand, moderately gravelly; very fine sand to fine gravel; contains gray silt layers below 16.0 ft...	10.0	20.0
Sand, very fine to medium, some coarse sand.....	20.0	25.0
Sand and gravel; very fine sand to fine gravel; some medium to coarse gravel below 45.0 ft.....	25.0	50.0
Sand and gravel; fine sand to fine gravel.....	50.0	65.0
Gravel, very sandy; coarse sand to fine gravel, some fine to medium sand.....	65.0	70.0
Gravel, very sandy; coarse sand to medium gravel, some coarse gravel.....	70.0	74.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, dark gray, very calcareous.....	74.5	81.0

Test Hole #8-RS-97
(3-28-30bbaa)
Red Willow County

Location: NE NE NW NW sec. 30, T. 3 N., R. 28 W., approximately 100 feet south and 1305 feet east of northwest corner.
Ground elevation: 2,427 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 8.0 ft. (9-25-97).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Sand, very fine to medium, some coarse sand.....	0.0	6.0
Silt, moderately clayey, moderately sandy, grayish brown; sand is very fine.....	6.0	10.0
Sand, very fine to medium, some coarse sand to fine gravel.....	10.0	20.0
Sand, very fine to coarse, some very coarse sand to very fine gravel.....	20.0	25.0
Sand and gravel; very fine sand to fine gravel.....	25.0	40.0
Sand, very fine to very coarse; some fine gravel....	40.0	45.0
Sand and gravel; very fine sand to fine gravel.....	45.0	55.0
Gravel, moderately sandy; coarse sand to medium gravel; some fine to medium sand; trace coarse gravel below 70.0 ft.....	55.0	75.5
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, dark gray, very calcareous.....	75.5	82.0

Test Hole #307-41
(3-29-25cdcc)
Red Willow County

Location: SW SW SE SW sec. 25, T. 3 N., R. 29 W.; on north side of road.
Ground elevation: 2,436 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 7.5 ft., (10-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark brown	0.0	4.0
Clay, sandy, tan	4.0	7.0
Gravel, fine to medium, red	7.0	12.0
Gravel, fine to medium, gray	12.0	17.0
Gravel, coarse to very coarse, gray	17.0	33.0
Sand, fine to medium, gray	33.0	36.0
Gravel, coarse to very coarse, gray	36.0	43.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, very hard, black	43.0	43.5

Test Hole #311-41
(3-29-25ddcc)
Red Willow County

Location: SW SW SE SE sec. 25, T. 3 N., R. 29 W.; 0.2 mile west of southeast corner of section, on north side of road.
Ground elevation: 2,439 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 13.2 feet, October 27, 1941.

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and grayish buff sandy clay.....	0.0	4.0
Soil, sandy, dark brown.....	4.0	7.0
Clay, sandy, grayish tan.....	7.0	9.0
Sand, medium, red, and fine to medium red gravel....	9.0	15.0
Gravel, medium to coarse, red.....	15.0	18.0
Gravel, medium to coarse, gray.....	18.0	19.0
Gravel, coarse to very coarse, red.....	19.0	22.0
Gravel, medium to coarse, red.....	22.0	25.0
Sand, medium, red, and fine red gravel.....	25.0	31.0
Sand, fine, red.....	31.0	35.0
Gravel, medium to coarse, red; dirty.....	35.0	36.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, black.....	36.0	39.0

Test Hole #1-A-35
(3-29-28bcbb)
Red Willow County

Location: NW NW SW NW Sec. 28, T. 3 N., R. 29 W.; just north of bridge across drainage line, about 1/4 mile north of pavement, on east side of road.
Ground elevation: 2,482 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: not measured (7-3-35).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Alluvium sand and gravel.....	0.0	15.0
Clay; fine gravel, reworked.....	15.0	19.0
Sand, coarse, and fine gravel.....	19.0	23.0
Clay, sandy, yellow.....	23.0	39.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, gray to black.....	39.0	43.0

Test Hole #296-41
(3-29-28dddd)
Red Willow County

Location: SE SE SE SE sec. 28, T. 3 N., R. 29 W.; 40 feet west of southeast corner of section, on north side of road.
Ground elevation: 2,482 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 34.3 ft., (10-20-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey and sandy, tan.....	0.0	40.0
Clay, very sandy, bluish gray.....	40.0	49.0
Gravel, fine to medium, gray.....	49.0	56.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, black.....	56.0	59.0

Test Hole #293-41
(3-29-32abca)
Red Willow County

Location: NE SW NW NE sec. 32, T. 3 N., R. 29 W.; 0.25 mile south of north line, 50 feet west of highway, 200 feet north of river bridge.
Ground elevation: 2,466 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 25.4 ft., (10-20-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, slightly clayey and sandy, tan.....	0.0	30.0
Clay, sandy, grayish blue.....	30.0	36.0
Gravel, fine to coarse, green; seams of very fine sand.....	36.0	41.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray; very hard at 43 feet.....	41.0	43.0

Test Hole #302-41
(3-29-32bbbb)
Red Willow County

Location: NW NW NW NW sec. 32, T. 3 N., R. 29 W.; 30 feet east of west section line, on south side of trail.
Ground elevation: 2,468 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 2.8 ft., (10-25-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil, sandy, gray	0.0	3.0
Sand, fine to medium, red	3.0	7.0
Gravel, fine to medium, gray; clean	7.0	11.0
Gravel, medium to coarse, gray; clean	11.0	21.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, medium, gray	21.0	25.0

Test Hole #301-41
(3-29-33dadd)
Red Willow County

Location: SE SE NE SE sec. 33, T. 3 N., R. 29 W.; 60 feet west of southeast corner of forty, at west of curve, on north edge of road.
Ground elevation: 2,454 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 4.5 ft., (10-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	4.0
Clay, sandy, gray	4.0	7.0
Sand, fine, gray	7.0	10.0
Sand, and fine gravel, grayish green	10.0	21.0
Sand, fine to coarse, red	21.0	30.0
Sand and fine gravel, red	30.0	41.0
Gravel, fine, some coarser	41.0	45.0
Gravel, fine, some coarser, red; some water-worn shale	45.0	65.0
Gravel, fine to coarse, red; some water-worn shale	65.0	73.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray to black	73.0	79.0

Test Hole #303-41
(3-29-33babb)
Red Willow County

Location: NW NW NE NW sec. 33, T. 3 N., R. 29 W.; on south side of road.
Ground elevation: 2,488 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 28.9 ft., (10-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown sandy soil.....	0.0	2.0
Silt, slightly clayey and sandy, tan.....	2.0	32.0
Clay, sandy, grayish blue.....	32.0	44.0
Gravel, medium, gray; dirty.....	44.0	46.0
Gravel, medium, gray; much reworked shale and blue clay.....	46.0	47.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, black.....	47.0	49.0

Test Hole #304-41
(3-29-33cdbb)
Red Willow County

Location: NW NW SE SW sec. 33, T. 3 N., R. 29 W.; on south side of road.
Ground elevation: 2,464 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 6.8 ft., (10-25-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and brown sandy soil.....	0.0	4.0
Clay, sandy, tan.....	4.0	10.0
Clay, sandy, bluish gray.....	10.0	14.0
Gravel, medium to coarse, gray.....	14.0	26.0
Gravel, coarse to very coarse, gray.....	26.0	30.0
Sand, fine, gray.....	30.0	34.0
Gravel, coarse to very coarse, gray.....	34.0	41.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, black.....	41.0	44.0

Test Hole #305-41
(3-29-35cbcb)
Red Willow County

Location: NW SW NW SW sec. 35, T. 3 N., R. 29 W.; 0.1 mile north of northwest corner of forty, on east side road.
Ground elevation: 2,453 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 9.1 ft., (10-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark brown	0.0	4.0
Clay, sandy, tan	4.0	7.0
Clay, sandy, grayish buff	7.0	11.0
Gravel, medium, red; some gray clay streaks	11.0	14.0
Gravel, medium to coarse, red	14.0	18.0
Gravel, fine to medium, red	18.0	21.0
Sand, fine, red	21.0	24.0
Gravel, coarse, red	24.0	28.0
Gravel, fine to medium, red	28.0	37.0
Sand, fine, red	37.0	46.0
Gravel, fine to medium, red	46.0	52.0
Sand, very fine, red	52.0	56.0
Gravel, medium, red	56.0	68.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, black	68.0	69.0

