UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY. [Reports - Open file series]

Preliminary geologic map and physical properties for the Englewood quadrangle, Denver, Arapahoe, and Adams Counties, Colorado

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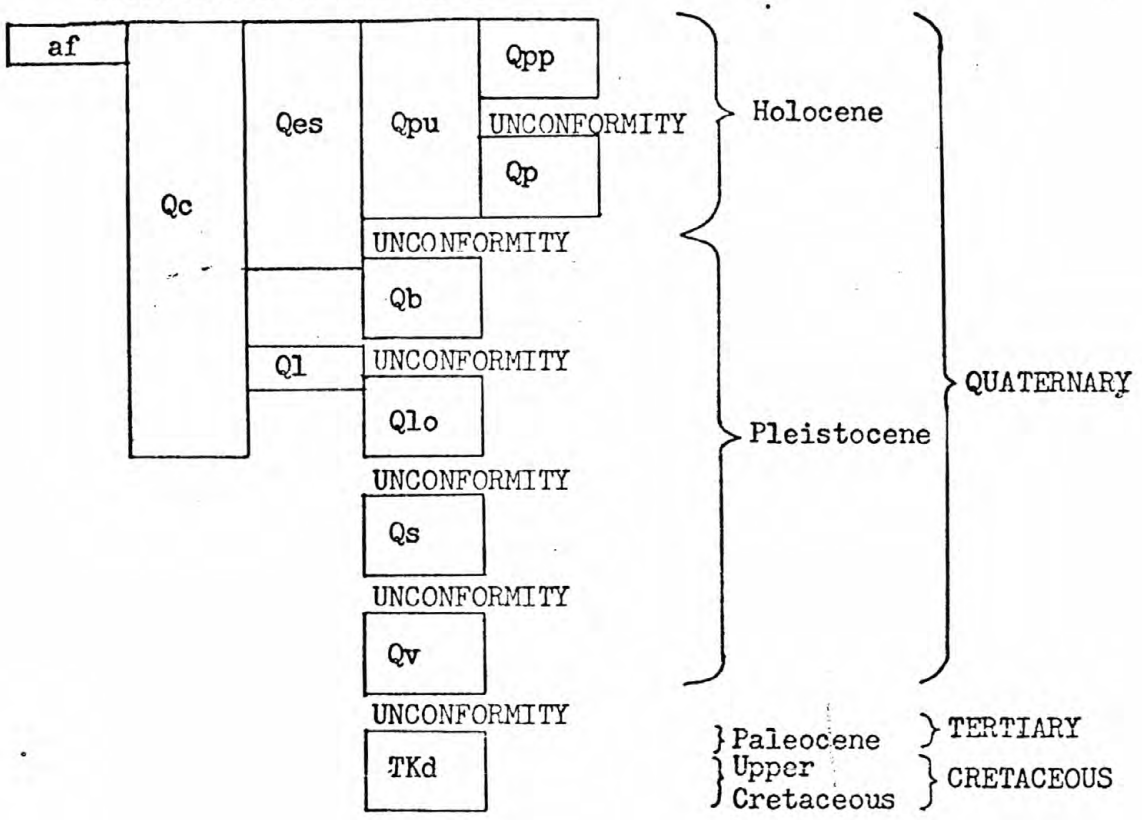
Open-file report 77-862

This report is preliminary and has not been edited or reviewed for conformity with U.S. Geological Survey standards and nomenclature.

CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

[Surficial deposits not mapped where <1 m thick]

af ARTIFICIAL FILL (UPPER HOLOCENE)--Manmade deposits composed of varying amounts of earth, rock fragments, and refuse. Includes embankments, dams, and other engineered fills placed at optimum moisture and maximum density, compacted landfills, and uncompacted dump fill and spoil banks along irrigation ditches. Only mapped where visible in the field or recognizable on aerial photographs from 1949, 1963, or 1971. Thin, discontinuous fills that cover much of downtown Denver, Lowry Air Force Base, and low-lying areas along the South Platte River and Cherry Creek are not shown. The large areas of artificial fill on the west side of the South Platte River and along the north side of Cherry Creek are the sites of mined-out sand and gravel pits that were reclaimed for commercial, industrial, and recreational uses. Poorly compacted fills are susceptible to differential settlement and slow consolidation with time and are unsuitable sites for most structures. Landfills are potential sources of ground-water pollution when placed in permeable material. Unvented landfills may contain small amounts of methane and other gases that are produced by the decomposition of organic substances. Thickness generally <3 m; some embankments and earth dams >6 m

Qc COLLUVIUM (HOLOCENE TO PLEISTOCENE)--Light-brown to yellowish-brown, slightly calcareous, pebbly to cobbly clayey sandy silt to silty sand. Usually occurs on slopes steeper than about 4 percent in the southern part of the quadrangle. Grades upslope into loess and downslope into Piney Creek Alluvium; overlies the Denver Formation. Produces low to moderate swelling pressures when wetted. Thickness <3 m; frequently <1.5 m

Qes EOLIAN SAND (UPPER HOLOCENE TO UPPER PLEISTOCENE)--Light-yellowish brown to yellowish-brown, silty very fine to very coarse sand. Grain size decreases from northwest to southeast. The upper 0.3-0.6 m is slightly finer grained than the lower part. Noncalcareous in the upper 1.2 m and very slightly calcareous to a depth of >4.5 m. Covers large areas on the east sides of major streams. Partially buries old barbed wire fences in the area south of Windsor Lake. Sand dunes and deflation basins are vegetated and have a northwest-southeast orientation. Low to high consolidation and very low shear strength; nonexpansive. Thickness usually <6 m; locally >9 m

Ql LOESS (PLEISTOCENE)--Yellowish-brown, nonstratified, clayey sandy silt. Slightly more clayey and noncalcareous in the

upper 0.6 m. Contains numerous small carbonate nodules and veinlets to a depth of 1.2 m and slightly calcareous to a depth of >3 m. Covers extensive areas in the eastern two-thirds of the quadrangle. Locally may include deposits of younger sandy silt in areas adjacent to eolian sand. Moderate to high shear strength when dry and low to very high consolidation when wet. Produces low to moderate swelling pressures when wetted. Thickness <7.5 m; frequently <4.5 m

Qpu UNDIFFERENTIATED ALLUVIUM (UPPER HOLOCENE)--Deposits of post-Piney Creek and Piney Creek Alluviums along Cherry Creek, west of Glendale, where units are too extensively modified by urban development to permit mapping. Includes large areas of artificial fill along Cherry Creek

Qpp POST-PINEY CREEK ALLUVIUM (UPPER HOLOCENE)--Light-gray to light-brown, noncalcareous, clean to slightly silty pebbly sand interbedded with sandy silt. Forms channel, flood plain, and low terraces <5 m above the South Platte River and <3 m above Cherry Creek. Subject to periodic flooding. Thickness about 1.5-3 m

Qp PINEY CREEK ALLUVIUM (UPPER HOLOCENE)--Light-gray to dark grayish-brown, humic, slightly calcareous, sandy silt and clay overlying noncalcareous, clean to silty pebbly sand interbedded with sandy silt along major streams and sandy clay to silty sand along intermittent streams. The upper 1-1.5 m of the alluvium along major streams is finer grained and darker colored than the lower part. Forms terraces about 6-8 m above the South Platte River, 3-5 m above Cherry Creek, and <3 m above Little Dry Creek. Includes thin deposits of post-Piney Creek alluvium along intermittent streams and small alluvial fans composed of clean very fine to very coarse sand along the east side of Cherry Creek near Iliff Avenue. Generally not subject to flooding along major streams but locally covered by periodic floods in tributary drainages. Thickness 1.5-4.5 m along the South Platte River and <4.5 m along Cherry Creek and Little Dry Creek

