Open-File 86-02

Surficial - Geologic and Slope Stability Study of the Douglas Pass Region

By

B. K. Stover

Colorado Geological Survey

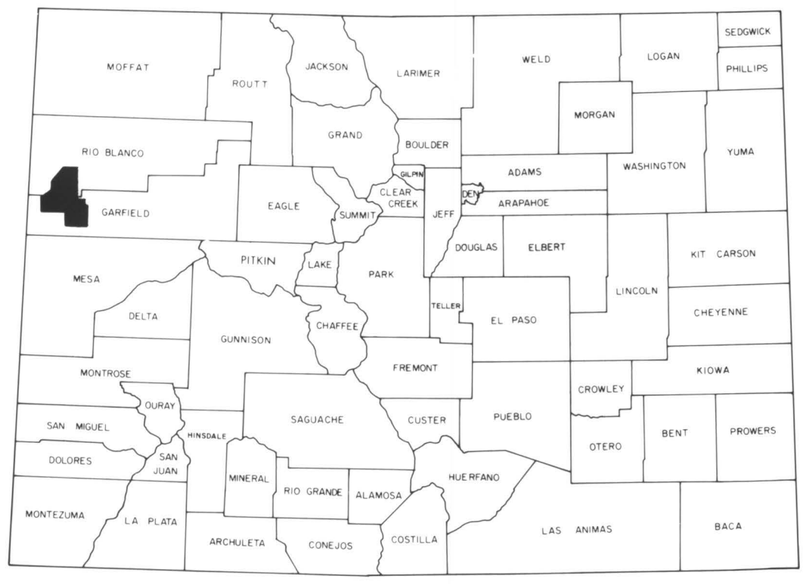
1985

DOI: https://doi.org/10.58783/cgs.of8602.axtb7142

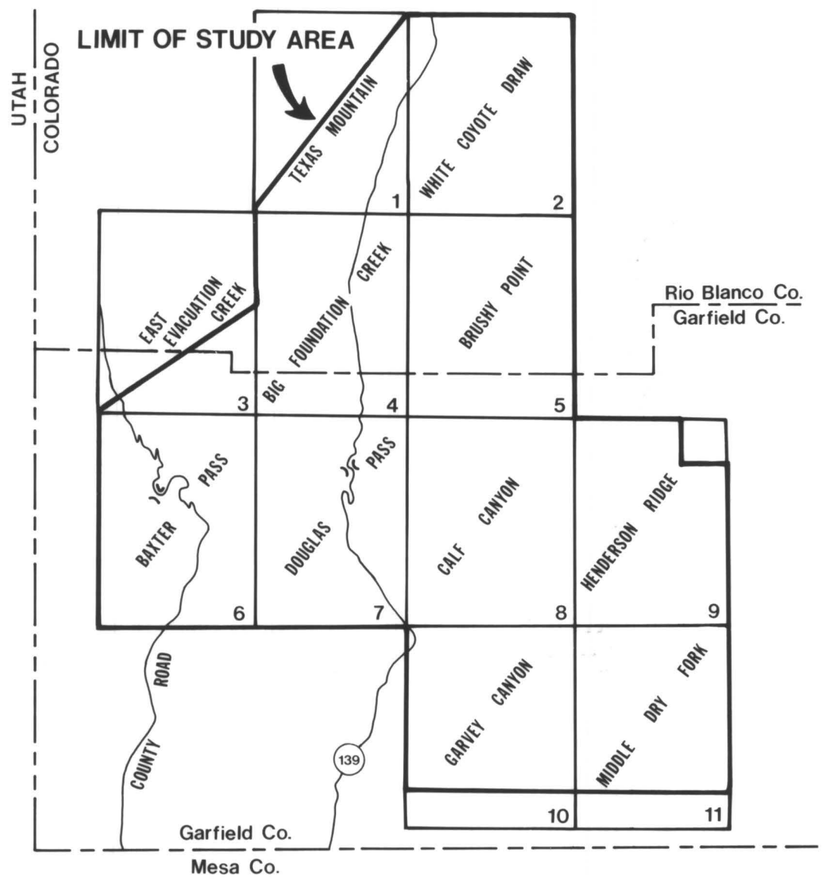
Folio #1 Surficial Geology

Folio #1 Surficial Geology

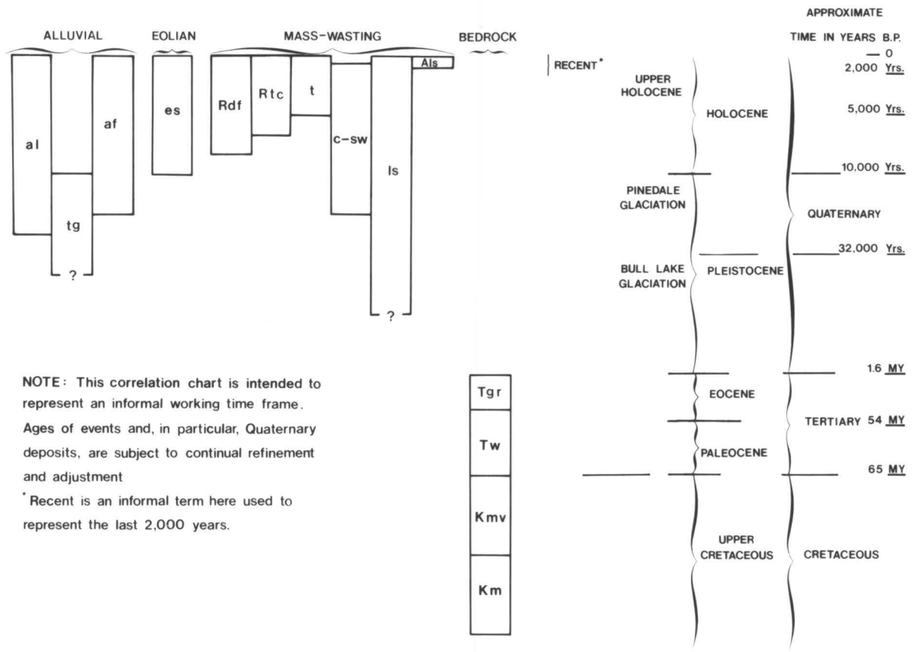
Location Map



Topographical Location Map



Correlation of Map Units



NOTE: This correlation chart is intended to represent an informal working time frame. Ages of events and, in particular, Quaternary deposits, are subject to continual refinement and adjustment

*Recent is an informal term here used to represent the last 2,000 years.

References

Cashion, W. B., 1973, Geologic and structure map of the Grand Junction Quadrangle, Colorado and Utah: U. S. Geological Survey Miscellaneous Investigations Map I-736, Scale 1:250,000.

Johnson, R. C., 1984, New names for units in the lower part of the Green River Formation, Piceance Creek Basin, Colorado: U. S. Geological Survey Bulletin 1529-I, 19 p., 1 pl.

Mears, A. I., 1976, Guidelines and methods for detailed snow avalanche hazard investigations in Colorado: Colorado Geological Survey Bulletin 38, 125 p., 32 figs.

Nuccio, V. F., 1985, Preliminary geologic map of the Douglas Pass Quadrangle, Garfield County, Colorado: U. S. Geological Survey Miscellaneous Field Studies Map MF-1772, Scale 1:24,000.

Roehler, H. W., 1973, Geologic map of the Calf Canyon Quadrangle, Garfield County, Colorado: U. S. Geological Survey Geologic Quadrangle Map GQ-1086.

Roehler, H. W., 1973, Geologic map of the Henderson Ridge Quadrangle, Garfield County, Colorado: U. S. Geological Survey Geologic Quadrangle Map GQ-1113, Scale 1:24,000.

Roehler, H. W., 1972, Geologic map of the Brushy Point Quadrangle, Rio Blanco and Garfield Counties, Colorado: U. S. Geological Survey Geologic Quadrangle Map GQ-1018, Scale 1:24,000.