Test Hole #306-41
(3-29-36cbbb)
Red Willow County

Location: NW NW NW SW sec. 36, T. 3 N., R. 29 W.; 200 foot east of west section line, on north side of road.
Ground elevation: 2,480 feet (t). (McCook East 7.5 min. quadrangle)
Depth to water: 31.5 ft., (10-25-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark brown.....	0.0	3.0
Sand, very fine, red; dirty.....	3.0	11.0
Clay, sandy, buff gray.....	11.0	30.0
Clay, sandy, reddish buff to grayish buff.....	30.0	34.0
Gravel, coarse, red; some pink lime and dark clay, dirty.....	34.0	36.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, black, some yellow streaks at top.....	36.0	39.0

Test Hole #323-41
(3-30-7cccc)
Red Willow County

Location: SW SW SW SW Sec. 7, T. 3 N., R. 30 W.; 150 feet north of southwest corner of section, on east edge of road.
Ground elevation: 2,573 feet (t). (Culbertson 7.5 min. quadrangle)
Depth to water: 26.4 ft., (11-1-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, and brown sandy soil	0.0	4.0
Sand, silty, clayey, buff; darker brown below 20 feet	4.0	25.0
Gravel, fine to medium, red	25.0	27.0
Gravel, fine to coarse, compact, red, some green; much lime and brown sandstone pebbles	27.0	34.0
Gravel, fine to coarse, red, some green; slightly compact, some lime pebbles	34.0	41.0
Gravel, fine to medium, clean, red	41.0	46.0
Gravel, medium to coarse, red; clean some very coarse	46.0	57.0
Gravel, fine to medium, red, some green	57.0	64.0
Clay, very sandy, tan	64.0	67.0
Gravel, fine to coarse, red and green; some green flint chips	67.0	76.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, weathered, very light gray; clay	76.0	80.0
Shale, tough, rubbery, dark blue gray to black	80.0	83.0

Test Hole #7-U-41
(3-30-12dddd)
Red Willow County

Location: SE SE SE SE sec. 12, T. 3 N., R. 30 W; 150 feet west of southeast corner of section, on north edge of road.
Ground elevation: 2,625 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: caved at 97.5 ft., (9-23-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, soft, buff	0.0	24.0
Silt, sandy, buff	24.0	39.0
Silt, clayey, reddish buff, brown	39.0	44.0
Silt, clayey, reddish buff	44.0	48.0
Silt, sandy, limy whitish reddish; plastic, limy concretions	48.0	54.0
Clay, tough, plastic, pinkish tan	54.0	63.0
Clay, tan; hard tan clay and limy concretions	63.0	72.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, tough, sticky, plastic, pinkish tan	72.0	77.0
Sand, soft, silty, tannish brown	77.0	81.0
Clay, tough, plastic, light tannish brown	81.0	86.0
Clay, sandy, limy, soft, whitish gray	86.0	89.0
Clay, less limy and softer	89.0	92.0
Silt, sandy, soft, tan	92.0	104.0
Silt, sandy, soft, limy, whitish brown; some limy concretions	104.0	112.0
Silt, sandy, soft, clayey, tan; cuts in large pieces, some scattered gravel	112.0	118.0
Gravel, medium, well sorted; quartz, more red chert grains, some green grains	118.0	146.0
Silt, sandy, soft, light gray, slight greenish cast.	146.0	151.0
Clay, sandy, green drab	151.0	155.0
Gravel, fine, red	155.0	165.0
Gravel, medium, chiefly green	165.0	171.0
Clay, hard, tan; flinty appearance, almost conchoidal fracture	171.0	172.0
Gravel, medium; quartz, red and green grains	172.0	182.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, weathered, tan	182.0	186.0
Shale, dark slate gray, slight blue color	186.0	200.0

Test Hole #320-41
(3-30-18ddaa)
Red Willow County

Location: NE NE SE SE sec. 18, T. 3 N., R. 30 W.; 0.2 mile north of southeast corner of section, on west edge of road.
Ground elevation: 2,546 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 19.1 ft., (11-1-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and brown silty sand.....	0.0	8.0
Sand, silty, buff to brown.....	8.0	14.0
Sand and fine to medium red gravel.....	14.0	16.0
Sand and fine to medium red gravel; some dirty streaks.....	16.0	26.0
Gravel, fine to coarse; fairly clean and loose.....	26.0	31.0
Sand and fine to medium gravel, loose, red; clean, some coarse gravel,.....	31.0	44.0
Gravel, fine to coarse, red; some sand, fairly compact,.....	44.0	51.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray; tough, compact.....	51.0	59.0

Test Hole #322-41
(3-30-18cccc)
Red Willow County

Location: SW SW SW SW sec. 18, T. 3 N., R. 30 W.; 130 feet north of railroad, south of highway, on east side of trail.
Ground elevation: 2,538 feet (t). (Culbertson 7.5 min. quadrangle)
Depth to water: 3.6 ft., (11-1-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Top soil, gray, and grayish buff sandy clay.....	0.0	4.0
Sand, fine to medium; some coarse greenish gray gravel.....	4.0	12.0
Gravel, medium to coarse, red; clay streak at 15 feet.....	12.0	18.0
Sand, medium, red, to fine red gravel.....	18.0	26.0
Gravel, medium to coarse, red.....	26.0	30.0
Sand, fine to medium, red; some fine red gravel.....	30.0	38.0
Gravel, fine to medium, red.....	38.0	41.0
Sand, fine, and fine red gravel.....	41.0	45.0
Gravel, medium to coarse, red.....	45.0	52.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray.....	52.0	59.0

Test Hole #318-41
(3-30-20dadd)
Red Willow County

Location: SE SE NE SE sec. 20, T. 3 N., R. 30 W.; 0.15 mile south of railroad, on west edge of road.
Ground elevation: 2,518 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: caved at 6 ft., (11-1-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and gray buff sandy clay.....	0.0	7.0
Gravel, medium to coarse, green.....	7.0	11.0
Gravel, fine to medium, some coarse, red.....	11.0	15.0
Gravel, medium to coarse, red.....	15.0	21.0
Gravel, medium dark, red.....	21.0	25.0
Gravel, coarse, dark red.....	25.0	31.0
Gravel, fine to medium, red.....	31.0	36.0
Gravel, coarse, red; some reworked shale pebbles....	36.0	41.0
Gravel, medium to coarse, red; some shale pebbles...	41.0	46.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray.....	46.0	49.0

Test Hole #319-41
(3-30-20aaaa)
Red Willow County

Location: NE NE NE NE sec. 20, T. 3 N., R. 30 W.; 90 feet south of northeast corner of section, on west edge of road.
Ground elevation: 2,536 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 14.8 ft., (11-1-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	4.0
Sand, silty, buff	4.0	7.0
Sand, silty, light gray	7.0	8.0
Gravel, fine, red; dirty	8.0	10.0
Gravel, fine to medium; some sand, red	10.0	17.0
Gravel, some fine, mostly very coarse, red; some shale pebbles	17.0	21.0
Gravel, fine to medium, red; many shale pebbles	21.0	24.0
Gravel, fine to medium, red; very clean	24.0	26.0
Gravel, fine to very coarse, red; clean except first foot which has some black	26.0	33.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray; compact, very little weathering at top	33.0	39.0