Qb BROADWAY ALLUVIUM (PLEISTOCENE)--Light-brown, noncalcareous, clean to slightly silty pebbly sand interbedded with sandy silt to silty sand along the South Platte River and silty pebbly sand interbedded with sandy silt along Cherry Creek. Slightly finer grained in the upper meter. Forms terraces about 12-14 m above the South Platte River, 6 m above Cherry Creek, and 5 m above Little Dry Creek. Partially buried by eolian sand in places along the South Platte River and Cherry Creek and completely buried by eolian sand along Little Dry Creek. Thickness 6-9 m along

the South Platte River in Denver's central business district and probably <9 m along Cherry Creek and Little Dry Creek

Qlo LOUVIERS ALLUVIUM (PLEISTOCENE)--Light-brown, clean pebbly sand interbedded with clayey silt to silty sand and pebble to cobble gravel along the South Platte River and clean pebbly sand interbedded with sandy silt to silty sand along Cherry Creek. Forms terraces approximately 11-14 m above Cherry Creek. Buried beneath younger alluvium and eolian deposits. Exposed along Leetsdale Drive between South Monaco and South Quebec Streets. Maximum thickness about 4.5 m in terraces along Cherry Creek, and 15 m in the valleys of the South Platte River and Cherry Creek

Qs SLOCUM ALLUVIUM (PLEISTOCENE)--Light-brown to light reddish-brown, clean pebbly sand interbedded with sandy silt to silty sand and pebble to cobble gravel. The upper half of the deposit is a pebbly sandy silt that is strongly impregnated by calcium carbonate. Biotite-bearing granitic clasts are weathered. South of Sullivan, forms two terrace or pediment remnants about 23 and 34 m above Cherry Creek. The lower alluvium and portions of the upper alluvium are concealed beneath about 1.5-3 m of loess. Thickness about 3-5 m

Qv VERDOS ALLUVIUM (PLEISTOCENE)--Reddish-brown, silty pebbly sand interbedded with pebble to cobble gravel. Caps small hill about 45 m above Cherry Creek near the intersection of East Hampden Avenue and South Yosemite Street. In places buried by as much as 5 m of loess. Thickness about 1.5-5 m

TKd DENVER FORMATION (PALEOCENE AND UPPER CRETACEOUS)--Olive-gray to light-gray, silty claystone and sandy siltstone interbedded with thin, lenticular beds of olive-yellow to light-brown, tuffaceous sandstone and andesitic pebble conglomerate. Occurs within 1.5-3 m of the surface in most of the southeastern part of the quadrangle. Sandstones and finer grained units contain varying amounts of montmorillonitic clays that produce low to very high swelling pressures when wetted. Thickness ranges from about 90 m in downtown Denver to about 300 m in the southeast corner of the quadrangle (Romero, 1976)

CONTACT--Contacts in the area bounded by South Broadway on the east and East Evans Avenue on the south are approximately located

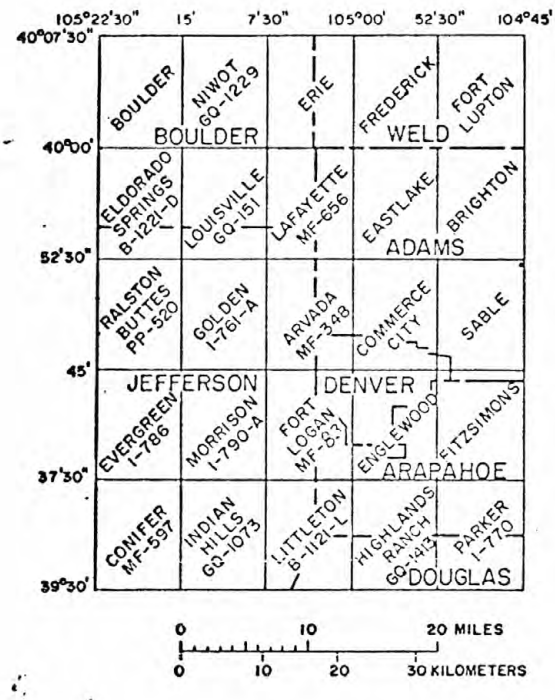
BURIED TERRACE SCARP--Eastern margin of the Broadway Alluvium along the South Platte River, Cherry Creek, and Little Dry Creek where buried by eolian sand. Position determined on the basis of topographic expression and subsurface data

BURIED VALLEY--Approximate location of inferred post-Slocum-pre-Louviers course of Cherry Creek. As much as 26 m of clean pebbly sand beneath 1.5-6 m of eolian material. Delineated on the basis of well logs and test hole data

CRESTS OF SAND DUNES

DEFLATION BASINS--Shallow closed depressions formed by wind erosion

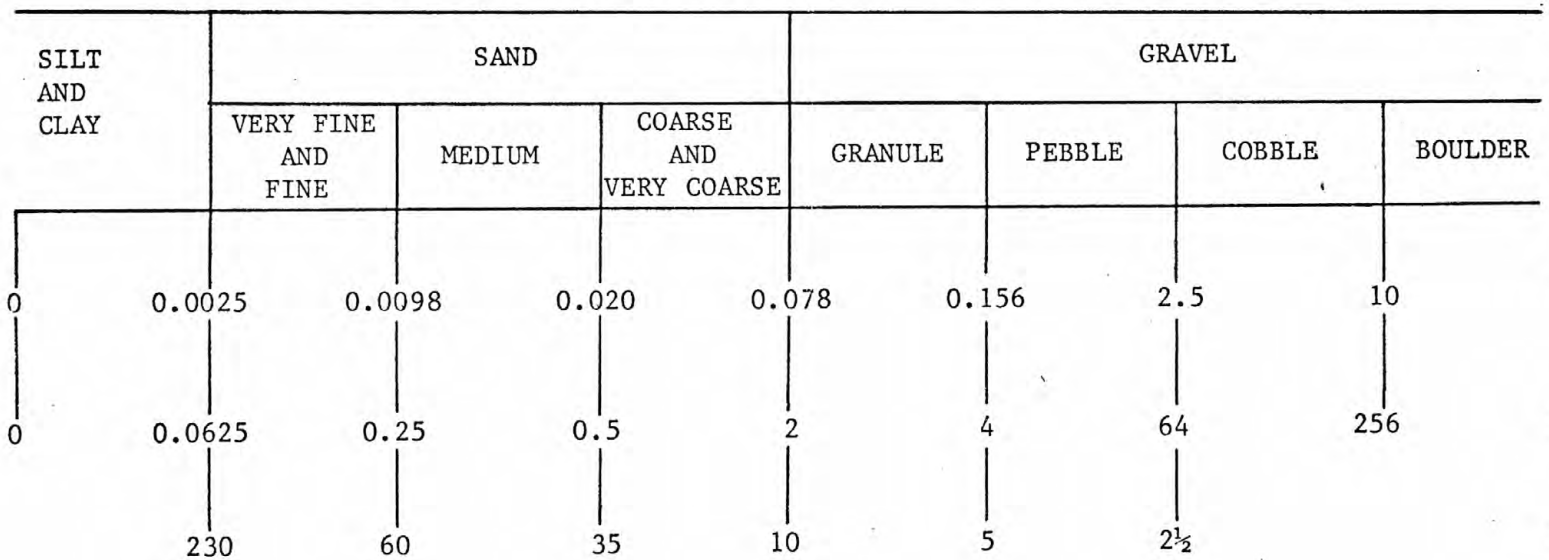
▲15 LOCATION OF ABBREVIATED COLUMNAR SECTIONS--Grain-size distribution and thickness, in meters, of surficial materials and lithology of bedrock in test holes and water wells described in Table 3



INDEX MAP--Showing location of the Englewood quadrangle and recently published U.S. Geol. Survey geologic maps

GRAIN-SIZE DISTRIBUTION

(Wentworth system, modified from Schwochow and others, 1974)



ENGLISH EQUIVALENTS

1 m = 3.28 ft

1 kg/m^3 = 0.062 lb/ft^3

1 kN/m^2 = 20.88 lb/ft^2

METRIC EQUIVALENTS

1 lb/ft^3 = 16.02 kg/m^3

1 lb/ft^2 = 0.048 kN/m^2

Table 1.--Grain-size distribution, plasticity characteristics, and Unified Soil Classification of Quaternary and bedrock units