Rogers, W. P., and others, 1974, Guidelines and Criteria for identification and land-use controls of geologic hazard and mineral resource areas: Colorado Geological Survey Special Publication SP-6, 146 p.

Soule, J. M., and Stover, B. K., 1984, Unpublished, Surficial geology, geomorphology, and general engineering geology of parts of the Colorado River Valley, Roaring Fork River Valley, and adjacent areas, Garfield County, Colorado: Colorado Geological Survey Open File Report OFR 85-1, (In preparation).

Varnes, D. V., 1978, Slope movement types and processes, **in** Schuster, R. L., and Krizek, R. J., eds., Landslides: analysis and control: National Academy of Sciences, Transportation Research Board, Special Report 176, p. 11-33.

Whitney, J. W., 1981, Surficial Geologic Map of the Grand Junction 1X2 degree Quadrangle, Colorado and Utah: U. S. Geological Survey Miscellaneous Investigations Map I-1289, Scale 1:250,000.

Notes on Use and Limitations of These Maps

The reconnaissance Surficial Geologic Maps produced within the scope of this project are intended to provide information covering a very broad corridor in the vicinity of Douglas Pass and Baxter Pass that will be useful in planning and evaluating possible future major relocations of highways, pipelines, and related structures. They are not intended to be used in place of detailed site specific geotechnical investigations, but rather to aid in guiding and planning such detailed work that will be necessary to evaluate potential new transportation or facilities corridors. At a scale of 1:24,000, the maps are necessarily generalized, and must be considered preliminary.

Mapping was accomplished using aerial-photographic interpretation techniques in conjunction with field mapping of key areas on the ground. Emphasis of this project was toward mapping and interpreting surficial geologic deposits and processes, and their potential impacts on the works of man. As such, contacts between bedrock units are only approximately located, and are shown as dashed lines on the maps.

Active landsliding and slope failures are continuing to occur throughout the study area. The current mapping generally reflects conditions visible on photographs taken in 1978 and 1979. The active landslide areas along Highway 139 are as observed during field studies in summer, 1985. Active slides existing in 1978 and 1979, as well as those in 1985, are probably now larger in extent; many new active slides have undoubtedly occurred since, and would not show on the present maps.

Explanation

All units are mid-Pleistocene to recent unless noted otherwise

al — **Stream and Terrace Alluvium**
Sand, silt, clay and minor gravel deposits in floodplains, low depositional terraces, and along main stream and tributary drainages. Deposits are dominantly fine-grained sandy to silty alluvial deposits with subordinate cobble and pebble gravel lenses. This unit comprises the generally flat alluvial valley floors of canyons and valleys. Some minor alluvial fan gravels along the margins of the flood plain deposits may be included where it is not practical to delineate them separately at the map scale. Deposits are up to 20m thick in major valley bottoms.

tg — **Remnant Terrace Gravels and Alluvium**
These deposits are similar in composition and origin to stream and fill-terrace deposits (**al**), except that they typically lie 10 to 30m above the alluvial valley floor on erosionally cut bedrock benches. The gravel and alluvium are older and show a greater degree of soil development and clast weathering.

af — **Alluvial Fan Deposits**
Deposits of clay, sand, silt, subangular gravels, and boulders of rock types derived from the drainage basin of the associated stream. These materials accumulate as triangular wedge or fan-shaped landforms at the confluence of steep, incised side canyons with larger stream valleys. Only the larger well defined fans are mapped along the stream valleys. Smaller fans are included in the **al** unit.

Rdf — **Recent or Active Debris Fan**
Active Debris Fans are those that are currently undergoing deposition of mud and debris. The deposits consist of an intermixed mass of clay, silt, sand, and large cobbles and boulders. They form a generally unsorted, dominantly coarse grained, triangular wedge or fan-shaped deposit at the confluence of steeply sloping gullies or ravines where they discharge upon floodplains, terraces, or landslide benches. Large boulders are commonly strewn on the fan surfaces, and evidence such as damaged or buried vegetation indicates active depositional processes.