Test Hole #317-41
(3-30-22cbbc)
Red Willow County

Location: SW NW NW SW sec. 22, T. 3 N., R. 30 W.; 0.4 mile north of southwest corner, on east edge of road.
Ground elevation: 2,518 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: caved at 11.9 ft., (11-1-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill, dark brown sandy soil.....	0.0	6.0
Gravel, medium, red; dirty, clay streak at 9 feet...	6.0	10.0
Gravel, medium to coarse, red.....	10.0	15.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, weathered, grayish yellow.....	15.0	20.0
Shale, dark gray.....	20.0	29.0

Test Hole #4-A-35
(3-30-25cabd)
Red Willow County

Location: SE NW NE SW sec. 25, T. 3 N., R. 30 W.; 0.4 mile from west section line, just south of railroad, on north side of road.
Ground elevation: 2,490 feet. (t). (McCook West 7.5 min. quadrangle)
Depth to water: not measured, (7-7-35).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	2.0
Soil; embedded gravel, reworked material	2.0	10.0
Gravel, fine	10.0	12.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray to black	12.0	15.0

Test Hole #287-41
(3-30-25ddaa)
Red Willow County

Location: NE NE SE SE sec. 25, T. 3 N., R. 30 W.; 150 feet south of intersection, on west side of road.
Ground elevation: 2,488 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 8.8 ft., (10-20-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Gravel, road fill, and tan sandy clay.....	0.0	8.0
Sand, very fine, red.....	8.0	10.0
Sand, fine to coarse, red.....	10.0	24.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray.....	24.0	29.0

Test Hole #321-41
(3-30-26accb)
Red Willow County

Location: NW SW SW NE sec. 26, T. 3 N., R. 30 W.; 0.45 mile west of southeast corner, 40 feet north of highway, in ditch, 150 feet west of culvert, 600 feet southwest of old dry gravel pit.
Ground elevation: 2,515 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water, 20.2 ft., (11-1-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil, sandy, dark brown	0.0	4.0
Sand, silty, brown to buff	4.0	7.0
Sand and fine to medium gravel, red, green; much lime, dirty	7.0	11.0
Sand, silty to clayey, brown	11.0	15.0
Sand, silty to clayey, buff; some scattered gravel	15.0	20.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, brown	20.0	25.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark bluish gray to black; tough, compact, rubbery	25.0	29.0

Test Hole #2-A-35
(3-30-26bccb)
Red Willow County

Location: NW SW SW NW sec. 26, T. 3 N., R. 30 W.; just south of railroad, just east of section line, on south side of road.
Ground elevation: 2,508 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: not measured, (7-5-35).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	3.0
Soil	3.0	5.0
Clay, yellow	5.0	9.0
Clay, silty, grayish	9.0	10.0
Sand	10.0	13.0
Gravel, fine	13.0	16.0
Gravel, fairly coarse	16.0	21.0
Rock, conglomerate; unable to penetrate	21.0	22.0

Test Hole #3-A-35
(3-30-26bccb)
Red Willow County

Location: NW SW SW NW sec. 26, T. 3 N., R. 30 W.; just south of railroad, 30 feet east of section line, on south side of road.
Ground elevation: 2,508 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: not measured, (7-6-35).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	3.0
Loam, black	3.0	5.0
Silt, sandy, yellow	5.0	10.0
Clay, silty, fine	10.0	11.0
Gravel, fine	11.0	16.0
Gravel, fine, medium, coarse	16.0	19.0
Gravel, fairly coarse; much water worn Pierre, particularly from 19 to 22 feet and from 32 to 38 feet	19.0	38.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray to black, slightly weathered, compact	38.0	43.0

Test Hole #316-41
(3-30-28cbbc)
Red Willow County

Location: SW NW NW SW sec. 28, T. 3 N., R. 30 W.; 0.4 mile north of southwest corner of section, 0.18 mile south of river bridge, on east side of road.
Ground elevation: 2,519 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 11.15 ft., (11-1-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and buff silty sand.....	0.0	3.0
Sand, silty, brownish buff.....	3.0	10.0
Gravel, fine to medium; some fine sand, red.....	10.0	16.0
Gravel, greenish gray and red.....	16.0	17.0
Silt, gray.....	17.0	18.0
Gravel, fine to medium, red; dirty.....	18.0	24.0
Silt, gray.....	24.0	26.0
Gravel, fine to medium, grayish red.....	26.0	29.0
Gravel, fine to very coarse, greenish red; some large greenish gray rounded clay pebbles.....	29.0	42.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, hard, dark gray, slight greenish cast.....	42.0	47.0

Test Hole #20-HP-78
(3-30-31cccc)
Red Willow County

Location: SW SW SW SW sec. 31, T. 3 N., R. 30 W., 6 feet north of south section line and 14 feet east of west section line.
Ground elevation: 2,749 feet (t). (Culbertson 7.5 min. quadrangle)
Depth to water: 158-163 ft. (est.). (8-7-78).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt (Topsoil) loamy, light brownish-gray, subsoil below 2 ft.....	0.0	5.0
Silt to very fine sand, very pale brown, rare volcanic ash shards 10 to 45 ft, limy between 29 and 30 ft.....	5.0	52.0
Silt to very fine sand, pale brown, siltier with some limy streaks below 53 ft.....	52.0	55.0
Silt to very fine sand, very pale brown to white, limier 71 to 78 ft.....	55.0	83.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt and very fine sand, white to very pale brown, some rootlets, very calcareous, very limy 86 to 89 ft.....	83.0	89.0
Silt, some very fine sand, white to light greenish gray, some ash shards 93 to 95 ft, very ashy 95 to 97.5 ft, sandier between 102 to 105 ft, rootlets below 102 ft.....	89.0	112.0
Sand, very fine to medium, some coarse, rare rootlets white to light greenish white, slightly silty and limy.....	112.0	120.0
Silt to very fine sand, light greenish-white, limy.	120.0	126.0
Sand, very fine to medium, slightly silty, light greenish-yellow.....	126.0	132.0
Sandstone, very fine to medium, calcareous and limy, many rootlets, light greenish yellow.....	132.0	150.0
Sand, fine to very coarse, some fine to medium gravel.....	150.0	158.0
Silt, some siltstone and claystone interbedded with silty fine to medium sand, light greenish white, slightly cemented 165.5 to 166 ft, calcareous....	158.0	166.0
Sand, fine to very coarse, some fine gravel, some thin silty lenses and claystone fragments.....	166.0	177.0
Sand and gravel, fine sand to coarse gravel, silty, contains reworked claystone and weathered Pierre shale.....	177.0	182.0

Cretaceous System - Upper Cretaceous Series - Montana Group:

Pierre Formation:

Clay weathered shale, light gray to pale yellow variegated with some brownish-yellow, light gray to tan below 195 ft, light gray to black below 204 ft.....	182.0	210.0

Test Hole #315-41
(3-30-34addd)
Red Willow County

Location: SE SE SE NE sec. 34, T. 3 N., R. 30 W.; 240 feet north of southeast corner, on west edge of road.
Ground elevation: 2,496 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 5.9 ft,, (11-1-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, very fine red sand.....	0.0	3.0
Soil, sandy, dark brown, light at base.....	3.0	6.0
Gravel, medium to coarse, red.....	6.0	12.0
Gravel, medium to very coarse, gray.....	12.0	28.0
Gravel, coarse to very coarse, red.....	28.0	29.0
Gravel, medium, greenish red; streaks of fine sand..	29.0	66.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray.....	66.0	69.0

Test Hole #314-41
(3-30-35cddd)
Red Willow County

Location: SE SE SE SW sec. 35, T. 3 N., R. 30 W.; 40 feet west of south center line, on north side of road.
Ground elevation: 2,503 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 18.2 ft., (11-1-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, dark brown sandy soil	0.0	3.0
Soil, sandy, medium brown	3.0	5.0
Sand, fine, red	5.0	11.0
Gravel, medium, red	11.0	17.0
Gravel, coarse to very coarse, red	17.0	21.0
Sand, medium, red, and fine red gravel	21.0	24.0
Gravel, medium to coarse, red	24.0	29.0
Gravel, fine to coarse, red	29.0	42.0
Gravel, fine, red; very compact, some reworked shale, slightly dirty	42.0	45.0
Gravel, medium to coarse, red; some reworked shale	45.0	51.0
Sand, fine to medium, red	51.0	56.0
Gravel, coarse to very coarse, green and red	56.0	70.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray	70.0	75.0