[NA, not applicable; . ., no data; NP, nonplastic]

MAP UNITS		DRAINAGE BASIN	NUMBER OF SAMPLES TESTED	STATISTICAL MEASURES	GRAIN-SIZE DISTRIBUTION (PERCENT)							SOURCE OF DATA[1]	NUMBER OF SAMPLES TESTED	PLASTICITY CHARACTERISTICS			SOURCE OF DATA	UNIFIED SOIL CLASSIFICATION
					SAND				GRAVEL					LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX		
					SILT AND CLAY	VERY FINE AND FINE	MEDIUM	COARSE AND VERY COARSE	GRANULE	PEBBLE	COBBLE							
Qpp	POST-PINEY CREEK ALLUVIUM	SOUTH PLATTE RIVER	1	NA	40	44	11	4	1	0	0	CDH	1	29	18	11	CDH	SC
		CHERRY CREEK	1	NA	7		9	56	20	8	0	RRS	1	. .	NP	. .	RRS	SW
Qp	PINEY CREEK ALLUVIUM	SOUTH PLATTE RIVER	1	NA	58	20	6	8	3	5	0	CDH	1	43	18	25	CDH	CL
		CHERRY CREEK	4	RANGE	7-32	7-56	7-20	11-34	1-21	0-24	0	DSD	0	. .	. .	. .	DSD	SM,SC
				MEAN	20	30	13	21	8	8	0			. .	. .	. .		SM
				STANDARD DEVIATION	11.2	21.0	5.4	10.6	9.1	11.0	0			. .	. .	. .		NA
		GOLDSMITH GULCH	6	RANGE	54-82	12-32	2-9	2-9	0-3	0	0	CDH	6	36-47	17-23	18-27	CDH	CL
				MEAN	68	20	6	5	1	0	0			43	20	23		CL
				STANDARD DEVIATION	11.5	6.9	2.8	2.6	1.2	0	0			6.6	2.7	8.9		NA
Qes	EOLIAN SAND	NA	37	RANGE	3-48	19-46	10-44	4-56	0-5	0-1	0	CDH	25	20-39	NP-26	NP-23	CDH	SP,SM,SC
				MEAN	23	33	24	19	1	0	0	CGS		26	NP	NA	DCPWD	SM
				STANDARD DEVIATION	13.6	9.3	9.7	9.4	1.5	0.2	0	DSD		4.7	NA	NA	DSD	NA
Qb	BROADWAY ALLUVIUM, FINE GRAINED	SOUTH PLATTE RIVER	6	RANGE	31-52	14-39	8-14	6-22	1-10	1-8	0	DSD	5	22-41	NP-23	NP-18	DSD	SM,SC,CL
				MEAN	43	28	12	12	3	2	0			29	17	12		SC
				STANDARD DEVIATION	8.5	8.5	2.3	6.1	3.5	2.9	0			7.2	4.6	4.3		NA
	BROADWAY ALLUVIUM, COARSE GRAINED	SOUTH PLATTE RIVER	16	RANGE	2-11	4-20	5-33	26-51	10-36	2-36	0	DSD	16	. .	NP	. .	DSD	SP,SM
				MEAN	5	9	15	38	20	13	0			. .	NP	. .		SP
				STANDARD DEVIATION	2.1	4.4	7.5	6.8	8.3	10.4	0			. .	NA	. .		NA
Qc	COLLUVIUM	NA	2	RANGE	70-72	12-22	4-6	3-7	1-3	0	0	ACPD CDH	4	45-49	18-27	21-28	ACPD CCSD CDH	CL
Ql	LOESS	NA	22	RANGE	52-85	9-34	1-10	1-15	0-5	0-2	0		41	22-56	NP-30	NP-35	CDH	CL,CH
				MEAN	68	18	6	7	1	0	0	CDH		39	21	18	CGS	CL
				STANDARD DEVIATION	9.9	6.0	2.4	3.6	1.7	0.5	0	DSD		9.3	3.7	7.9	DCPWD DSD	NA
Qlo	LOUVIERS ALLUVIUM	SOUTH PLATTE RIVER	1	NA	2	4	7	22	11	50	4	CDH	1	. .	NP	. .	CDH	GP
		CHERRY CREEK	1	NA	4	7	7	43	21	18	0	CDH	1	18	NP	NA	CDH	SW
Qs	SLOCUM ALLUVIUM	CHERRY CREEK	1	NA	9		11	46	24	10	0	RRS	1	. .	NP	. .	RRS	SW
Qv	VERDOS ALLUVIUM	CHERRY CREEK	1	NA	14	12	8	52	13	1	0	CDH	1	37	22	15	CDH	SC
Tkd	DENVER FORMATION, CLAYSTONE	NA	15	RANGE	87-100	0-11	0-3	0-2	0	0	0	CDH	17	49-99	23-40	24-59	ACPD	CL,CH
				MEAN	95	4	1	0	0	0	0			64	27	37	CDH	CH
				STANDARD DEVIATION	5.8	4.6	1.1	0.7	0	0	0			12.6	4.5	8.9	CGS	NA
	DENVER FORMATION, SILTSTONE	NA	6	RANGE	58-82	14-34	3-8	1-13	0	0	0	CDH	5	32-53	21-26	9-31	CDH	CL,CH
				MEAN	68	22	5	5	0	0	0			45	23	22		CL
				STANDARD DEVIATION	10.0	7.1	2.7	6.1	0	0	0	DSD		8.2	1.9	8.2	DSD	NA
	DENVER FORMATION, SANDSTONE	NA	4	RANGE	11-22	14-49	8-30	18-32	1-26	0-2	0		2	35	NP-29	NP-7	CDH	SM
				MEAN	18	30	19	26	6	1	0	ACPD		NA	NA	NA		SM
				STANDARD DEVIATION	4.8	14.6	9.3	6.6	13.0	1.0	0	CDH		NA	NA	NA		NA

[1] Abbreviations explained in table 4.

Table 2.—Dry density, moisture content, volume change, swelling pressure, and shear strength of selected surficial and bedrock units

[NA, not applicable; . ., no data]

