Three Geologic Cross Sections Across Portions of Eastern Nebraska Showing Quaternary Lithologic Units and Stratigraphy of Uppermost Bedrock

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Correlations and Cross Sections (CCS) 18
Conservation and Survey Division
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Lincoln, Nebraska

2012

Introduction

Three cross sections were constructed across portions of eastern Nebraska to characterize the regional geology of unconsolidated Quaternary deposits and the bedrock units that lie directly beneath them. The locations of these cross sections are shown in Figure 1. Lithologic data were obtained primarily from historical test hole logs drilled by the Conservation and Survey Division (CSD). These test holes were drilled specifically to investigate subsurface geology and therefore represent the highest quality data available. Lithologic logs of these test holes are available from CSD or at http://snr.unl.edu. Additional unpublished test hole logs not drilled as part of the official CSD test hole drilling program that exist along the line of cross section were reviewed for quality and reliability. Logs of good quality were used in some places to supplement the lithologic data. These logs are included in Appendices A-C.

Each of these geologic cross sections was originally drafted by Vince Dreeszen of the CSD. Although these original cross sections were not published, the originals are archived at CSD. The geologic interpretations on each of the three cross sections are based in part on the existing data and Dreeszen's original cross sections. The correlations of Quaternary lithologic units are the interpretations of the authors and were made based upon their understanding of the regional geology and stratigraphy of eastern Nebraska. In general, lithologic units greater than 10 feet (~ 3 m) thick were correlated between test holes, whereas thinner units were ignored. The distances between boreholes, which is as much as several miles, are too great to reliably correlate such thin units. Nonetheless, since the thicknesses of most Quaternary lithologic units in eastern Nebraska are known to vary considerably over short distances, the units represented in the cross sections should not be taken to represent actual thicknesses in the areas between boreholes.

Information regarding bedrock stratigraphy was obtained from the geologic bedrock map of Nebraska (Burchett, 1986), published measured sections from outcrops (i.e. Burchett, 1971), as well as oil and gas exploration wells within several miles of the line of cross section (http://nogcc.ne.gov/, see also Appendices A-C).

The elevations of some test holes were determined at the time that the test hole was drilled using USGS 7.5 minute topographic maps or at a later date using USGS Digital Elevation Models (DEM). The land surface elevation profiles along the lines of cross section were derived from a DEM mosaic of the study area.

The position of the water table (or, in some locations, the potentiometric surface) displayed on the cross sections was taken from a DEM of the water table that was created using water levels from 1995 as indicated in maps by Dreeszen (2001), Summerside (2001), and Hartung and Summerside (2001). These maps represent a best approximation of the water table over a large area. The position of the water table shown on these cross sections was modified locally to correct unlikely relationships between the water table and land surface.