Rtc — **Active Talus Cones and Aprons**
Steeply sloping cone or wedge-shaped deposits of loose rock rubble located at the base of steep chutes in eroding bedrock cliffs. Rockfall activity is occurring on the cones and adjacent steep cliffs. Dry debris flows of talus may occur on the cones. These deposits are distinguished from debris fans by their lack of a fine-grained matrix, steeper slopes, and locations at the base of slopes rather than at mouths of tributary ravines.

t — **Talus and Scree Deposits**
Coarse, angular, unconsolidated rock debris deposited by rockfall from bedrock outcrops; deposits form broad aprons or narrow streams of rocky debris on and at the base of steep rock cliffs. The source areas for rock debris are sometimes included within the units because of the map scale. Only larger accumulations are mapped; numerous other smaller talus areas are too small to delineate at the scale of mapping.

c-sw — **Colluvium and Slopewash**
Deposits of angular pebbles and cobbles in a sandy or clayey matrix deposited by downslope transport and sheetwash of material from adjacent sideslopes. Includes thicker areas of rocky soils with flat clasts typical of the Green River Formation outcrop areas.

es — **Wind-deposited (Eolian) Sand and Silt**
Reddish brown loess; mapped where greater than 2m thick. Occurs in swales and on upland benches. Only larger areas are shown.

ls — **Landslide, Slump, and Earthflow Deposits**
Mass wastage slope-failure deposits consisting of homogenous masses of admixed clay, silt, sand, cobbles, and boulders. Also includes toreva blocks of sedimentary rock. All types of rotational and translational slope failure deposits and earthflows are included in this unit, as are sag pond and marshy deposits associated with closed depressions, and poorly drained areas within the landslide complexes. Large sections of bedrock which have remained intact during rotational slumping or translational sliding and form bench-like areas on steep slopes are included in this mapping unit.

Als — **Active Landslide**
Landslide, slump, and earthflow deposits which were actively moving downslope as of fall, 1979. There are undoubtedly many new active landslides in back country areas which have developed since the aerial photography, upon which this reconnaissance mapping is largely based, was flown. New active landslides occur each spring and summer in the Douglas Pass Area.