MAP UNITS		NUMBER OF SAMPLES TESTED	STATISTICAL MEASURES	SAMPLE DEPTH (METERS)	DRY DENSITY		MOISTURE CONTENT (PERCENT)	VOLUME CHANGE				SWELLING PRESSURE		SOURCE OF DATA[2]	SHEAR STRENGTH				
								CONSOLIDATION			SWELL (PERCENT)				NUMBER OF SAMPLES TESTED	SAMPLE DEPTH (METERS)	UNCONFINED COMPRESSIVE STRENGTH		SOURCE OF DATA[2]
					kg/m³	lb/ft³		INITIAL (PERCENT)	FINAL (PERCENT)	TOTAL (PERCENT)		kN/m²	lb/ft²				kN/m²	lb/ft²	
Qes	EOLIAN SAND	23	RANGE	0.9-2.7	1,586-1,826	99-114	5-22	0.1-2.5	0-1.8	0.2-2.5	0	0	0	CCSD		1.2	30-45	600-900	
			MEAN	1.2	1,698	106	12	0.7	0.5	1.2	0	0	0	CGS	3	1.2	35	700	DSD
			STANDARD DEVIATION	0.6	117	7.3	6.4	0.5	0.5	0.7	0	0	0	DSD		0	10	200	
Qc	COLLUVIUM	8	RANGE	0.6-2.7	1,458-1,714	91-107	7-23	0.3-1.4	0	0.3-1.4	0-4.0	0-190	0-4,000	ACPD		. .	. .	. .	
			MEAN	1.2	1,602	100	15	0.7	0	0.7	1.5	60	1,300	CCSD	0	. .	. .	. .	. .
			STANDARD DEVIATION	0.7	79	4.9	4.4	0.4	0	0.4	1.1	70	1,500	CGS DSD		. .	. .	. .	
Ql	LOESS	48	RANGE	0.9-2.7	1,346-1,842	84-115	[1]6-27	0.1-1.8	0-4.5	0.2-5.3	0-3.8	0-170	0-3,500	ACPD		0.9-5.5	[1]80-720	[1]1,700-15,000	CCSD
			MEAN	1.8	1,618	101	15	0.7	0.4	1.1	0.9	25	500	CCSD	26	1.8	310	6,500	DSD
			STANDARD DEVIATION	0.8	144	9.0	5.0	0.4	0.9	1.0	1.2	40	900	DSD LAFB		1.1	185	3,900	LAFB
TKd	DENVER FORMATION — CLAYSTONE	18	RANGE	0.9-4.3	1,474-1,842	92-115	14-26	0.2-1.3	0	0.2-1.3	1.3-10.1	140-930	2,900-19,500	ACPD		1.8-18.0	[3]160-1,550	[3]3,300-32,300	ACPD
			MEAN	2.1	1,682	105	20	0.7	0	0.7	4.0	310	6,500	CCSD	38	8.2	615	12,800	CCSD
			STANDARD DEVIATION	0.9	90	5.6	3.3	0.4	0	0.4	2.2	240	5,100	CGS		3.4	370	7,700	CDH RTD
	SILTSTONE	11	RANGE	1.8-7.0	1,378-1,874	86-117	12-30	0.1-1.8	0-0.3	0.1-2.0	0-3.1	0-120	0-2,500	ACPD		2.7-16.5	[4]440-1,090	[4]9,200-22,700	
			MEAN	4.0	1,570	98	24	0.5	0.03	0.5	1.0	45	900	CCSD	11	7.7	735	15,300	DSD
			STANDARD DEVIATION	2.0	130	8.1	5.1	0.4	0.07	0.4	0.9	50	1,100	CGS DSD		4.0	235	4,900	RTD
	SANDSTONE	3	RANGE	1.8-2.1	1,570-1,794	98-112	4-15	0.3-0.8	0-0.4	0.3-0.9	0-0.8	0-30	0-600	ACPD		4.3-7.3	140-345	2,900-7,200	
			MEAN	1.8	1,714	107	11	0.5	0.1	0.6	0.5	15	300	DSD	2	NA	NA	NA	RTD
			STANDARD DEVIATION	0.2	120	7.5	6.4	0.3	0.3	0.3	0.4	20	400			NA	NA	NA	

[1] There is a strong inverse relationship between moisture content and the unconfined compressive strength of loess.

[2] Tests performed on samples described as firm to hard.

[3] One sample of highly weathered claystone collected at a depth of 1.8 m had an unconfined compressive strength of 185 kN/m² (3,900 lb/ft²).

[4] Two samples of highly weathered siltstone collected at different sites at depths of 2.4 and 5.5 m had an unconfined compressive strength of 115 and 135 kN/m² (2,400 and 2,800 lb/ft²), respectively.

[5] Abbreviations explained in table 4.

TERMS USED IN TABLES 1 AND 2

Dry Density: Oven-dry weight per unit volume of sample.

Final Consolidation: Additional percent decrease in volume, after initial consolidation, that occurs when material loaded at 24 to 48 kN/m^2 is wetted.

Initial Consolidation: Percent decrease in volume that occurs when undisturbed material at natural moisture content is loaded at 24 to 48 kN/m^2 for 24 hours.

Liquid Limit: Percent water content at which the sample passes from the plastic state to the liquid state.

Moisture Content: Amount of water in an undisturbed sample expressed as a ratio of the weight of the water to the weight of the oven-dry sample.

Plastic Limit: Percent water content at which the sample passes from the solid state to the plastic state.

Plasticity Index: Numerical difference between the liquid limit and the plastic limit.

Standard Deviation: Measure of the spread of the data around the mean. Of the samples tested, 68.3 percent should have values that fall within plus and minus one standard deviation of the mean.

Swell: Percent increase in volume due to expansion, that occurs after final consolidation when material with free access to water is loaded at 24 to 48 kN/m^2 for 24 hours.

Swelling Pressure: Additional weight per unit area required to return the expanded material to its original volume.

Total Consolidation: Sum of initial consolidation plus final consolidation.

Unconfined Compressive Strength: Maximum axial load required to deform or to break a sample when lateral pressure is equal to atmospheric pressure.

Unified Soil Classification: System that groups unconsolidated materials according to their engineering properties. The first letter indicates grain size and inorganic or organic character of the material: G is gravel, S is sand, M is silt (nonplastic fines), C is clay (plastic fines), O is organic silt or clay, and Pt is peat or other highly organic material. The second letter indicates gradation (engineering sense) and plasticity of the material: W is well graded, P is poorly graded, M is silty, C is clayey, L is low liquid limit, and H is high liquid limit. Material that falls on or near the boundary between two classes is given a dual classification, such as SM-SC (U.S. Bureau of Reclamation, 1974).

Table 3.--Estimated grain-size distribution and thickness, in meters, of surficial materials and lithology of the underlying bedrock

[The estimated grain-size distribution is designated by a two-letter symbol. The first letter corresponds to the dominant size fraction followed by a second letter that denotes the next most abundant size fraction: G, gravel; S, sand; M, silt; and C, clay. Letters in parentheses indicate surficial map units. In test holes that do not extend into bedrock, the thickness of the lowest surficial unit represents the amount of material penetrated and does not necessarily indicate total thickness. Bedrock units in the Denver Formation are: TKdc--claystone and siltsone; TKds--sandstone; TKdcs--claystone, siltstone, and sandstone; and TKd--undifferentiated]

Section locality number	Location				Abbreviated columnar section	Source of data
	Section	1/4 sec.	1/4-1/4 sec.	1/4-1/4-1/4 sec.		
					Township 3 South, Range 67 West	
1	31	d	b	a	3.7 CM/1.8 SG/0.6 CM/11.9 SG	CDS
2	31	d	b	c	0.6 (af)/2.4 CS/1.2 SC/10.4 SG/TKdcs	DSD
3	31	d	c	c	4.0 CS/0.3 SC/1.2 SG	CDS
4	32	a	c	c	4.3 CS/0.3 S	CDS
5	32	d	c	c	4.6 MC/1.5 S/3.7 SG/4.9 S	CDS
6	33	c	a	c	3.7 CS	CDS
7	34	b	d	c	2.4 MS/1.8 CS/0.6 SC/TKdc	CDS
					Township 3 South, Range 68 West	
8	33	d	a	b	1.5 (af)/1.2 CS/3.1 SG/TKdc	CDS
9	33	d	a	d	2.7 (af)/2.1 S/5.5 C/0.3 S/0.3 G/TKdc	CDS
10	34	b	c	d	0.9 (af)/1.2 S/5.2 SG/TKdc	CDS
11	34	c	a	b	2.4 (af)/2.4 SG/1.5 CM/2.4 CS/TKdc	CDS
12	34	c	a	c	0.6 (af)/4.6 SG/0.6 MS/2.1 SG/0.3 CS 2.7 SG/TKdc	CDS
13	34	c	b	a	1.5 (af)/5.2 SG/0.3 G/TKdc	CDS
14	34	c	b	b	3.1 (af)/4.0 SG/3.4 SC/TKdc	CDS
15	34	c	c	b	0.3 (af)/2.1 SG/1.2 CS/1.8 SG/TKdc	CDS
16	34	c	d	a	2.7 (af)/1.5 SG/1.2 CM/6.1 SG/TKdc	CDS
17	34	c	d	d	5.2 SM/0.6 CS/2.7 SM/4.3 SG/1.8 MS/3.7 SG/TKdc	CDS