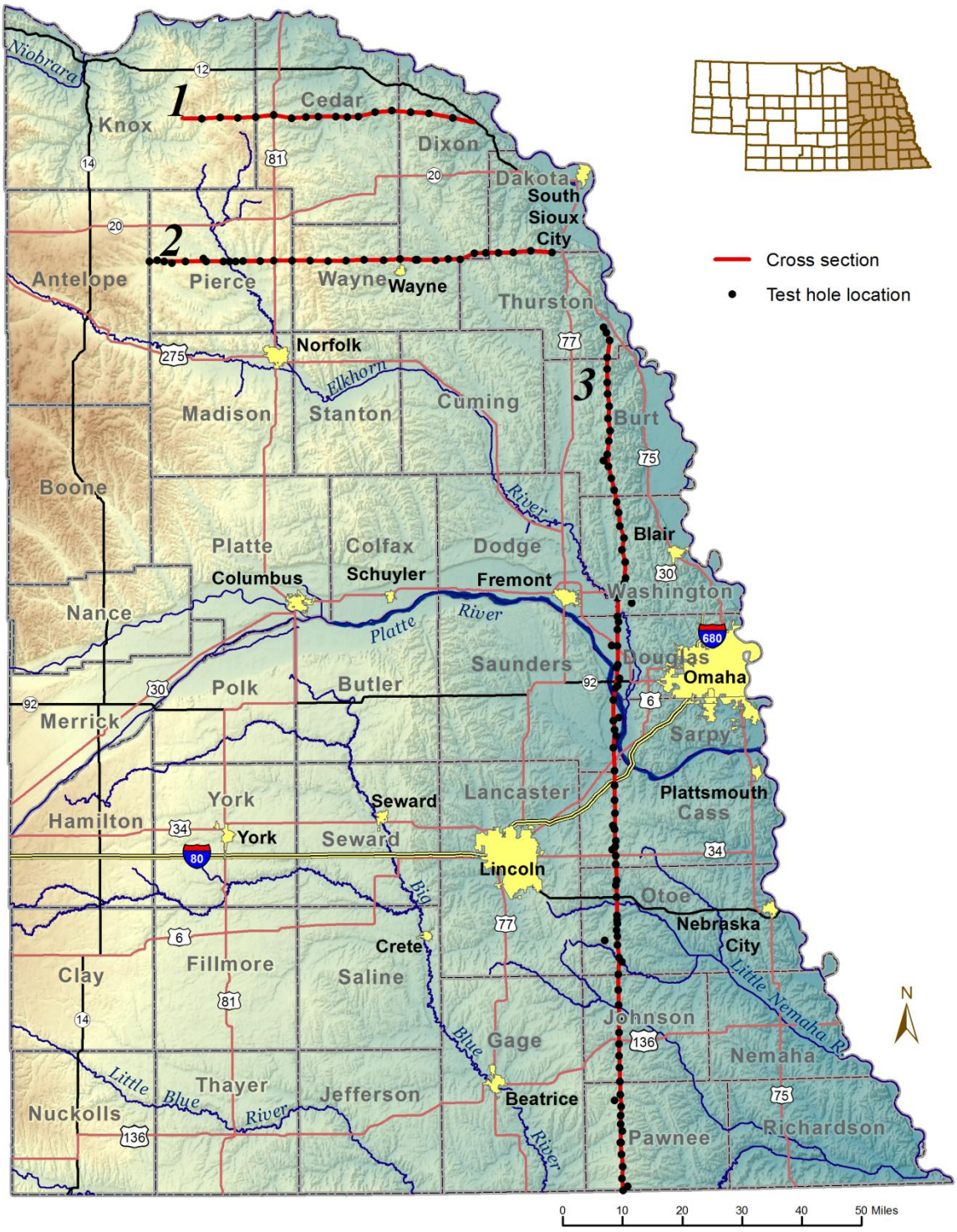

Fig. 1. Locations of cross sections and test holes.