Test Hole #288-41
(3-30-36daaa)
Red Willow County

Location: NE NE NE SE sec. 36, T. 3 N., R. 30 W.; approximately on east center line, 100 feet north of river bridge, on west side of road.
Ground elevation: 2,483 feet (t). (McCook West 7.5 min. quadrangle)
Depth to water: 7.5 ft., (10-20-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and dark brown sandy soil.....	0.0	3.0
Sand, fine, red, to fine red gravel.....	3.0	23.0
Sand, very fine, red.....	23.0	29.0
Gravel, medium to coarse, red.....	29.0	33.0
Sand, very fine, red.....	33.0	38.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray.....	38.0	45.0

Test Hole #99-41
(4-26-1ddcd)
Red Willow County

Location: SE SW SE SE sec. 1, T. 4 N., R. 26 W.; 0.15 mile west of southeast corner, 320 feet east of road to north.
Ground elevation: 2,294 feet (t). (Cambridge 7.5 min. quadrangle)
Depth to water: 10.2 ft., (7-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and fine brown sand.....	0.0	14.0
Gravel, fine to medium, reddish.....	14.0	19.0
Gravel, fine to coarse, red.....	19.0	22.0
Silt, brownish gray; organic matter.....	22.0	29.0
Silt, brownish gray; some gravel, wood.....	29.0	37.0
Silt, brownish gray.....	37.0	39.0
Woody material.....	39.0	40.0
Silt, bluish gray.....	40.0	50.0
Gravel, medium, gray; poor.....	50.0	52.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, gray, slight greenish lime.....	52.0	55.0

Test Hole #3-U-41
(4-26-6bccb)
Red Willow County

Location: NW SW SW NW sec. 6, T. 4 N., R. 26 W.; 0.1 mile north of southwest corner of NW quarter, on east edge of road.
Ground elevation: 2,548 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: 148.7 ft., (9-15-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, light buff; gastropod shells, dark soil at top	0.0	34.0
Silt, clayey, reddish buff, darker near top.....	34.0	42.0
Silt, clayey, limy, whitish buff.....	42.0	44.0
Silt, light buff.....	44.0	49.0
Silt, limy, white; less limy and more buff farther down.....	49.0	55.0
Silt, light buff.....	55.0	56.0
Silt, clayey, limy, whitish buff.....	56.0	57.0
Silt, light buff.....	57.0	69.0
Silt, clayey, limy, light buff.....	69.0	73.0
Silt, clayey, buff.....	73.0	78.0
Silt, clayey, reddish.....	78.0	88.0
Silt, limy, pale; lime nodule.....	88.0	89.0
Silt, clayey, light buff.....	89.0	93.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, hard, silty, limy, pinkish to flesh-colored.....	93.0	101.0
Sandstone, less limy, softer, browner, some pebbles.	101.0	106.0
Sandstone, silty, limy, light pinkish brown; scattered pebbles, harder zone.....	106.0	120.0
Sandstone, less limy, softer.....	120.0	123.0
Claystone, limy, dense, light flesh-colored; hard limy sandstone.....	123.0	127.0
Sandstone, fine, silty, very limy, light yellow; not very hard.....	127.0	128.0
Mudstone, fine, dense, limy, pale, flesh-colored; very hard.....	128.0	130.0
Silt, soft, sandy, limy, grayish buff.....	130.0	131.0
Siltstone, sandy, limy, hard, light tan.....	131.0	139.0
Silt, soft, sandy, light greenish	139.0	140.0
Silt, sandy, limy, hard, light yellowish green.....	140.0	144.0
Sand, soft, fine, silty, tan.....	144.0	148.0
Siltstone, limy, light brownish gray.....	148.0	152.0
Gravel, fine, pink; predominantly green grains.....	152.0	168.0
Silt, limy, pale greenish; not very hard.....	168.0	170.0
Gravel, fine, pinkish and green.....	170.0	171.0
Gravel, fine to medium, green pinkish.....	171.0	178.0
Sandstone, silty, light gray, slightly greenish; sandy siltstone.....	178.0	188.0

Silt, limy, white, pale greenish	188.0	189.0
Gravel, fine to medium, green, some pinkish; angular pebbles	189.0	190.0
Silt, clayey, pale greenish, white	190.0	193.0
Gravel, medium to fine, green, pink; angular pebbles	193.0	198.0
Silt, cemented, limy, white	198.0	199.0
Gravel, medium, pink and green, angular pebbles	199.0	210.0
Silt, clayey, limy, white	210.0	212.0
Gravel, fine to medium, white and pinkish, angular fragments	212.0	221.0
Gravel, greener	221.0	222.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Flint, very hard, green and flesh-colored	222.0	224.0
Shale and flint, buff	224.0	225.0

Test Hole #95-41
(4-26-12aaaa)
Red Willow County

Location: NE NE NE NE sec. 12, T. 4 N., R. 26 W.; 320 feet west of northeast corner of section, 320 feet west of bridge, on south edge of road.
Ground elevation: 2,293 feet (t). (Cambridge 7.5 min. quadrangle)
Depth to water: 9.4 ft., (7-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, mostly sand	0.0	2.0
Clay, sandy, dark buff	2.0	14.0
Sand and woody material	14.0	19.0
Gravel, medium, bluish green	19.0	22.0
Clay, light buff	22.0	23.0
Gravel, medium to coarse, bluish green; much water-worn shale, siltstone and limestone	23.0	59.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, bluish gray	59.0	65.0

Test Hole #1-U-41
(4-26-24dddd)
Red Willow County

Location: SE SE SE SE sec. 24, T. 4 N., R. 26 W.; 65 feet north of southeast corner, on west edge of road.
Ground elevation: 2,395 feet (t). (Cambridge 7.5 min. quadrangle)
Depth to water: caved at 98.3 ft., (9-15-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, buff	0.0	38.0
Silt, clayey, sandy, reddish buff	38.0	68.0
Sand and silt, very fine, light gray	68.0	84.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, silty, light greenish gray	84.0	87.0
Gravel, fine to medium, white, yellow, green, red	87.0	93.0
Silt, whitish to greenish gray; some sand	93.0	107.0
Clay, hard, green; chips	107.0	108.0
Gravel, fine to medium, green, red, yellow, white; large lime pebbles	108.0	112.0
Clay, silty, brownish tan	112.0	116.0
Silt, clayey, brownish tan	116.0	123.0
Clay, silty, whitish tan; some gravel	123.0	126.0
Gravel, fine to medium, green, red, white; mostly fine, some lime pebbles	126.0	138.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, ochre colored	138.0	143.0
Shale, dark olive brown	143.0	158.0
Shale, very dark gray to almost black; dark blue color when wet	158.0	160.0

Test Hole #102-41
(4-26-25dddd)
Red Willow County

Location: SE SE SE SE sec. 25, T. 4 N., R. 26 W.; 120 feet west of southeast corner, on north edge of road.
Ground elevation: 2,279 feet (t). (Cambridge 7.5 min. quadrangle)
Depth to water: 12.4 ft., (7-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and brown sandy clay.....	0.0	8.0
Gravel, fine to medium, red; compact, clean.....	8.0	22.0
Gravel, medium to coarse, red; some sand, clean and not as compact as above, clay seam at 22 ft.....	22.0	29.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, light tan, greenish cast, some white.....	29.0	36.0