Section locality number	Location				Abbreviated columnar section	Source of data
	Section	1/4 sec.	1/4-1/4 sec.	1/4-1/4-1/4 sec.		
					Township 3 South, Range 68 West--continued	
18	34	d	c	b	4.0 SC/1.5 SG/5.2 SC/7.9 SG/TKdc	CDS
19	34	d	c	d	0.3 (af)/2.7 SM/4.9 SG/3.7 SC/1.2 CS/0.6 SC/0.9 CS/1.2 G/2.1 CS/0.6 S	CDS
20	35	a	c	c	3.7 (af)/0.6 CS/TKdcs	CDS
21	35	b	c	c	7.9 SM/6.7 G/TKdcs	MCBM
22	35	c	a	b	0.3 (af)/2.7 SM/3.1 CS/1.5 SG/0.6 CS/TKdcs	DSD
23	35	d	c	a	1.5 CS/1.2 SM/0.6 CS/TKdcs	DSD
24	36	b	d	a	2.1 MS/0.6 CS/0.6 MS/2.7 S	CDS
25	36	c	d	b	1.2 (af)/0.6 MC/2.1 CS/TKdcs	CDS
26	36	d	a	b	1.2 CM/2.4 MC/2.4 CS/1.5 SC/6.1 S	CDS
27	36	d	a	c	0.9 CS/3.4 MS/TKdc	MCBM
28	36	d	c	b	6.4 CS/0.6 SG/TKdc	CDS
					Township 4 South, Range 67 West	
29	3	b	c	d	1.5 M/4.9 SM/TKdc	DCPWD
30	3	c	d	a	4.9 CS/TKdc	LAFB
31	4	a	a	a	3.1 C/4.6 SC/TKd	CDS
32	4	a	c	d	4.6 C/1.5 M/TKdc	DCPWD
33	4	d	a	a	1.5 CS/1.2 SM/1.2 CS/TKdc	LAFB
34	4	d	d	b	0.3 (af)/3.1 CS/1.5 SC/1.8 SG/TKdc	LAFB
35	5	a	c	c	5.2 CS/0.6 SG	CDS
36	5	a	d	b	3.1 CS/1.2 S	CDS
37	5	b	a	c	4.6 CS/1.5 SG	CDS
38	5	c	b	c	0.9 CS/0.6 MS/2.7 CS/TKds	CDS
39	5	c	c	a	4.6 C	CDS
40	5	c	d	b	3.7 C/6.1 G/TKdc	WRD
41	5	d	b	b	4.0 CS/1.5 S	CDS
42	5	d	c	b	3.4 CS/1.5 S	CDS
43	6	b	c	a	4.3 CS	CDS
44	6	b	d	b	3.1 CS/TKdc	CDS
45	6	c	b	a	2.1 MS/TKdcs	CDS
46	6	c	b	c	0.6 (af)/4.3 CS/TKdc	CDS
47	6	d	a	b	3.4 C/0.9 SG/TKdc	CDS
48	6	d	a	c	2.7 CS/TKdcs	CDS

Section locality number	Location				Abbreviated columnar section	Source of data
	Section	1/4 sec.	1/4-1/4 sec.	1/4-1/4-1/4 sec.		
					Township 4 South, Range 67 West--continued	
49	6	d	b	d	2.7 CS/TKds	CDS
50	7	a	a	d	4.6 C	CDS
51	7	b	b	d	2.1 SM/1.5 CS/TKdcs	DSD
52	7	b	d	c	1.2 SM/TKdc	CDS
53	7	c	a	d	3.1 SM/0.6 SC/1.5 CS/TKdc	CDS
54	7	c	b	d	5.8 SM	CDS
55	7	c	c	c	2.1 C/5.2 G/3.4 S/1.5 C/1.5 G/TKdcs	MCBM
56	7	d	a	a	1.8 MS/0.6 CS/TKdc	DSD
57	7	d	b	a	2.1 SM/TKdc	CDS
58	7	d	c	c	3.4 SM/TKdc	CDS
59	7	d	d	c	1.2 SC/TKdc	CDS
60	8	a	b	b	4.0 SC/0.3 S	CDS
61	8	a	b	d	4.9 CS/5.5 SG/TKdc	DSD
62	8	b	c	c	1.8 S/1.2 CS	CDS
63	8	c	b	a	4.6 S	CDS
64	8	d	b	d	0.9 CS/0.9 SM/3.4 CS/25.9 SG/TKdc	LAFB
65	8	d	c	b	1.8 C/20.1 SG/1.2 C/0.9 G/1.5 S/TKdcs	MCBM
66	8	d	c	c	12.2 G/0.9 C/14.6 G/TKds	CDS
67	9	b	b	a	6.1 MS/5.8 GC/3.7 MS	LAFB
68	9	c	a	a	0.3 SM/4.9 CS/0.6 SM/1.2 CS/1.5 S/1.2 CS/1.8 SC/TKdc	LAFB
69	10	b	b	a	2.1 CS/TKdcs	LAFB
70	16	a	a	d	0.3 SC/1.8 SM/3.1 CS/TKdc	LAFB
71	16	c	c	d	13.1 S/TKdc	WRD
72	17	a	c	a	4.0 SM/2.4 CS/7.9 SG	DSD
73	17	b	d	a	2.7 S/1.8 SC/1.5 SG/TKdc	DSD
74	17	c	c	c	3.4 M/2.1 SM/TKdcs	DSD
75	17	d	b	b	4.6 SG/TKdc	MCBM
76	17	d	d	c	1.8 SC/1.2 C/7.3 S/0.9 C/4.6 S/TKdc	WRD
77	18	a	a	c	0.9 SM/0.3 SG/0.9 CS/4.9 SG/TKdc	MCBM
78	18	a	c	a	1.5 M/0.6 MS/8.8 SG/TKdc	MCBM
79	18	a	c	c	3.7 MS/15.2 SG/TKdc	MCBM
80	18	a	c	c	3.1 SM/1.5 C/8.5 G/TKdc	MCBM

Section locality number	Location				Abbreviated columnar section	Source of data
	Section	1/4 sec.	1/4-1/4 sec.	1/4-1/4-1/4 sec.		
	Township 4 South, Range 67 West--continued					
81	18	c	a	a	1.8 SM/5.5 SG/2.1 C/4.0 SG/2.7 C/1.8 G/TKdc	MCBM
82	18	c	a	c	0.9 SM/3.1 MS/1.5 SG/1.5 SM/1.5 SG/TKdc	MCBM
83	18	d	a	d	0.9 SM/6.4 SG	DSD
84	19	b	c	a	2.1 CS/TKdcs	CDS
85	19	b	d	a	1.5 CM/1.5 CS/TKdcs	CDS
86	19	c	a	d	0.9 CM/2.4 CS/TKdc	DSD
87	19	c	d	d	1.5 CS/TKdcs	CDS
88	20	a	a	c	2.1 C/2.1 SG/0.6 C/11.6 SG/TKdcs	MCBM
89	20	b	d	b	3.7 SM/TKdc	CDS
90	20	c	d	d	0.6 (af)/3.4 CS/TKdcs	MCBM
91	20	d	a	b	13.7 SM/0.3 SG/TKdc	DSD
92	20	d	d	a	0.9 C/6.4 SG/3.4 C/3.1 SG/TKdc	MCBM
93	21	a	d	d	8.2 S/TKdc	WRD
94	21	b	a	b	3.4 S/TKdc	MCBM
95	21	b	c	d	1.5 C/12.2 G/TKdcs	MCBM
96	21	d	a	a	3.4 SM/0.6 CS/TKdc	CGS
97	22	b	a	c	9.8 S/TKdc	WRD
98	22	b	b	a	9.1 S/3.7 CS/TKdcs	WRD
99	22	b	b	b	10.7 S/1.5 C/TKdc	CDS
100	22	b	b	c	19.5 S/0.6 C/TKdc	WRD
101	22	c	c	a	4.3 SC/TKdcs	CGS
102	27	b	a	a	5.5 S/1.2 CS/TKdc	WRD
103	27	c	b	a	1.8 S/4.9 C/6.1 SG/TKdc	WRD
104	28	a	c	c	13.1 SG/TKdc	CDS
105	28	a	c	d	1.5 C/13.1 SG/TKdc	WRD
106	28	a	d	a	0.9 SM/1.8 MS/3.4 SM/TKdc	MCBM
107	28	a	d	c	4.9 MS/0.9 SG/0.9 CS/14.3 SG/0.3 C/7.3 SG/TKdc	MCBM
108	28	b	a	b	1.2 MS/3.1 SM/9.8 SG/TKdc	MCBM
109	28	b	d	c	11.9 S/3.7 CS/0.6 G/TKdc	MCBM
110	28	c	a	b	9.1 C/6.1 SG/4.6 CS/TKdc	WRD
111	28	c	a	c	2.4 MS/2.7 SG/TKdc	MCBM