BEDROCK UNITS

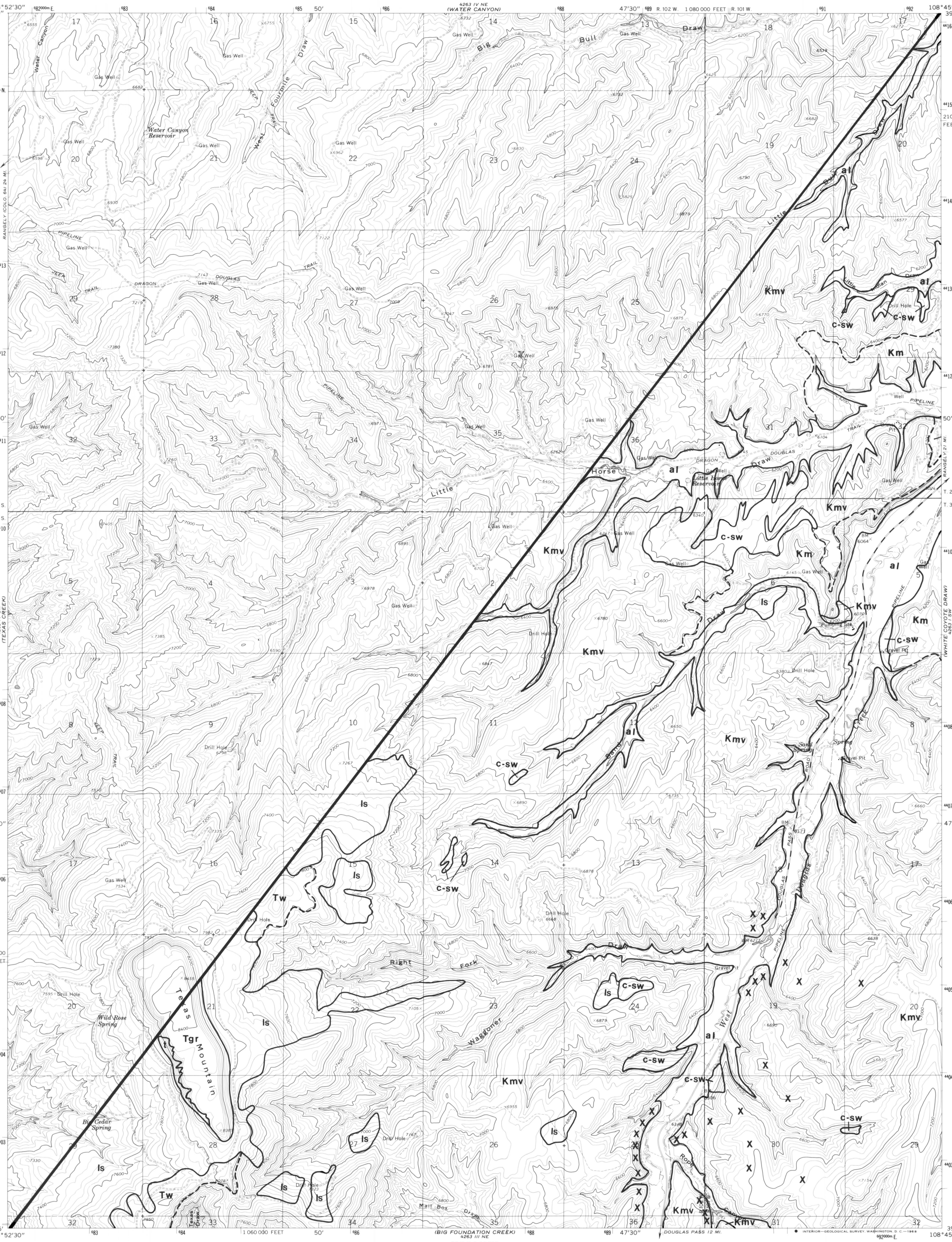
Tgr — **Green River Formation (Eocene)**
Marlstone, oil shale, siltstone, and sandstone; generally forms steep, smooth slopes, cliffs and spires. Includes lower, middle and upper parts of the Douglas Creek Member, the Mahogany Oil Shale Bed, and the Parachute Creek Member.

Tw — **Wasatch Formation (Eocene and Paleocene)**
Mostly purple, maroon, and gray, massive mudstone containing lenticular sandstone units. Includes the Cow Ridge Member of the Green River Formation. Thickness ranges from 75m to 200m. A nearly continuous landslide bench occurs at the Wasatch-Green River formational contact in the Douglas Pass Area.

Kmv — **Mesa Verde Group (Upper Cretaceous)**
Mostly gray-to-white fine-grained massive sandstone, interlayered with medium-gray, massive, silty shale, brownish-gray sandy shale, coal, medium-grained sandstone, and minor siltstones. Contact with overlying Wasatch Formation is only approximately located (dashed contacts). Also includes clinker deposits resulting from burning of coal seams along major valleys, denoted by "**X**" symbols. Thickness approximately 700m.

Km — **Mancos Shale (Upper Cretaceous)**
Brownish to dark-gray marine shale with interbedded siltstone and fine grained sandstone units. Exposures in study area limited to upper 100m, which crops out only along East Douglas Creek in the Texas Mountain Quadrangle.

Contacts dashed where approximately located between bedrock units.



Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964

Polyconic projection. 1927 North American datum
10,000-foot grid based on Colorado coordinate system, north zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

GN MN
1°24' 25 MILS
15° 267 MILS

UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

COLORADO

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Medium-duty Light-duty

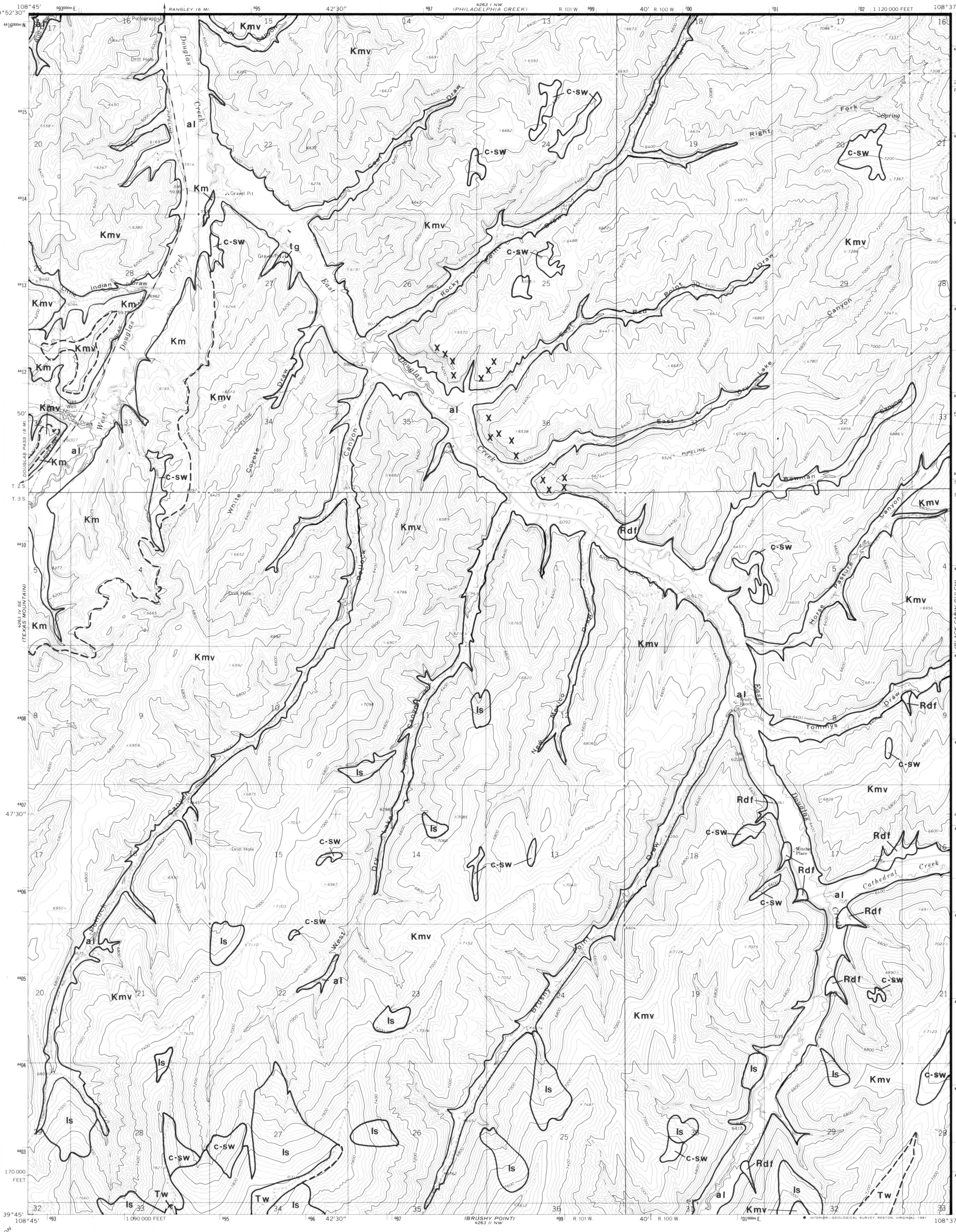
Unimproved dirt

TEXAS MOUNTAIN, COLO.