Test Hole #2-U-41
(4-26-30abbb)
Red Willow County

Location: NW NW NW NE sec. 30, T. 4 N., R. 26 W.; 135 feet east of northwest corner of quarter on south edge of road.
Ground elevation: 2,432 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: 90.5 ft., (9-15-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Silt, light buff	0.0	35.0
Silt, clayey, reddish brown, lighter colored near bottom	35.0	47.0
Silt, clayey, grayish buff	47.0	50.0
Gravel, medium, pinkish; poorly sorted	50.0	61.0
Silt, light tan	61.0	62.0
Gravel, fine to medium, pinkish and greenish; pebbles not well rounded, probably not well sorted, contains limy pebbles	62.0	72.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, sandy, clayey, grayish green; zones of hard greenish white lime	72.0	80.0
Sand, fine, hard, green; contains dense hard concretions	80.0	89.0
Sandstone, soft, brownish green; fine gravel	89.0	101.0
Sand, fine, grayish green; similar that above, but softer	101.0	106.0
Clay, silty, light green; much limy white clay, probably in the form of concretions	106.0	112.0
Clay, silty, green, similar to that above, but having no limy white clay at top; becomes more abundant downward	112.0	128.0
Gravel, sandy, pink and green; poorly sorted, may also contain clay	128.0	137.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, whitish buff; more buff to tan with depth	137.0	140.0

Test Hole #113-41
(4-26-31cccc)
Red Willow County

Location: SW SW SW SW sec. 31, T. 4 N., R. 26 W.; 75 feet north of corner, on east edge of road.
Ground elevation: 2,363 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: 40.2 ft., (8-4-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and clay, black.....	0.0	9.0
Clay, somewhat sandy, hard, buff or khaki colored...	9.0	40.0
Silt, robin egg blue color.....	40.0	55.0
Clay, buff; some gravel.....	55.0	58.0
Gravel, medium, red, clean.....	58.0	76.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, weathered, cream colored to lemon yellow.....	76.0	77.0
Shale, soft, ochre, cream colored to yellow.....	77.0	79.0

Test Hole #105-41
(4-26-33cada)
Red Willow County

Location: NE SE NE SW sec. 33, T. 4 N., R.26 W.; 105 feet southwest of bridge, on northwest edge of road.
Ground elevation: 2,330 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: caved at 28.5 ft., (7-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	5.0
Clay, sandy, dark buff	5.0	17.0
Gravel, medium, compact, red; much buff clay	17.0	30.0
Gravel, medium, red; some black clayey material	30.0	35.0
Gravel, medium to coarse, compact, red; some buff clay	35.0	41.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, tan, some lighter color	41.0	45.0

Test Hole #111-41
(4-26-33ddad)
Red Willow County

Location: SE NE SE SE sec. 33, T. 4 N., R. 26 W.; 80 feet west of east section line, in ditch on north side of highway.
Ground elevation: 2,303 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: 12.1 ft., (7-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill, sandy loam, black	0.0	5.0
Clay, sandy, tan	5.0	11.0
Gravel, fine to medium, sandy, red	11.0	20.0
Gravel, medium to coarse, red; loose, clean, clay seam at 35 ft, reddish yellow clay	20.0	55.0
Cretaceous System, Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, yellowish tan or brown	55.0	59.0

Test Hole #110-41
(4-26-34cddd)
Red Willow County

Location: SE SE SE SW sec. 34, T. 4 N., R. 26 W.; 0.3 mile south of highway.
Ground elevation: 2,296 feet (t). (Cambridge 7.5 min. quadrangle)
Depth to water: 10.7 ft,. (7-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Clay, sandy, buff to dark gray.....	0.0	10.0
Gravel, medium to coarse, green.....	10.0	25.0
Gravel, medium to coarse, red; loose.....	25.0	30.0
Gravel, fine to coarse, red; somewhat compact, clean	30.0	56.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, soft, sticky, yellow ochre.....	56.0	59.0

Test Hole #104-41
(4-26-35cbba)
Red Willow County

Location: NE NW NW SW sec. 35, T. 4 N., R. 26 W.; 620 feet east of section line, 330 feet east of bridge, on south edge of road.
Ground elevation: 2,307 feet (t). (Cambridge 7.5 min. quadrangle)
Depth to water, 23.5 ft., (7-28-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	2.0
Clay, dark buff	2.0	20.0
Gravel, fine to medium, red; compact, much sand	20.0	46.0
Gravel, hard, red; much buff clay	46.0	50.0
Gravel, medium to coarse, red; loose, some sand	50.0	63.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, creamy buff to darker	63.0	69.0

Test Hole #103-41
(4-26-36bbbd)
Red Willow County

Location: Center of SE NW NW NW sec. 36, T. 4 N., R. 26 W.; 90 feet east of intersection of old highway and road to north, on north edge of road.
Ground elevation: 2,297 feet (t). (Cambridge 7.5 min. quadrangle)
Depth to water: 22.2 ft., (7-28-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and sandy clay.....	0.0	9.0
Gravel, medium, compact, red; much sand.....	9.0	32.0
Gravel, medium to coarse, red.....	32.0	40.0
Gravel, medium, very compact, red; much clay.....	40.0	62.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, creamy tan at first to greenish gray at 69 feet.....	62.0	69.0

Test Hole #27-A-60
(4-27-6bbbb)
Red Willow County

Location: NW NW NW NW sec. 6, 4 N., R. 27 W., 11 feet south of north section line, and 118 feet east of west section.
Ground elevation: 2,640 feet (t). (Bartley SW 7.5 min. quadrangle)
Depth to water: 170.56 ft., (7-27-60).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Top soil, silt, slightly clayey, brown-dark brown..	0.0	2.5
Silt, slightly clayey, trace limy nodules, trace iron stain, trace snails, light yellow brown to pale brown to pale olive.....	2.5	50.0
Silt, slightly clayey, marly and limy, trace very fine sand, very pale brown to light yellow brown.	50.0	86.0
Silt, slightly clayey, slightly sandy, medium to very coarse, trace fine gravel, very limy, white to light brown.....	86.0	95.0
Sand, fine to very coarse, very silty, lime cemented and marly.....	95.0	98.0
Silt, slightly clayey, slightly sandy, very fine to medium sand, marly, trace limestone, light yellow brown.....	98.0	115.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand to sandstone, very fine to coarse, trace very coarse, moderately to very silty, marly in part lime cemented, pale brown.....	115.0	158.0
Silt, slightly clayey, very sandy, very fine to medium, trace coarse, trace siltstone and lime-stone, yellowish red.....	158.0	162.0
Sand with interbedded sandstone, very fine to coarse, trace very coarse, rare fine gravel, mostly very silty, slightly clayey, slightly to moderately limy, very pale brown to light olive green to olive gray.....	162.0	205.0
Silt, slightly to moderately clayey, slightly sandy, very fine to medium, very limy, very pale brown to white.....	205.0	208.0
Sand to sandstone, very fine to fine, trace medium, slightly to very silty, in part lime cemented, trace rootlets, light gray.....	208.0	275.0
Sand, very fine to fine, trace medium, very silty, reworked, soft yellow limestone and shale.....	275.0	280.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Lost circulation 280 to 285 drilling into Niobrara	280.0	285.0

Test Hole #118-41
(4-27-26daaa)
Red Willow County

Location: NE NE NE SE sec. 26, T. 4 N., R. 27 W.; 0.47 mile north of southeast corner of section, 100 feet north of bridge over creek, on west edge of road.
Ground elevation: 2,389 feet (a). (Bartley 7.5 min. quadrangle)
Depth to water: 29.8 ft., (8-4-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	4.0
Clay, sandy, buff	4.0	27.0
Gravel, red; poor, some organic matter and clay	27.0	35.0
Tertiary System - Miocene Series - Ogallala Group:		
Gravel, medium, red; fair, much lime and some clay	35.0	39.0
Gravel, medium, red; very much limy material, hard or compact	39.0	57.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, cream colored, tan to greenish	57.0	59.0