Section locality number	Location				Abbreviated columnar section	Source of data
	Section	1/4 sec.	1/4-1/4 sec.	1/4-1/4-1/4 sec.		
					Township 4 South, Range 67 West--continued	
112	28	c	c	a	0.6 CS/TKdc	MCBM
113	28	c	d	a	6.7 MC/1.5 MS/1.5 MG/0.9 SG/TKdc	MCBM
114	29	a	b	a	2.7 C/5.5 S/TKdc	MCBM
115	29	b	a	d	5.2 S/1.2 C/TKdcs	WRD
116	30	a	a	c	4.6 C/TKdc	WRD
117	30	a	d	a	2.1 C/0.3 CS/TKdc	CDS
118	30	c	a	a	4.9 CS/TKdc	MCBM
119	30	c	c	b	3.7 CS/1.8 SC/TKdcs	CDS
120	30	c	d	c	4.0 CS/TKdc	CDS
121	30	c	d	c	0.9 (af)/TKdc	CDS
122	30	d	c	c	0.9 MS/1.5 CS/TKdc	CDS
123	31	b	b	b	1.2 MS/1.2 CM/TKdcs	CDS
124	31	c	b	b	6.7 CS/TKdc	CDS
125	31	c	c	b	2.1 MS/1.5 CS/TKdc	CDS
126	31	c	d	d	3.1 CS/0.3 S/TKdc	CDS
127	31	d	a	d	1.2 CS/TKdc	CDS
128	32	b	a	b	2.4 (af)/1.2 CS/TKdc	CCSD
129	32	c	b	b	4.3 C/0.6 CS/TKdc	WRD
130	32	c	c	b	1.2 (af)/TKdc	CDS
131	32	c	a	d	1.5 CS/TKdc	CCSD
132	33	a	b	c	2.7 MS/TKds	RRS
133	33	a	c	c	2.4 C/4.0 SG/TKdc	WRD
134	33	b	b	b	1.8 MS (Q1)/1.8 MS (Qs)/2.1 SG (Qs)/TKdcs	RRS
135	33	c	a	a	1.5 MS/TKds	RRS
136	33	c	d	a	1.2 MS/TKdcs	RRS
137	33	d	b	a	4.0 MS/TKds	RRS
138	33	d	b	d	0.9 (af)/1.8 CS/TKdcs	DSD
					Township 4 South, Range 68 West	
139	1	a	a	a	3.1 CM/1.8 CS/TKdc	CDS
140	1	a	a	b	2.4 (af)/0.9 CS/4.3 CM/0.6 CS/TKdc	CDS
141	1	a	a	d	3.7 CS/TKdcs	DSD
142	1	b	b	a	1.5 CM/2.1 CS/1.2 SM/1.2 CS/1.5 C/TKdc	CDS
143	1	c	c	d	2.1 MS/3.1 CS/0.6 SC/TKds	CDS

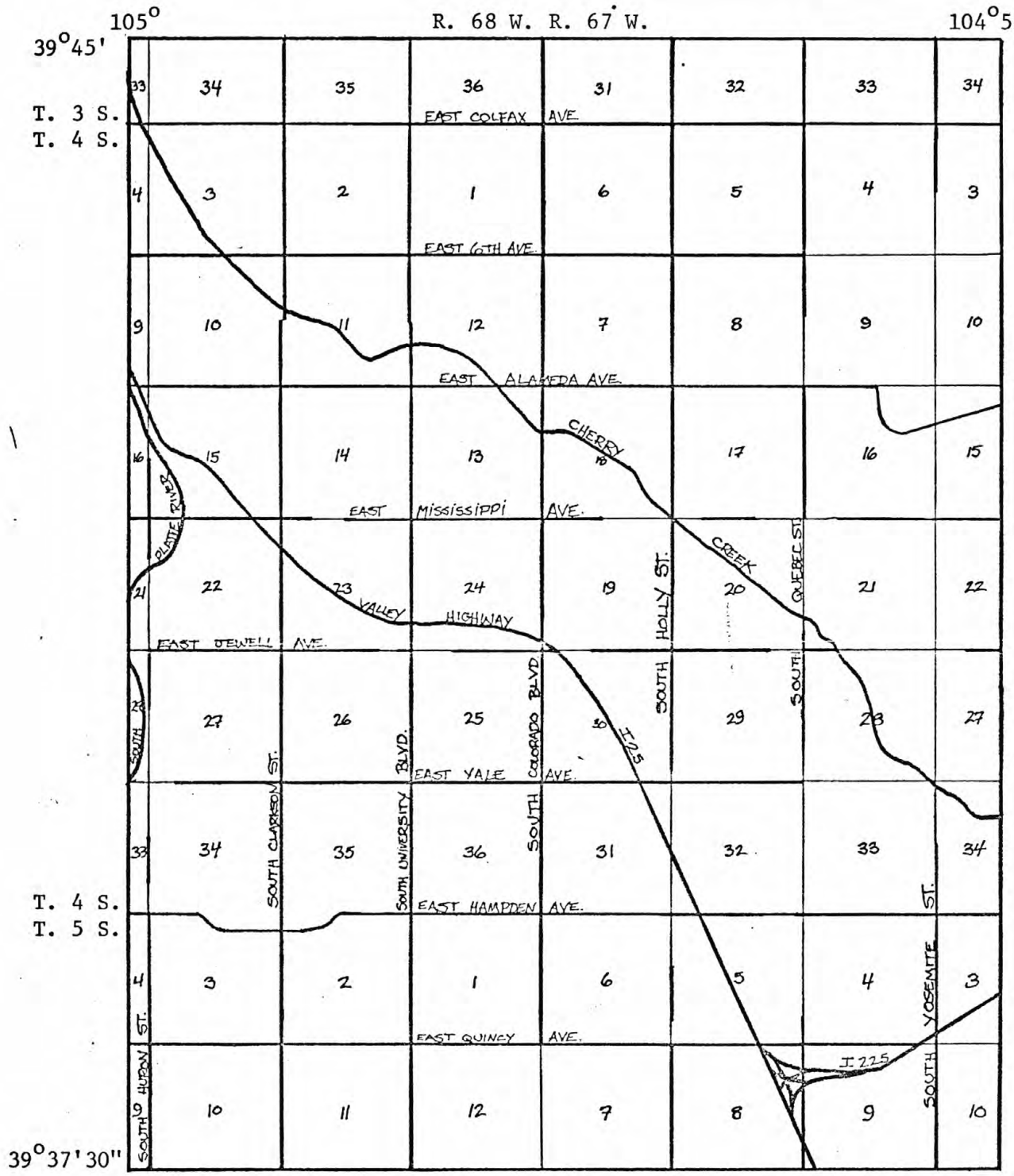
Section locality number	Location				Abbreviated columnar section	Source of data
	Section	1/4 sec.	1/4-1/4 sec.	1/4-1/4-1/4 sec.		
					Township 4 South, Range 68 West--continued	
144	2	a	b	c	0.9 C/3.4 MS/3.1 CS	CDS
145	2	b	c	b	2.4 (af)/4.0 SM/TKds	CDS
146	3	a	b	a	29.9 SG/TKdc	MCBM
147	3	b	a	d	1.2 (af)/5.2 SG/3.4 SC/3.1 CS/1.8 G/4.9 CS	CDS
148	3	b	b	a	1.5 SG/1.2 MS/1.2 CM/0.6 SG/1.2 G/TKdc	CDS
149	3	b	c	c	2.1 (af)/1.2 SM/8.2 SG	DSD
150	3	c	b	d	3.1 (af)/1.2 SG/1.8 CM/9.5 SG/TKdc	MCBM
151	3	c	c	b	0.9 (af)/3.1 S/3.1 SG/3.7 S/2.4 SG/1.2 CS/4.3 SC/TKdc	DSD
152	3	c	d	b	0.9 SM/3.1 SG/0.6 GM/0.6 SG/0.9 SM/1.8 SG/TKdc	MCBM
153	3	c	d	c	3.1 (af)/3.7 SG/0.3 CS/0.6 SG/TKdc	CDS
154	3	d	b	d	6.1 SM/1.2 SC/4.9 SG	CDS
155	3	d	c	c	0.9 (af)/0.9 SM/1.2 SC/0.3 SG/TKdc	CDS
156	3	d	d	a	3.7 S/3.4 SG/0.9 C/0.9 S/TKds	MCBM
157	3	d	d	d	2.4 (af)/2.1 S/3.1 SG/TKds	CDS
158	4	a	a	b	1.2 (af)/1.2 SC/2.1 S/10.1 SG	DSD
159	4	a	d	c	0.9 MS/0.6 SM/7.3 SG	DSD
160	9	d	a	c	4.0 SM/TKdc	CDS
161	9	d	d	c	3.1 (af)/8.2 SG/TKdc	CDH
162	10	a	b	d	2.4 (af)/0.9 SM/1.5 S/7.3 SG/TKdc	CDS
163	10	b	b	b	1.5 SM/0.6 MS/0.9 SM/3.1 S/0.9 SG/4.6 SC	DSD
164	10	b	c	b	0.9 (af)/3.7 S/0.9 SM/2.4 SG/10.4 SM/3.4 SG/TKdc	DSD
165	10	c	b	d	0.9 C/10.4 SG/TKdc	CDS
166	11	a	c	c	9.1 S/1.5 G/TKdc	WRD
167	11	b	d	c	3.1 SM/5.8 G/TKdc	MCBM
168	11	d	a	a	9.5 S/1.2 C/0.9 G/TKdc	WRD
169	11	d	b	a	2.4 SM/13.4 G/TKdc	MCBM
170	11	d	c	a	2.1 (Qpp)/TKdcs	RRS
171	12	a	c	c	10.7 S/7.6 SG/TKdc	MCBM
172	12	b	b	c	7.9 SM/5.2 SC/2.1 SG/TKdc	DSD
173	12	b	c	c	1.8 MS/1.5 SC/4.0 S/7.0 SG/TKdc	CDS