1—1

108°45′ — 693 000m E. — RANGLEY 16 MI. — 695 — 42′30″ — 697 — 4263 I NW (PHILADELPHIA CREEK) — R. 101 W. — 699 — 40′ — R. 100 W. — 700 — 701 — 702 — 1 120 000 FEET — 108°37′30″

39°52′30″ — 4416 000m N. — 4416 — 210 000 FEET



39°45′ — 4403 000m N. — 170 000 FEET — 47′30″ — 4407

108°45′ — 693 — 1 090 000 FEET — 695 — 696 — 42′30″ — 697 — R. 101 W. — 699 — 40′ — R. 100 W. — 701 000m E. — 108°37′30″

© INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1981

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964

Polyconic projection. 1927 North American datum
10,000-foot grid based on Colorado coordinate system, north zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

To place on the predicted North American Datum 1983 move the projection lines 7 meters north and 57 meters east as shown by dashed corner ticks

Map photoinspected 1973
No major culture or drainage changes observed

UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Medium-duty ——— Light-duty

Unimproved dirt - - - - - -

WHITE COYOTE DRAW, COLO.

1–2

EAST EVACUATION CREEK, COLO.

1–3

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964

Polyconic projection. 1927 North American datum
10,000-foot grids based on Colorado coordinate system, north and central zones
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
Light-duty — Unimproved dirt - - -

QUADRANGLE LOCATION

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1968

B

4263 IV SW (TEXAS CREEK)

4263 I SW (WHITE COYOTE DRAW)

108°52'30" 39°45'

683 000m E. 1 060 000 FEET (CENTRAL) 685 50' 686 687 4263 IV SE (TEXAS MOUNTAIN) 688 689 47'30" RANGELY 27 MI. 1 080 000 FEET (NORTH) 692 108°45' 39°45'

4401 000m N.

T. 3 S.

T. 4 S.

710 000 FEET (CENTRAL)

160 000 FEET (NORTH)

4402 4401 4400 4399 4398 42'30" 4397 4396 4395 4394 4393 40' 4392 4391 4390

T. 4 S.

T. 5 S.

RIO BLANCO CO
GARFIELD CO

130 000 FEET (NORTH)

4389 000m N.

670 000 FEET (CENTRAL)

39°37'30" 108°52'30"

683 684 1 060 000 FEET (NORTH) 50' 687 (DOUGLAS PASS) 4263 III SE 689 47'30" DOUGLAS PASS 2.6 MI. 691 000m E. INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1968 1 080 000 FEET (CENTRAL) 39°37'30" 108°45'

(BAXTER PASS) 4263 III SW

(EAST EVACUATION CREEK) 4263 III NW

(BRUSHY POINT) 4263 II NW

(CALF CANYON) 4263 II SW

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964

Polyconic projection. 1927 North American datum
10,000-foot grids based on Colorado coordinate system, north and central zones
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

Fine red dashed lines indicate selected fence lines

GN MN 1°24' 25 MILS 15° 267 MILS

UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

Light-duty ——— Unimproved dirt - - - - -

COLORADO

QUADRANGLE LOCATION

BIG FOUNDATION CREEK, COLO.