Test Hole #119-41
(4-27-26abbb)
Red Willow County

Location: NW NW NW NE sec. 26, T. 4 N., R. 27 W.; 390 feet west of bridge, on south edge of road.
Ground elevation: 2,396 feet (a). (Bartley 7.5 min. quadrangle)
Depth to water: 23.6 ft., (8-4-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	3.0
Clay, sandy, buff	3.0	30.0
Clay; some red gravel	30.0	37.0
Gravel, very coarse, red; clean	37.0	42.0
Gravel, coarse, red; limy and clayey	42.0	55.0
Tertiary System - Miocene Series - Ogallala Group:		
Lime and gravel	55.0	70.0
Clay, sandy, tan, salmon like cast	70.0	96.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, soft, yellow ochre colored	96.0	99.0

Test Hole #116-41
(4-27-36dcdd)
Red Willow County

Location: SE SE SW SE sec. 36, T. 4 N., R. 27 W.; 0.2 mile east of southwest corner of quarter, 125 feet west of creek, on north side of road.
Ground elevation: 2,355 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: 27.9 ft., (8-4-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	5.0
Clay, sandy, buff	5.0	30.0
Clay, sandy, grayish brown	30.0	36.0
Silt, dark, bluish gray	36.0	50.0
Silt, light, blue, some wood	50.0	57.0
Clay and silt, buff	57.0	60.0
Gravel, red, and clay	60.0	65.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, cream colored, tan and yellow	65.0	69.0

Test Hole #117-41
(4-27-36cdcd)
Red Willow County

Location: SE SW SE SW sec. 36, T. 4 N., R. 27 W.; 0.35 mile east of southwest corner of section, on north edge of road.
Ground elevation: 2,368 feet (t). (Bartley 7.5 min. quadrangle)
Depth to water: 29.5 ft., (8-4-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill, black	0.0	6.0
Clay, sandy, dark buff	6.0	20.0
Clay, more sandy than above, buff	20.0	35.0
Silt, powder blue; many snail shells, may be from above	35.0	57.0
Gravel, very coarse, red	57.0	68.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Shale, tan	68.0	69.0

Test Hole #266-41
(4-28-23dddc)
Red Willow County

Location: SW SE SE SE sec. 23, T. 4 N., R. 28 W.; approximately on south center line of forty, about 100 feet west of bridge, on north side of road.
Ground elevation: 2,457 feet (t). (Bartley SW 7.5 min. quadrangle)
Depth to water: 27.7 ft, (10-7-41.)

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and dark brown sandy soil.....	0.0	8.0
Soil, sandy, black.....	8.0	13.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, sandy, medium brown to tan.....	13.0	15.0
Clay, sandy, buff.....	15.0	29.0
Clay, sandy, gray; small limy stem casts.....	29.0	44.0
Sand, medium fine, to coarse red gravel; streaks of green sandy clay at 56 feet.....	44.0	60.0
Sand, fine to coarse, green.....	60.0	73.0
Clay, sandy, green to buff.....	73.0	74.0
Gravel, coarse, red; streaks of varicolored clay...	74.0	82.0
Sand, very fine, reddish gray.....	82.0	84.0
Clay, sandy, green; some medium red gravel.....	84.0	88.0
Clay, white to buff.....	88.0	93.0
Clay, sandy, green; streaks of tan indurated clay..	93.0	99.0
Unable to add another rod, caving sand below 82 feet		

Test Hole #26-A-60
(4-28-24aaaa)
Red Willow County

Location: NE NE NE NE sec. 24, T. 4 N., R. 28 W., 8 feet south of north section line and 209 feet west of east section line.
Ground elevation: 2,562 feet (t). (Bartley SW 7.5 min. quadrangle)
Depth to water: 121.66 ft., (7-26-60).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Silt, moderately clayey, grayish brown to very dark gray brown	0.0	2.5
Silt, slightly to moderately clayey, coarse silt, trace very fine sand, limy nodules, marly areas, brown to light yellow brown	2.5	57.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand to sandstone, very fine to medium, slightly to moderately silty, in part lime cemented and marly, trace rootlets	57.0	70.0
Silt to siltstone, slightly clayey, limestone seams, light yellow brown	70.0	73.5
Sand to sandstone, very fine to medium, in part marly and lime cemented, pale olive brown	73.5	89.0
Silt, slightly sandy, very fine to medium, slightly to moderately clayey, pale olive and brown	89.0	93.0
Sandstone, very fine to medium, slightly silty, in part limy and lime cemented, pale olive to very pale brown	93.0	105.0
Silt, very sandy, very fine to medium, pale olive to pale brown	105.0	109.0
Sandstone, very fine to medium, trace coarse, very marly to limy cemented, pale brown to white	109.0	114.0
Sandstone, very fine to medium, lime cemented and marly lenses, silty at 122 ft, pale brown	114.0	127.0
Silt, moderately to very sandy, very fine to medium, marly and lime cemented, slightly to moderately clayey, very pale brown to white	127.0	133.0
Sandstone, very fine to medium, rootlets, pale brown	133.0	137.0
Clay, marly, light yellow brown	137.0	144.0
Sand, fine to medium, trace coarse, rootlets, light yellow brown	144.0	149.0
Silt, moderately clayey, moderately to very sandy, very fine to medium, pale olive to white	149.0	156.0
Clay, in part limy, pale brown to light yellow brown	156.0	160.0
Silt, moderately sandy, fine to medium sand, slightly to very clayey, light yellow brown	160.0	163.0

Sand to sand and gravel, very fine to very coarse sand with fine gravel, rootlets.....	163.0	170.0
Silt, moderately to very clayey, slightly sandy, very fine to medium, trace coarse sand, trace rootlets, limestone fragments, pale yellow brown.	170.0	179.0
Sand, medium to very coarse, trace fine gravel, clay seam at 186 ft.....	179.0	189.0
Clay, silty, sandy, very fine to very coarse, light yellow brown.....	189.0	194.0
Sand, coarse to very coarse, trace fine gravel and medium sand.....	194.0	202.0
Silt, slightly sandy, moderately to very clayey, trace siltstone, in part limy, light yellow brown.....	202.0	214.0
Sand, medium to coarse, siltstone and sandstone fragments.....	214.0	224.0
Clay, silty, moderately sandy, very fine to coarse, very limy, very pale brown.....	224.0	227.0
Sand, medium to coarse, trace very coarse sand and fine gavel.....	227.0	232.0
Silt, very sandy, slightly clayey, pale brown.....	232.0	238.0
Sand, very fine to very coarse, trace fine gravel, much coarse to very coarse sand, some reworked silt, pale brown.....	238.0	260.0
Sand and gravel, very coarse sand to fine gravel...	260.0	264.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Clay, marly, slightly sandy, pale yellow white.....	264.0	283.0
Clay, shaley, brown to dark gray.....	283.0	310.0

Test Hole #281-41
(4-28-31ddcc)
Red Willow County

Location: SW SW SE SE sec. 31, T. 4 N., R. 28 W.; 0.2 mile west of southeast corner of section, on north edge of road.
Ground elevation: 2,450 feet (t); (Quick SE 7.5 min. quadrangle)
Depth to water: caved at 21 ft., (10-14-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil, silty, brown.....	0.0	16.0
Soil, sandy, medium, gray.....	16.0	29.0
Gravel, fine to very coarse, red; no clay breaks....	29.0	71.0
Sand, very fine, hard rock at 78 feet.....	71.0	78.0