Acknowledgements

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References

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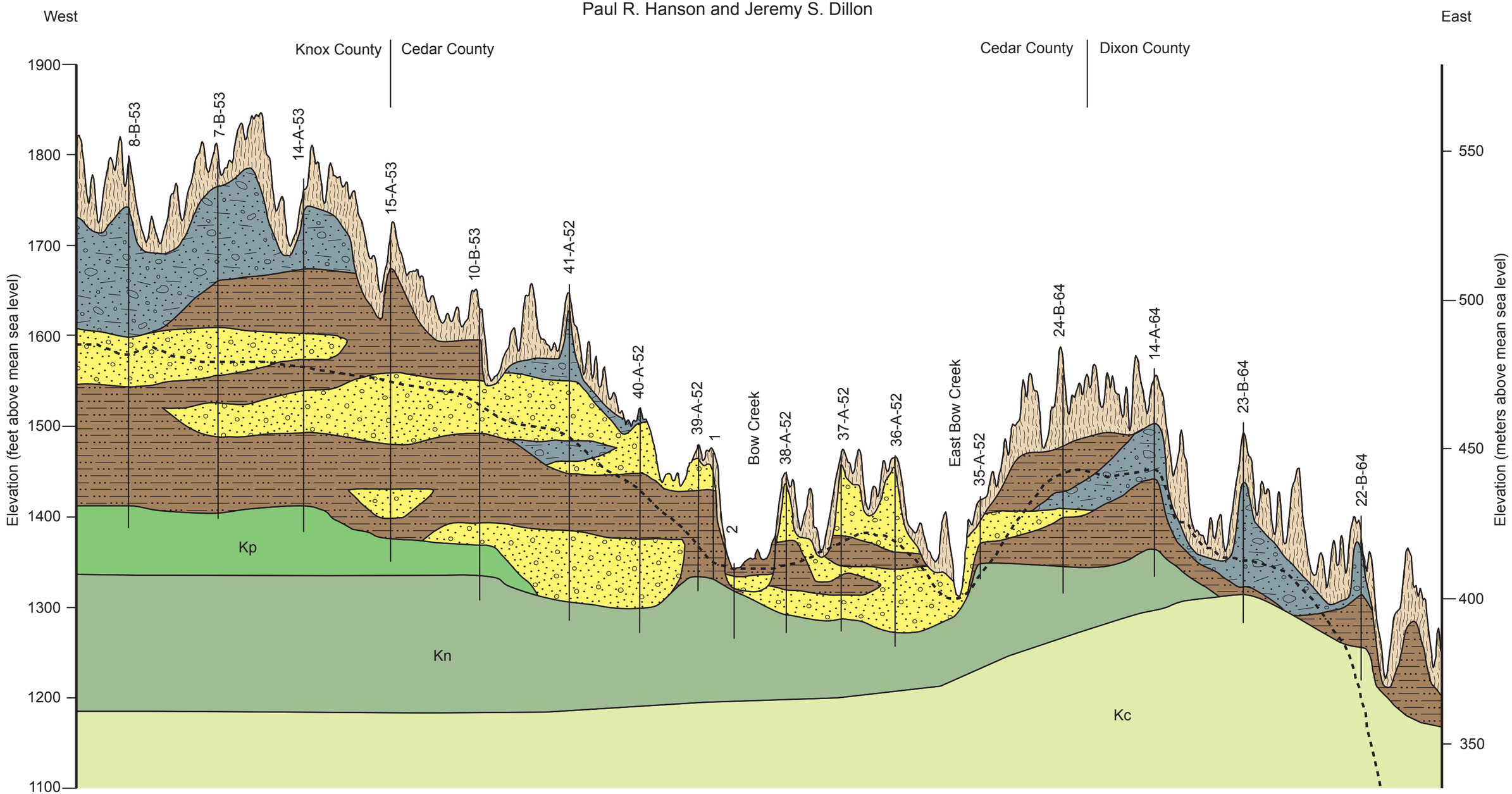
Interpretive Geologic Cross Section from Knox County to Dixon County, Nebraska

Paul R. Hanson and Jeremy S. Dillon



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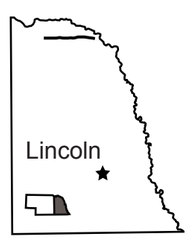
System	Group or Formation	
Quaternary	undifferentiated	
Cretaceous	Kp	Pierre Shale
	Kn	Niobrara Formation
	Kc	Carlile Shale