Section locality number	Location				Abbreviated columnar section	Source of data
	Section	1/4 sec.	1/4-1/4 sec.	1/4-1/4-1/4 sec.		
					Township 4 South, Range 68 West--continued	
174	12	c	b	a	5.2 (af)/8.8 SG/TKdc	CDS
175	12	c	b	c	0.3 C/3.4 S/1.2 C/9.8 SG/TKdc	MCBM
176	12	c	c	c	2.1 (af)/2.4 S/TKdc	MCBM
177	13	a	d	d	8.8 S/0.3 C/5.2 S/TKds	MCBM
178	13	a	d	d	1.8 (af)/1.2 SC/2.4 CS/TKd	CDS
179	13	b	c	c	2.7 SM/0.6 SC/TKdc	CDS
180	13	d	a	b	1.2 SC/2.4 S/0.6 CS	CDS
181	14	b	a	b	0.9 SM/1.5 MS/1.8 SM/1.2 MS/TKdc	MCBM
182	14	b	d	a	9.1 S/0.3 C/1.5 S/TKdc	CDS
183	15	a	a	b	2.4 S/1.2 SG	CDS
184	15	a	b	d	0.9 MS/14.0 SG/TKdcs	MCBM
185	15	b	c	b	11.3 SG/TKdc	CDS
186	15	b	d	a	6.7 SG/TKdc	CDS
187	15	b	d	c	1.5 CS/1.2 S/TKdc	CDS
188	15	c	d	c	2.4 SG/0.9 CM/0.3 SG/TKdc	CDS
189	15	d	c	b	1.2 (af)/2.4 S/4.9 SG/1.5 C/2.7 SG/TKdc	MCBM
190	16	a	a	a	3.7 SG/TKdc	CDS
191	16	d	a	b	1.2 SM/6.7 SG/0.6 C/2.1 SG/TKdcs	MCBM
192	16	d	d	a	0.9 SM/6.7 SG/1.2 C/1.2 SG/TKdc	MCBM
193	22	a	a	b	2.1 S/8.5 SG/TKdc	CDS
194	22	a	a	d	1.5 SM/1.5 S/5.8 SG	CDS
195	22	b	b	a	1.8 S/1.8 G/9.8 SG/TKdc	MCBM
196	22	b	d	b	3.1 SG/2.1 C/TKdcs	MCBM
197	22	d	a	b	4.0 S	CDS
198	22	d	d	a	1.5 SM/2.1 S/1.5 CS/0.6 SM/9.1 SG/0.6 CS/1.2 SG	DSD
199	23	a	c	a	1.8 SC/1.5 CS/TKdcs	DSD
200	23	b	a	c	1.8 S/7.3 CS/TKdc	CDS
201	23	b	c	c	1.2 SM/3.1 S/2.1 CS/0.9 SG	CDS
202	23	b	c	d	2.1 SM/0.6 S/TKdc	CDS
203	23	b	d	c	1.8 SM/1.8 S/4.0 CS/TKdc	CDS
204	23	b	d	d	2.4 SM/1.2 S/TKdcs	CDS
205	23	d	b	b	2.1 SM/1.5 SG/TKdc	CDS

Section locality number	Location				Abbreviated columnar section	Source of data
	Section	1/4 sec.	1/4-1/4 sec.	1/4-1/4-1/4 sec.		
	Township 4 South, Range 68 West--continued					
206	23	d	b	c	>4.6 S	RRS
207	23	d	c	a	7.3 (af)/TKdc	CDS
208	24	a	a	d	3.1 CM/TKdc	CDS
209	24	a	c	c	5.5 MS	CDS
210	24	c	b	b	2.4 MS/TKdc	RRS
211	24	c	d	a	0.6 SM/2.1 CS/TKdc	CDS
212	24	d	b	a	0.6 CS/1.2 MS/0.9 CS/TKdcs	DSD
213	24	d	c	b	0.9 SC/2.7 CS/TKdc	CDS
214	24	d	d	b	2.7 S/0.9 SC/1.5 C/TKdc	CDS
215	25	a	d	d	2.4 MS/1.8 CS/TKdc	CDS
216	25	b	c	c	2.4 (af)/2.4 CS/TKds	CDS
217	25	c	a	a	1.8 SC/TKdc	CDS
218	26	c	c	a	6.1 (af)/1.8 SM/TKdc	CDS
219	26	c	c	b	0.9 S/2.7 C/4.9 S/TKdcs	MCBM
220	26	d	c	b	3.1 SM/TKdc	CDS
221	26	d	d	a	4.6 C	CDS
222	27	a	b	b	1.5 S/>0.3 SG	RRS
223	27	b	c	a	1.2 (af)/3.1 SG/1.5 CS/0.9 SG/TKdc	CDH
224	27	c	b	b	1.2 C/0.3 SG/TKds	CDS
225	27	d	c	a	2.7 SG/1.5 SM/0.9 CG/0.6 SG/0.6 CG/3.4 C/1.8 G/1.2 CG/TKdc	CDS
226	27	d	c	b	6.4 S/4.0 SG/TKdc	MCBM
227	28	a	a	d	4.3 (af)/4.9 S/0.6 G/TKdc	MCBM
228	28	d	a	c	1.2 SC/9.5 G/TKds	CDS
229	33	a	d	d	2.1 (af)/1.5 S/5.2 MS/4.3 SG/TKdc	MCBM
230	34	a	c	c	6.4 SG/1.5 G/TKdc	MCBM
231	34	c	c	d	1.2 MC/0.9 MS/4.0 SG	CDS
232	34	c	d	a	0.3 (af)/0.9 SM/0.9 CS/0.6 SC/0.6 CS/4.0 SG	CDS
233	34	d	a	a	0.6 (af)/1.8 SC/1.2 CS/4.9 SG/TKds	MCBM
234	35	c	d	d	0.3 (af)/0.9 SM/>0.3 MS	RRS
235	36	b	a	d	0.9 SM/>0.6 MS	RRS
236	36	b	c	d	0.9 CS/1.2 MS/2.4 CS/TKdcs	DSD
237	36	c	c	b	3.1 CS/TKdcs	CDS
238	36	d	d	c	4.3 CS/TKdc	MCBM