Test Hole #10-U-41
(4-28-32aabb)
Red Willow County

Location: NW NW NE NE sec. 32, T. 4 N., R. 28 W.; just east of entrance to field, on south side of road.
Ground elevation: 2,578 feet (t). (Quick SE 7.5 min. quadrangle)
Depth to water: 136.6 ft., (9-23-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill	0.0	3.0
Silt, sandy, buff	3.0	16.0
Silt, sandy, buff; fossil roots, stems, gastropod shells	16.0	19.0
Silt, buff, fine silty sand	19.0	39.0
Silt, reddish brown, silty clay	39.0	44.0
Silt, limy, clayey, light tan buff; limy concretions	44.0	65.0
Clay, silty, light reddish buff	65.0	84.0
Tertiary System - Miocene Series - Ogallala Group:		
Sandstone, light brown; some gravel and lime pebbles	84.0	90.0
Clay, silty, reddish buff; compact, some limy.areas.	90.0	100.0
Clay, silty, reddish buff; much lime, limy concretions	100.0	103.0
Limestone, gray; crystalline, very hard	103.0	105.0
Sandstone, light gray, slight greenish cast	105.0	109.0
Clay, sandy, hard, compact, green	109.0	114.0
Clay, sandy, limy, whitish gray	114.0	115.0
Sandstone, green; fairly compact	115.0	120.0
Sandstone, light greenish to tan to gray; porous	120.0	135.0
Sandstone, hard, light tannish gray, dries whitish gray; limy in spots	135.0	155.0
Sandstone, greenish gray, dries light gray; softer than above	155.0	164.0
Clay, sandy, or clayey sand, soft, pale green	164.0	168.0
Sand, silty, clayey, soft, pale green; hard clay pebbles, concretions, limy clay or mudstone	168.0	178.0
Clay, hard, indurated, slightly limy, dark tan when wet, dries to light tan or buff	178.0	190.0
Clay, sandy, soft, brown; sticky, some indurated clay seams or concretions	190.0	201.0
Clay, hard, indurated, brown; cuts small pieces, small limy concretions	201.0	215.0
Clay, light brown or dark brownish buff; soft, sticky, some indurated clay seams	215.0	237.0
Sand, fine, clayey, brown, some red sand grains	237.0	240.0
Gravel, fine to coarse, red; clean	240.0	265.0
Gravel, fine to coarse, red; some pinkish and tan shale, not as clean as above	265.0	269.0

Cretaceous System - Upper Cretaceous Series - Colorado Group:

Niobrara Formation:

Flint, very hard, pinkish white; took approximately one half hour to drill.....	269.0	270.0
Shale, ochre to light khaki colored.....	270.0	276.0
Shale, dark olive brown.....	276.0	280.0

Test Hole #264-41
(4-28-36cdcc)
Red Willow County

Location: SW SW SE SW sec. 36, T. 4 N., R. 28 W.; north side of road.
Ground elevation: 2,417 feet (t). (Bartley SW 7.5 min. quadrangle)
Depth to water: 21.7 ft., (9-30-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and brown silty soil.....	0.0	15.0
Silt, light brown to buff; limy pieces.....	15.0	25.0
Silt, light gray to medium gray; some specks.....	25.0	36.0
Clay, sandy, medium, grayish blue.....	36.0	45.0
Sand, medium to fine, and coarse red gravel.....	45.0	54.0
Tertiary System - Miocene Series - Ogallala Group:		
Clay, sandy, tan.....	54.0	66.0
Sand, fine to medium, red.....	66.0	70.0
Gravel, medium to coarse, green.....	70.0	74.0
Cretaceous System - Upper Cretaceous Series - Colorado Group:		
Niobrara Formation:		
Chert or jasper, orange yellow; drilled one inch in 50 minutes.....	74.0	74.1

Test Hole #13-RS-97
(4-29-6dbcd)
Red Willow County

Location: SE SW NW SE sec. 6, T. 4 N., R. 29 W., approximately 1580 ft north and 2250 ft west of southeast corner.
Ground elevation: 2512 ft (t). (Red Willow Dam 7.5 min. quadrangle)
Depth to water: 13.2 ft. (10-7-97).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Topsoil: Silt, slightly clayey, slightly sandy, very dark gray; sand is very fine.....	0.0	5.0
Silt, slightly sandy, slightly clayey, dark grayish brown; sand is very fine to fine.....	5.0	10.0
Silt, moderately clayey, slightly sandy, dark gray; sand is very fine; contains small calcium carbonate concretions.....	10.0	15.0
Sand, very fine to coarse, silty, clayey.....	15.0	20.0
Sand and gravel, coarse sand to coarse gravel; some fine to medium sand; most of gravel is reworked Ogallala; some gravel are granite pieces.....	20.0	34.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately sandy, slightly clayey, pale yellow; sand is very fine to fine.....	34.0	34.5
Sand, very fine to very coarse; some very fine gravel.....	34.5	43.0
Silt, very clayey, light olive gray to pale olive...	43.0	48.0
Sandstone, very fine to fine grained, olive gray, some fine gravel grains, few rootlets.....	48.0	55.0
Clay, very silty, olive gray.....	55.0	64.0
Sand, very fine to very coarse.....	64.0	83.0
Clay, very silty; few thin lenses of very fine to fine sand and olive gray sandstone.....	83.0	90.0
Sandstone, very fine to fine grained, olive gray; some very fine to fine sand lenses; few lenses of light olive gray clayey silt.....	90.0	100.0
Sand, slightly gravelly, very fine sand to fine gravel; some reworked shale gravel pieces.....	100.0	104.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, dark gray.....	104.0	115.0

Test Hole #14-RS-97
(4-29-6dbcc)
Red Willow County

Location: SW SW NW SE sec. 6, T. 4 N., R. 29 W., approximately 1580 ft north and 2330 ft west of southeast corner.
Ground elevation: 2512 ft (t). (Red Willow Dam 7.5 min. quadrangle)
Depth to water: 13.8 ft. (10-7-97).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Topsoil: Silt, slightly clayey, dark gray.....	0.0	4.0
Silt, moderately clayey, very dark grayish brown; dark gray below 10.0 ft.....	4.0	18.0
Sand and gravel, coarse sand to coarse gravel; some fine to medium sand, trace very coarse gravel; most of gravel are reworked Ogallala; some gravel are granite pieces.....	18.0	34.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, moderately sandy, slightly clayey, pale yellow; sand is very fine to fine.....	34.0	34.5
Sand, very fine to very coarse; some very fine to fine gravel; few rootlets.....	34.5	42.0
Silt, moderately clayey, slightly sandy, light olive gray; sand is very fine to fine; lenses of very fine to fine sand from 48.0 to 52.0 ft and from 56.0 to 58.0.....	42.0	60.0
Sand, very fine to very coarse; some very fine gravel; thin clay seam at 70.0 ft.....	60.0	80.0
Clay, very silty; few thin lenses of very fine to fine sand and olive gray sandstone, some claystone.....	80.0	90.0
Sandstone, very fine to fine grained, olive gray; some very fine to fine sand lenses; few lenses of light olive gray clayey silt.....	90.0	100.0
Sand, moderately gravelly, very fine sand to fine gravel; some reworked shale gravel pieces.....	100.0	104.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, olive gray, weathered.....	104.0	107.0
Shale, very dark gray.....	107.0	115.0

Test Hole #15-RS-97
(4-29-6dbcc)
Red Willow County

Location: SW SW NW SE sec. 6, T. 4 N., R. 29 W., approximately 1580 ft north and 2550 ft west of southeast corner.
Ground elevation: 2512 ft (t). (Red Willow Dam 7.5 min. quadrangle)
Depth to water: 12.0 ft. (10-7-97).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Topsoil: Silt, slightly clayey, very dark gray.....	0.0	2.0
Silt, moderately clayey, dark gray.....	2.0	17.0
Sand, very fine to very coarse; some very fine to fine gravel.....	17.0	30.0
Sand and gravel, fine sand to coarse gravel, trace very coarse gravel; most of gravel is reworked Ogallala; some gravel are granite pieces.....	30.0	43.5
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very clayey, slightly sandy, olive gray; sand is very fine; thin lenses of very fine to fine sand; few rootlets below 50.0 ft.....	43.5	60.0
Sand, coarse to very coarse; some fine to medium....	60.0	65.0
Sand, very fine to very coarse; some very fine to fine gravel; few rootlets.....	65.0	70.0
Sand, slightly gravelly; fine sand to fine gravel...	70.0	80.0
Sand, very fine to very coarse.....	80.0	85.0
Clay, very silty, pale olive.....	85.0	95.0
Sandstone, very fine to fine grained, olive.....	95.0	96.0
Sand and gravel, fine sand to fine gravel, some medium gravel, trace coarse gravel.....	96.0	103.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, pale olive, weathered.....	103.0	105.0
Shale, dark gray.....	105.0	115.0