water table or potentiometric surface

test hole

lithology of Quaternary deposits

- loess
- silt & clay
- till
- sand & gravel

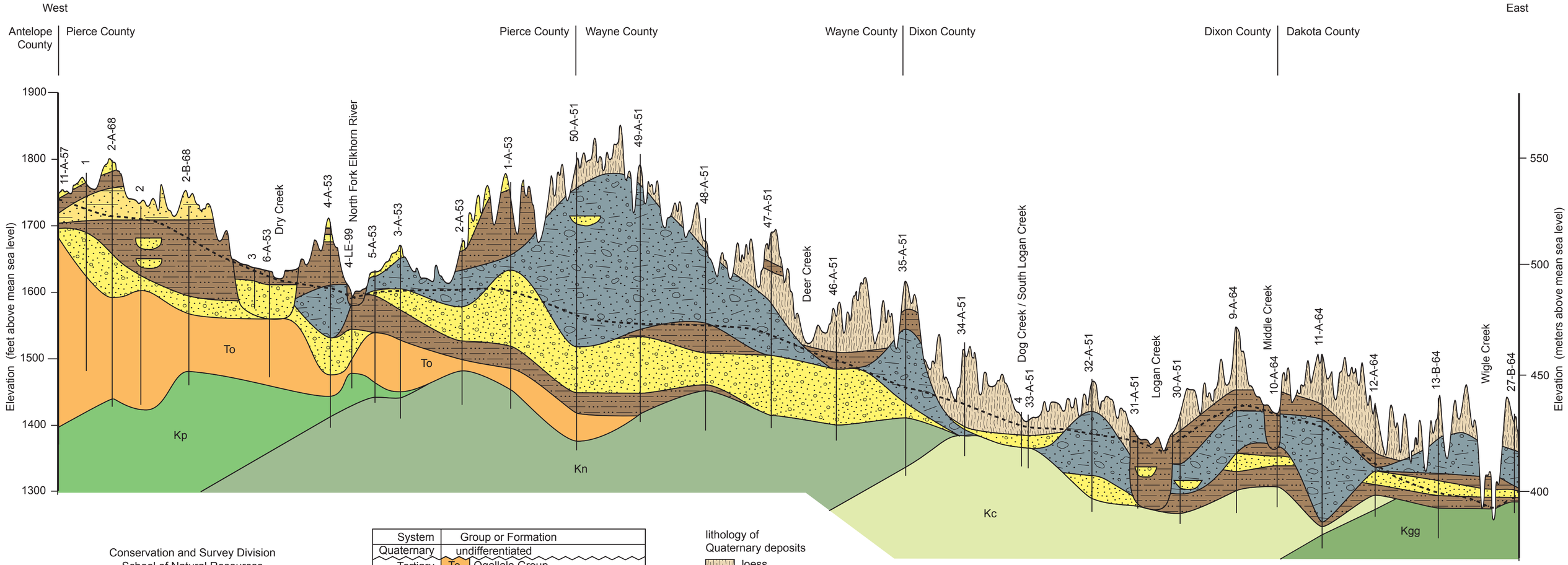


Horizontal Distance (km)
0 10 20 30
0 5 10 15 20
Horizontal Distance (mi)

Cite as: Hanson, P.R. and Dillon, J.S., 2012, Interpretive geologic cross section from Knox to Dixon County, Nebraska. Conservation and Survey Division, University of Nebraska–Lincoln. Correlations and Cross Sections (CCS) 18.1.

Interpretive Geologic Cross Section from Pierce County to Dakota County, Nebraska

Dana P. Divine



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System		Group or Formation
Quaternary		undifferentiated
Tertiary	To	Ogallala Group
Cretaceous	Kp	Pierre Shale
	Kn	Niobrara Formation
	Kc	Carlile Shale
	Kgg	Greenhorn Limestone/Graneros Shale