Section locality number	Location: Section	1/4 sec.	1/4-1/4 sec.	1/4-1/4-1/4 sec.	Abbreviated columnar section	Source of data
					Township 5 South, Range 67 West	
239	3	b	a	b	4.0 CS/0.9 CG/0.9 SG	CCSD
240	3	b	b	d	5.5 CS/5.2 SG/TKdc	MCBM
241	3	c	c	c	4.3 MC/1.2 SG/TKdc	CDH
242	4	a	b	d	0.9 MS/TKds	RRS
243	4	d	b	d	2.4 CS/TKdcs	DSD
244	5	a	c	b	2.1 CS/TKdcs	DSD
245	5	b	c	c	2.1 MS/0.6 CS/TKdcs	DSD
246	5	c	d	c	2.4 CS/TKdc	CDS
247	5	d	a	c	1.5 MS/TKdc	RRS
248	6	b	a	d	1.8 CS/TKdcs	MCBM
249	6	b	b	c	0.9 CS/2.4 MS/TKdc	CDS
250	6	b	d	a	2.1 MS/0.9 CS/TKdc	CDS
251	6	d	c	c	3.4 CS/TKdc	CDS
252	7	a	b	d	3.7 CS/TKdc	WRD
253	7	d	d	b	0.9 SM/TKdc	RRS
254	8	a	a	d	7.0 CM/TKdc	CDH
255	8	b	b	a	2.7 CS/TKdc	CDS
256	9	a	a	a	1.8 CS/TKdc	CDH
257	9	a	b	c	2.7 CM/1.2 CS/0.9 SC/TKdcs	CDH
258	9	a	d	d	1.5 MS/TKdc	RRS
259	9	c	a	b	3.4 C/1.2 G/TKdc	WRD
260	9	d	c	a	1.2 GM/TKdc	RRS
261	10	c	a	b	3.7 CS/TKdcs	CCSD
262	10	c	a	d	2.7 CS/TKdcs	CCSD
263	10	c	c	b	2.1 MS/TKds	RRS
264	10	c	d	a	2.7 CS/TKdcs	CCSD

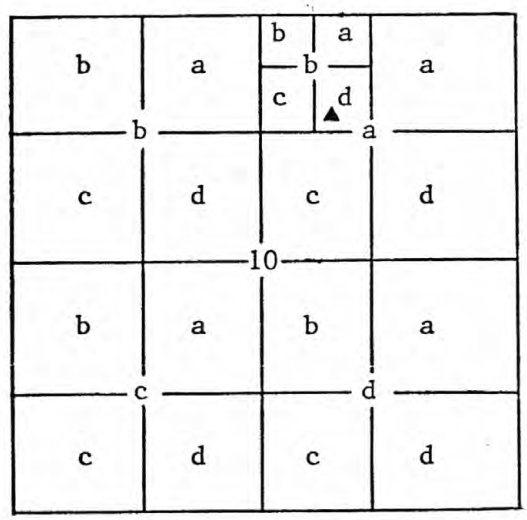
Section locality number	Location				Abbreviated columnar section	Source of data
	Section	1/4 sec.	1/4-1/4 sec.	1/4-1/4-1/4 sec.		
					Township 5 South, Range 68 West	
265	1	c	c	d	2.7 SM/2.7 SC/TKdc	CDS
266	1	d	b	b	2.7 CS/TKds	WRD
267	1	d	c	c	4.6 CS/TKdc	CDS
268	1	d	d	a	2.4 MS/TKdc	RRS
269	2	b	b	c	7.6 SC/4.6 CS/TKdc	WRD
270	2	b	c	b	1.5 SM (Qes)/>0.6 SG (Qb)	RRS
271	2	b	c	b	4.3 SM/TKds	RRS
272	2	c	c	a	10.7 SM/TKdc	MCBM
273	2	c	d	a	4.6 C/3.1 CS/TKdc	WRD
274	2	c	d	d	3.1 C/0.3 S/0.6 C/TKdc	CDS
275	2	d	b	c	3.1 CS/0.6 S/1.2 C/3.4 SG/TKds	MCBM
276	3	a	b	a	0.9 SM (Qes)/>0.6 SG (Qb)	RRS
277	3	b	a	b	3.7 S/4.9 C/4.9 SG/2.1 C/1.5 G	MCBM
278	10	b	b	a	6.1 S/TKdc	WRD
279	10	c	c	c	>2.4 SM	RRS
280	10	d	b	c	3.4 SM/0.9 SC/1.8 CS/TKdc	CDS
281	11	a	c	a	2.7 CS/3.7 S/6.1 CS/TKdcs	WRD
282	11	b	c	c	5.5 CS/8.2 S/1.5 SG/TKdc	WRD
283	11	b	d	d	7.9 CS/3.7 SG/TKdc	CDS
284	11	c	b	b	3.7 CS/1.5 S/TKdcs	WRD
285	11	d	b	c	2.7 CS/11.9 S/TKdc	CDS
286	11	d	d	a	7.0 SM/0.3 G/TKdc	CDS
287	12	a	b	a	2.7 SM/2.4 CS/TKdc	CDS
288	12	a	b	d	5.2 MS/3.1 C/TKds	MCBM
289	12	b	b	b	7.6 SC/4.6 SG	MCBM
290	12	b	b	c	1.5 SC/4.6 SG/TKdc	MCBM
291	12	b	d	b	3.7 CS/TKdcs	MCBM
292	12	d	a	c	0.9 MS/TKds	RRS



INDEX MAP SHOWING SECTION LINES, SECTION-LINE ROADS, INTERSTATE HIGHWAYS, AND MAJOR STREAMS ON THE ENGLEWOOD QUADRANGLE

LOCATION OF SUBSURFACE DATA

Abbreviated columnar sections are arranged numerically according to the section, township, and range in which they occur. Within the section, locations are listed by quarter section, quarter-quarter section, and quarter-quarter-quarter section. Quarter sections are lettered a, b, c, d, counterclockwise, beginning with the northeast quarter. Quarter-quarter sections and quarter-quarter-quarter sections are lettered in a similar manner.



10 a b d

Table 4.--Source of subsurface and analytical data

Source		Subsurface data			Analytical data				
		Test holes	Water wells	Excavations, hand auger holes, and outcrops	Grain size	Atterberg limits and plasticity index	Dry unit density and moisture content	Consolidation-swell	Unconfined compressive strength
ACPD	Arapahoe County Planning Department	x			x	x	x	x	x
CCSD	Cherry Creek School District	x				x	x	x	x
CDH	Colorado Division of Highways	x			x	x			x
CDS	Committee on Denver Subsoils (Judd and others, 1954)	x	x						
CGS	Colorado Geological Survey	x			x	x	x	x	
DCPWD	Denver County Public Works Department	x				x			
DSD	Denver School District No. 1	x			x	x	x	x	x
LAFB	Lowry Air Force Base Engineering Department	x					x	x	
MCBM	McConaghy and others (1964)	x	x						
RRS	Author			x	x	x			
RTD	Regional Transportation District								x
WRD	Water Resources Division, U.S. GeologicalSurvey		x						

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