Test Hole #16-RS-97
(4-29-6dbcc)
Red Willow County

Location: SW SW NW SE sec. 6, T. 4 N., R. 29 W., approximately 1580 ft north and 2470 ft west of southeast corner.
Ground elevation: 2512 ft (t). (Red Willow Dam 7.5 min. quadrangle)
Depth to water: 12.6 ft. (10-7-97).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Topsoil: Silt, moderately clayey, very dark gray....	0.0	5.0
Silt, moderately clayey, dark gray.....	5.0	10.0
Silt, moderately clayey, slightly sandy, grayish brown; sand is very fine to fine.....	10.0	18.0
Sand, very fine to very coarse.....	18.0	20.0
Sand and gravel, very fine sand to medium gravel....	20.0	25.0
Gravel, moderately sandy, coarse sand to medium gravel; some coarse gravel.....	25.0	30.0
Gravel, moderately sandy, coarse sand to coarse gravel, some very coarse gravel; most of gravel is reworked Ogallala; some gravel are granite pieces.	30.0	35.0
Gravel, very sandy, medium sand to fine gravel; some very fine to fine sand and medium gravel.....	35.0	41.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, very clayey, pale olive.....	41.0	52.0
Sand, very fine to very coarse; some very fine to fine gravel.....	52.0	82.0
Silt, very clayey, pale olive to light yellowish brown; limy from 83.0 to 85.0 ft.....	82.0	95.0
Sandstone, very fine to fine grained, silty, light yellowish brown.....	95.0	96.0
Sand and gravel, coarse sand to fine gravel.....	96.0	103.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, pale olive, weathered.....	103.0	105.0
Shale, very dark gray.....	105.0	122.0

Test Hole #285-41
(4-29-6bdbc)
Red Willow County

Location: SW NW SE NW sec. 6, T. 4 N., R. 29 W.; approximately in the center of south edge of forty, 100 feet east of highway and north of creek, 100 feet south of old bridge.
Ground elevation: 2,519 feet (t). (Red Willow Dam 7.5 min. quadrangle)
Depth to water: 12.4 ft. (10-16-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Clay, sandy, tan	0.0	7.0
Soil, sandy, black to gray	7.0	11.0
Clay, sandy, bluish gray	11.0	19.0
Gravel, medium to very coarse, red	19.0	41.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, clayey	41.0	49.0
Sand, very fine, red	49.0	68.0
Gravel, fine to medium, green	68.0	105.0
Sand, very fine, green; some medium gravel	105.0	117.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, grayish yellow to black	117.0	119.0

Test Hole #284-41
(4-29-22abcb)
Red Willow County

Location: NW SW NW NE sec. 22, T. 4 N., R. 29 W.; on east center line of forty, 0.15 mile south of north line of section, on east side of road.
Ground elevation: 2,484 feet (t). (Quick SE 7.5 min. quadrangle)
Depth to water: 21.4 ft., (10-16-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill and brown sandy soil.....	0.0	6.0
Soil, sandy, black.....	6.0	12.0
Clay, sandy, buff gray.....	12.0	20.0
Clay, sandy, grayish blue; limy streaks.....	20.0	43.0
Gravel, fine to medium, red.....	43.0	45.0
Clay, sandy, bluish green.....	45.0	52.0
Gravel, fine to coarse, red; hard streak at 63 feet.	52.0	74.0
Gravel, medium, compact, green.....	74.0	81.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, yellowish gray to gray.....	81.0	89.0

Test Hole #282-41
(4-29-25dcbc)
Red Willow County

Location: SW NW SW SE sec. 25, T. 4 N., R. 29 W.; about 600 feet west of bridge, on north side of road.
Ground elevation: 2,452 feet (t). (Quick SE 7.5 min. quadrangle)
Depth to water: 6.8 ft., (10-14-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Soil, sandy, brown	0.0	7.0
Soil, sandy, bluish gray	7.0	8.0
Sand, fine to coarse, gray; streaks of gray clay	8.0	28.0
Gravel, fine to coarse, red	28.0	40.0
Tertiary System - Miocene Series - Ogallala Group:		
Sand, limy, cemented, grayish buff	40.0	46.0
Gravel, medium to coarse, red	46.0	55.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, yellow	55.0	58.0
Shale, black	58.0	59.0

Test Hole #283-41
(4-29-25cccc)
Red Willow County

Location: SW SW SW SW sec. 25, T. 4 N., R. 29 W.; 50 feet east of southwest corner of section, on north side of road.
Ground elevation: 2,485 feet (t). (Quick SE 7.5 min. quadrangle)
Depth to water: 37.8 ft., (10-14-41).

	Depth, in feet From	To
Quaternary System, undifferentiated:		
Road fill and black sandy soil.....	0.0	6.0
Clay, sandy, tan to buff.....	6.0	51.0
Clay, sandy, grayish blue.....	51.0	58.0
Clay, sandy, dark blue to black.....	58.0	79.0
Gravel, fine to coarse, red.....	79.0	91.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, grayish yellow to medium gray.....	91.0	99.0

Test Hole #6-U-41
(4-30-13dcdd)
Red Willow County

Location: SE SE SW SE sec. 13, T. 4 N., R. 30 W.; 0.3 mile west of southeast corner of section, on north edge of road.
Ground elevation: 2,748 feet (t). (Red Willow Dam 7.5 min. quadrangle)
Depth to water, caved at 198.5 feet, (9-23-41).

	Depth, in feet	
	From	To
Quaternary System, undifferentiated:		
Road fill	0.0	5.0
Silt, soft, buff	5.0	42.0
Silt, reddish buff, to sandy clay	42.0	63.0
Silt, limy, light buff to whitish	63.0	66.0
Clay, silty, reddish buff	66.0	75.0
Tertiary System - Miocene Series - Ogallala Group:		
Silt, clayey, limy, whitish buff	75.0	111.0
Sandstone, fine, light gray; limy in spots, brown pebbly sandstone	111.0	119.0
Clay, firm, semi-indurated, mottled, light green and reddish brown, pale green near bottom; hard from 122 to 123 feet, light green and brown below 123 feet	119.0	135.0
Siltstone or sandstone, fine, hard, limy, white; contains light green and brown indurated clay, light green and brown fine sandstone, more limy material	135.0	142.0
Silt, sandy, clayey, limy, pale greenish; harder zone from 145 to 147 feet	142.0	147.0
Sandstone, fine, brown; perhaps also limy gray material of similar texture	147.0	153.0
Silt, sandy, clayey, soft, light gray, getting reddish with depth	153.0	156.0
Sandstone, fine, impure, limy, limy gray, brown at top; silt and some clay, thin seam of firmer brown sandstone at 169 feet	156.0	228.0
Gravel, medium, green, some red particles; some quartz, angular grains, poorly sorted, some fine material, cemented with lime, light green clean medium soft cemented sandstone	228.0	238.0
Sandstone, some gravel, medium, slightly cemented, light green	238.0	247.0
Silt, sandy, clayey, light green	247.0	248.0
Clay, sandy, limy white, or clayey silt; gray below 250 feet	248.0	252.0
Silt, soft, sandy, light grayish green; probably clay	252.0	254.0

Sandstone, fine, light gray and green; probably some silt zones	254.0	257.0
Clay, limy white with greeish cast; some indurated, contains sand grains	257.0	260.0
Sandstone, coarse, grayish brown; contains silt	260.0	268.0
Gravel, medium, green and pink	268.0	271.0
Silt, sandy, light gray, or very fine silty sand; hard white lime and grains of gravel and coarse sand	271.0	279.0
Gravel, fine to medium, green, pink and white; light green silt, clay, coarse sand and gravel mixture from 289 to 297 feet, more gravel and very little clay below 297 feet, coarse gravel near bottom	279.0	316.0
Cretaceous System - Upper Cretaceous Series - Montana Group:		
Pierre Formation:		
Shale, gray, white, olive and rusty red	316.0	320.0