water table or potentiometric surface

test hole

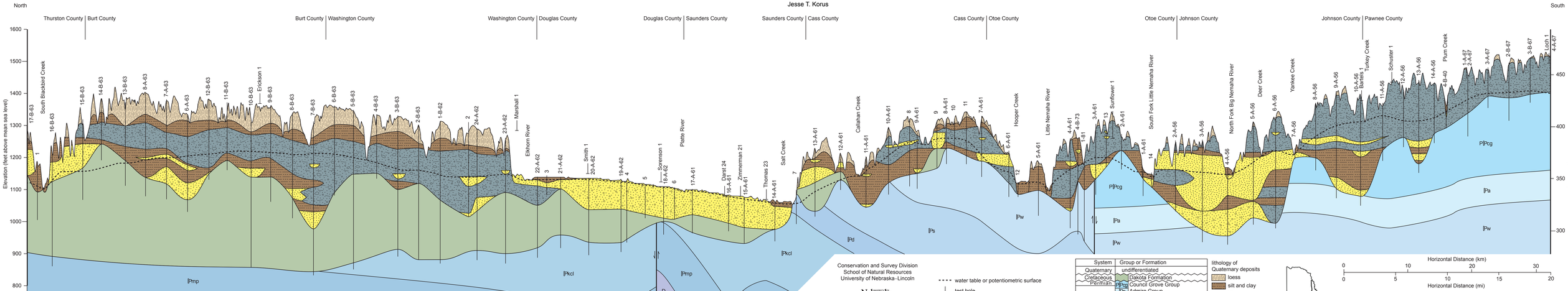
lithology of Quaternary deposits

- loess
- silt & clay
- till
- sand
- sand & gravel
- sand, silt, & clay

Cite as: Divine, D. P., 2012. Geologic Cross Section Across Eastern Nebraska from Pierce County to Dakota County. Conservation and Survey Division, School of Natural Resources, Institute of Agriculture and Natural Resources,University of Nebraska–Lincoln. Correlations and Cross Sections (CCS) 18.2.

Interpretive Geologic Cross Section from Thurston County to Pawnee County, Nebraska

Jesse T. Korus



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- water table or potentiometric surface
- test hole
- oil/gas well (subsurface trace not shown)
- fault zone or zone of steeply dipping beds

System		Group or Formation
Quaternary		undifferentiated
Cretaceous		Dakota Formation
Permian	P|Pcg	Council Grove Group
Pennsylvanian	|Pa	Admire Group
	|Pw	Wabaunsee Group
	|Ps	Shawnee Group
	|Pd	Douglas Group
	|Pkcl	Kansas City - Lansing Groups
	|Pmp	Marmaton - Pleasanton Groups
Devonian	D	undifferentiated

lithology of Quaternary deposits
- loess
- silt and clay
- till
- sand
- sand and gravel

Horizontal Distance (km)
0 10 20 30
Horizontal Distance (mi)
0 5 10 15 20

Cite as: Korus, J.T., 2012. Geologic cross section across eastern Nebraska from Thurston County to Pawnee County. Conservation and Survey Division, School of Natural Resources, Institute of Agriculture and Natural Resources, University of Nebraska–Lincoln. Correlations and Cross Sections (CCS) 18.3.

log ID: 1		legal location: 30N-1E-2
elevation: 1470 ft		latitude: -97.27050 longitude: 42.61053
depth (ft)		
from	to	description
0	3	topsoil
3	5	coarse clayey gravel
5	6	hard grey clay
6	25.5	medium sand
25.5	27	light yellow clay
27	29	sand and gravel
29	31	light clay hard
31	34	light clay soft
34	35	soft white clay
35	40	fine white sand
40	43	sandy soft light clay
43	48.5	sandy soft light clay
48.5	49	sand
49	54	light sandy clay
54	57	hard grey clay
57	61.5	soft grey clay
61.5	81	sand streaks-light to dark clay or shale in alternate layers. Soft at 81'
81	87	fine grey sand
87	90	grey shale with fine sand
90	111	very fine sand to fine clean sand (best at bottom). This area could be gravel packed
111	114	light blue clay
114	123	fine grey sand and hard grey clay
123	124	fine sand
124	126.5	sand and medium gravel, green and good
126.5	127.5	white clay, or Niobrara, one streak of yellow
127.5	129	green clay
129	131	mixture of white-green, some shells
131	133	hard dary grey clay or shale

log ID: 2		legal location: 31N-1E-36
elevation: 1344 ft		latitude: -97.250263 longitude: 42.617742
depth (ft)		
from	to	description
0	8	roadway fill; clay, silty and clayey
8	12	clay, silty, brown
12	27	gravel and sand, silty and clayey with intermittent layers of silty clay
27	30	gravel and sand, very silty, marly, compact
30	65	silt, clayey, marly, compact to very compact, slightly cemented below 43'. Blue-gray

log ID: 1		legal location: 27N-4W-32
elevation: 1780 ft		latitude: -97.81036 longitude: 42.2676
depth (ft)		
from	to	description
0	3	sand
3	11	yellow clay
11	21	sand
21	80	clay
80	96	coarse sand
96	114	gravel and coarse sand
114	119	clay
119	145	mixed sand and gravel
145	200	sand
200	300	sand and sandstone mixture
300	301	clay

log ID: 2		legal location: 26N-4W-3
elevation: 1730 ft		latitude: -97.7618 longitude: 42.2602
depth (ft)		
from	to	description
0	8	sandy clay and sand layers
8	30	clay
30	45	clay and blue clay
45	49	blue clay
49	66	fine medium blue sand
66	80	blue clay
80	94	fine blue sand
94	106	blue clay
106	120	medium coarse blue sand
120	125	fine medium blue gravel
125	129	clay
129	135	sandstone: medium hard; blue-gray
135	150	sand and clay with limestone and sandstone streaks
150	165	sand and sandstone and clay layers
165	180	fine sand
180	210	fine sand and sandy clay layers
210	221	fine sand
221	228	sandy clay
228	238	fine sand
238	240	sandy clay
240	255	sandy clay and sandstone layers
255	261	fine sand and sandstone
261	280	sandy clay
280	290	fine medium sand
290	300	clay and limestone, yellow rock and red rock

log ID: 3		legal location: 27N-3W-33
elevation: 1637 ft		latitude: -97.6594 longitude: 42.2709
depth (ft)		
from	to	description
0	4	top soil, black, very calcareous
4	5	sand, tan, medium, slightly silty
5	7	clay, tan
7	9	sand, medium-fine, very silty
9	21	clay, blue, very silty
21	40	sand, clean, medium-fine, moderately uniform
40	63	sand, clean, very coarse, contains gravel grains and pebbles below 50'; contians trace of gray silt @52'

log ID: 4		legal location: 26N-4E-4
elevation: 1419.5 ft		latitude: -96.9658 longitude: 42.2637
depth (ft)		
from	to	description
0	37	clay, silty, black to 26' then blue-gray
37	45	sand, silty, contains gravel
45	50	gravel, silty, contains sand
50	53	sand, very fine to medium, slightly silty
53	62	clay, very silty, soft, gray
62	80	Carlile: shale, dark gray to black, very hard to 64' then hard

log ID: 1		legal location: 24N-9E-1
elevation: 1175 ft		longitude: -96.347392 latitude: 42.080408
depth (ft)		
from	to	description
0	57	brown clay
57	62	gray clay
62	69	sandy gray clay
69	80	sandy yellow clay
80	83	rusty sand and gravel
83	99	yellow soft sandstone
99	130	brown shale
130	139	gray shale
139	170	brown shale

log ID: 2		legal location: 18N-10E-33
elevation: 1310 ft		longitude: -96.30052 latitude: 41.484548
depth (ft)		
from	to	description
0	10	silt, moderately clayey, in part very clayey, sligthly micaceous, light gray; iron stain
10	15	as above, pale brown
15	20	as above, much iron stain
20	26	as above, yellow
26	30	Soil: silty, very clayey, dark gray; contains carbonaceous material
30	40	silty, slightly clayey, slightly micaceous, light gray; iron stains
40	45	as above, slightly darker
45	50	as above, moderately clayey, light brownish-gray
50	60	as above, trace of pale brown
60	65	as above, in part clay
65	75	Clay, silty, very slightly sandy, light gray; sand is very fine'; trace of iron stain
75	80	as above, trace of limy areas
80	85	as above, no trace of limy areas
85	95	till: clay, silty, sandy, moderately calcareous, yellow-brown; contains limy grains
95	100	as above, light gray to yellow brown
100	105	as above, yellow brown
105	170	as above, slightly gravelly
170	200	Sand, gravelly, silty; fine sand to fine gravel (15-35% gravel)
200	208	Till: clay, silty, sandy, moderately calcareous, pale yellow
208	225	Till: clay, silty, sandy, moderately clacareous, blue-gray
225	230	as above, trace gravel
230	245	as above, no gravel
245	265	as above, some medium gravel
265	285	as above, some medium gray
285	295	Dakota: sand, silty, very fine to coarse, some iron stain

log ID: 3		legal location: 16N-10E-5
elevation: 1143 ft		longitude: -96.32561 latitude: 41.379094
depth (ft)		
from	to	description
0	15	fill: clay and silt
15	18	sand, contains silt and clay, blue
18	21.5	clay, contains silt and sand, black
21.5	31.5	sand, very fine to coarse; contains some gravel; clean, fairly compact tan and blue-gray
31.5	37	sand and gravel, grades from fine sand to coarse gravel, ~75% sand; clean, fairly compact
37	54.5	Till: clay, sand, silt, and gravel. Tan, grey, brown
54.5	60	Till: clay, sand silt and gravel. Contians layer of sand and gravel, very compact, tan grey and brown

log ID: 4		legal location: 15N-10E-18
elevation: 1125 ft		longitude: -96.335283 latitude: 41.268053
depth (ft)		
from	to	description
0	10	top soil
10	70	gravel, some fine sand
70	73	gray clay
73	80	gravel
80	90	brown gravel
90	100	red shale
100	150	red and gray shale
150	180	sandstone
180	190	limestone, hard

log ID: 5		legal location: 15N-10E-29
elevation: 1110 ft		longitude: -96.327742 latitude: 41.242794
depth (ft)		
from	to	description
0	4	fine sand
4	13.5	coarse sand
13.5	18	fine gravel
18	27	fine sand
27	39	gravel, 1.25"
39	73	fine sand
73	92.5	coarser
92.5	100	coarser dand

log ID: 6		legal location: 14N-10E-5
elevation: 1107 ft		longitude: -96.325949 latitude: 41.208348
depth (ft)		
from	to	description
0	5	Road fill: silt, organic, black-yellow brown
5	12	clayey silt, dark gray to yellow brown, some road fill
12	30	fine to coarse sand, <15% small gravel, well rounded, clean, granitic
30	64	as above, granitic and feldspar
64	70	low plasticity clay, dark gray, sandy
70	80	fine to coarse sand, fine to coarse gravel, <10% cobbles, granitic, feldspar, mafic, well rounded
80	90	medium to coarse sand, iron stained, well rounded, granitic, feldspar, marfics
90	99	as above, fine to medium gravel (<10%)
99	100	fine silica sand, well sorted. Dakota

log ID: 8		legal location: 11N-9E-25
elevation: 1320 ft		longitude: -96.356826 latitude: 40.886013
depth (ft)		
from	to	description
0	4	top soil
4	10	brown clay
10	18	yellow clay
18	29	tan clay
29	56	yellow clay
56	69	brown clay
69	80	50% fine sand
80	116	blue clay
116	117	blue Shale
117	148	blue clay
148	151	gravel
151	170	blue clay
170	174	rock
174	195	Shale and limestone layers
195	210	blue shale

log ID: 9		legal location: 10N-10E-7
elevation: 1315 ft		longitude: -96.348681 latitude: 40.848942
depth (ft)		
from	to	description
0	32	clay
32	37	clay, silty to moderately sandy, medium brown, in part very sandy
37	52	sand, fine to medium, a little coarse sand
52	87	sand, fine to coarse, trace very coarse sand, much medium to coarse sand
87	91	silty, clay, very light gray. Possibly top of Dakota
91	110	sand to sandstone, medium to coarse, highly iron stained
110	148	as above, very fine to medium, principally white

log ID: 10		legal location: 10N-9E-24
elevation: 1320 ft		longitude: -96.360742 latitude: 40.827178
depth (ft)		
from	to	description
0	1.5	black soil
1.5	17	brown clay
17	35	sticky red clay
35	64	hard gray and yellow clay with boulders
64	69	yellow clay, trace of fine sand
69	84	hard yellow sandy clay and boulders
84	86	fine and coarse buff sand
86	89	yellow sandy clay
89	92	fine and coarse buff sand
92	95	yellow sandy clay

log ID: 11		legal location: 10N-10E-30
elevation: 1345 ft		longitude: -96.350272 latitude: 40.812563
depth (ft)		
from	to	description
0	2	top soil
2	18	yellow clay
18	85	clay, sandy
85	90	sand, fine, packed and silty
90	100	medium coarse sand, cemented, traces of clay or shale which may be the material which cements the sand
100	165	clay, sandy with little gravel in some parts
165	166	limestone

log ID: 12		legal location: 9N-9E-13
elevation: 1130 ft		longitude: -96.352257 latitude: 40.740569
depth (ft)		
from	to	description
0	3.5	road fill; silty clay, black, wet, medium plasticity, medium stiff
7.5	9	as above, with lime concretions
9	10	silty clay, dark gray mottled with yellow brown, wet, high plasticity, very stiff
10	12	silty clay; grayish brown, wet, medium plsticity, stiff
12	16.5	silty clay; grayish brown, mottled with yellowish brown, saturated, medium plasticity, stiff
16.5	18.5	silty clay; grayish brown, mixed with brown, saturated, medium plasticity, medium stiff
18.5	20	silty clay; grayish brown, saturated, medium plasticity, medium stiff
20	23	as above
23	25	sitly clay; grayish brown, mottled with yellowish brown, saturated, medium plasticity, medium stiff
25	36	silty clay; grayish brown, mottled with gray and black, saturated, medium plasticity, stiff to very stiff
36	39.5	silty caly; gray mottled with yellow brown, saturated, medium plasticity, very stiff

39.5	40	sandy clay; gray, saturated, medium plasticity, very stiff, 25% sand
40	43	as above
43	44.5	sandy clay; gray, saturated, medium plasticity, stiff to very stiff (25% sand)
44.5	46	clayey shale
46	46.5	shale and limestone
46.5	47	limestone (clayey)
47	49	limestone-shale transitity
49	52.5	limestone (clayey)

log ID: 13	legal location: 8N-9E-36
elevation: 1290 ft	longitude: -96.349992 latitude: 40.616757

depth (ft)		
from	to	description
0	1.5	blck top soil
1.5	8	yellow clay
8	12	medium sand, buff color
12	15	medium to coarse gravel, multi color
15	24	soft brown clay with gravel streaks
24	32	medium to fine gravel
32	44	yellow sandy clay with gravel streaks
44	90	blue clay
90	92	sandstone
92	107	blue clay
107	112	medium to coarse gravel
112	119	blue clay
119	120	limestone

log ID: 14	legal location: 7N-10E-19
elevation: 1152 ft	longitude: -96.336251 latitude: 40.555596

depth (ft)		
from	to	description
0	20	Clay
20	25	Sand, medium coarse, some very fine to very coarse
25	30	sand and gravel, 20% gravel
30	35	clayey silt, sandy, medium dark gray
35	40	Sandy gravel, 60% gravel
40	45	Sand, slightly gravelly
45	46	Rock, some limestone cuttings in last sample

Appendix C: Additional information used in cross section from Thurston County to Pawnee County (CCS-18.3)

Published measured sections used to correlate bedrock

Log ID: 7	source: Burchett, R.R., 1971. Guidebook to the geology along portions of the lower Platte River Valley and Weeping Water Valley of Eastern Nebraska. Conservation and Survey Division, University of Nebraska-Lincoln, 39 p.

Oil and gas wells used to correlate bedrock (more information at http://nogcc.ne.gov/)

log ID	API number
Erickson-1	26021000020000
Marshall-1	26177190000000
Smith-1	26055190010000
Sorenson-1	26055210010000
Darst-24	26155300100000
Zimmerman-21	26155300050000
Thomas-23	26155300060000
Sunflower-1	26131300000000
Bartels-1	26097300030000
Schuster-1	26133000030000
Loch-1	26133000100000