1–4


4263 IV SE
(TEXAS MOUNTAIN)
4263 I SW
(WHITE COYOTE DRAW)
4263 I SE
(BLACK CABIN GULCH)
108°45'
39°45'
693000m E.
1 090 000 FEET (CENTRAL)
42'30"
R. 101 W.
40'
R. 100 W.
RANGELY 27 MI.
1 120 000 FEET (NORTH)
108°37'30"
4402000m N.
T. 3 S.
T. 4 S.
710 000 FEET (CENTRAL)
160 000 FEET (NORTH)
DOUGLAS PASS ROAD 3.5 MI.
4263 III NE
(BIG FOUNDATION CREEK)
4263 II NE
(RAZORBACK RIDGE)
DOUGLAS PASS 6 MI.
T. 5 S.
RIO BLANCO CO
GARFIELD CO
130 000 FEET (NORTH)
670 000 FEET (CENTRAL)
4389000m N.
39°37'30"
1 090 000 FEET (NORTH)
(CALF CANYON)
4263 II SW
1 110 000 FEET (CENTRAL)
DOUGLAS PASS 11 MI.
INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1968
703000m E.
(DOUGLAS PASS)
4263 III SE
(HENDERSON RIDGE)
4263 II SE
Brushy Point
Brushy Point Draw
Brushy Point Spring
Rope Canyon
Red Rock Canyon
Left Fork
Douglas Creek
East Douglas Creek
Little Burma Road
Decker Canyon
Sucker Creek
Willow Creek
Jeep Trail
Trail Canyon
Trail Canyon Lodge
Slide Canyon
Ponderosa Point
Ponderosa Spring
Gillam Draw
Scare Mountain
Big Rock Draw
Wildhorse Canyon
Right Fork Lake Creek
Left Fork Lake Creek
Deer Canyon
Brush Creek
Pike Ridge
Park Creek
Bear Creek
Big Spring
Big Spring Draw
Carr Creek
Windy Canyon
Spring
Springs
Kmv
Is
Tw
Tgr
c-sw
Als
al
af
es
Rdf
Rtc
t
SCALE 1:24 000
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL
GN
MN
1°29'
26 MILS
15°
267 MILS
UTM GRID AND 1964 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET
ROAD CLASSIFICATION
Light-duty
Unimproved dirt
COLORADO
QUADRANGLE LOCATION

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964

Polyconic projection. 1927 North American datum
10,000-foot grids based on Colorado coordinate system, north and central zones
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

Fine red dashed lines indicate selected fence lines

BRUSHY POINT, COLO.

4263 III NE (BIG FOUNDATION CREEK)
4263 III NW (EAST EVACUATION CREEK)
4263 II SE (DOUGLAS PASS)
DOUGLAS PASS 6 MI.
RANGELY 61 MI.
CRIPPLE COWBOY RANCH 3.5 MI.
21 MI. TO U.S. 50
R. 103 W.
R. 102 W.
T. 5 S.
T. 6 S.
109°00'
108°52'30"
39°37'30"
39°30'
32'30"
57'30"
55'
35'
672 000m E.
673
674
675
676
677
678
679
680 000m E.
681
682
1 020 000 FEET
1 040 000 FEET
660 000 FEET
630 000 FEET
4388
4387 000m N.
4386
4385
4384
4383
4382
4381
4380
4379
4378
4377
4376
4375 000m N.
4375

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964

Polyconic projection. 1927 North American datum
10,000-foot grid based on Colorado coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

Fine red dashed lines indicate selected fence lines

Certain land lines are omitted because of insufficient data

UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

COLORADO
QUADRANGLE LOCATION

ROAD CLASSIFICATION

Light-duty ——— Unimproved dirt - - - - - -

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1968

BAXTER PASS, COLO.

1–6

Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964

Polyconic projection. 1927 North American datum
10,000-foot grid based on Colorado coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

Fine red dashed lines indicate selected fence lines

Certain land lines are omitted because of insufficient data

UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

GN MN 1°23' 25 MILS 15° 267 MILS

SCALE 1:24 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

COLORADO

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Light-duty Unimproved dirt

State Route

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1968

DOUGLAS PASS, COLO.

1–7

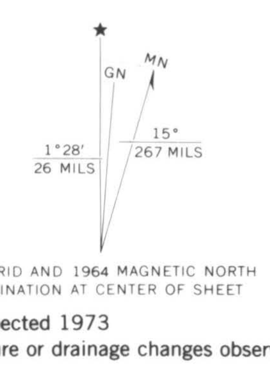
Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964

Polyconic projection. 1927 North American Datum
10,000-foot grid based on Colorado coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

Fine red dashed lines indicate selected fence lines

Certain land lines are omitted because of insufficient data

To place on the predicted North American Datum 1983 move the projection lines 6 meters north and 57 meters east as shown by dashed corner ticks



UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Map photoinspected 1973
No major culture or drainage changes observed

SCALE 1:24 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

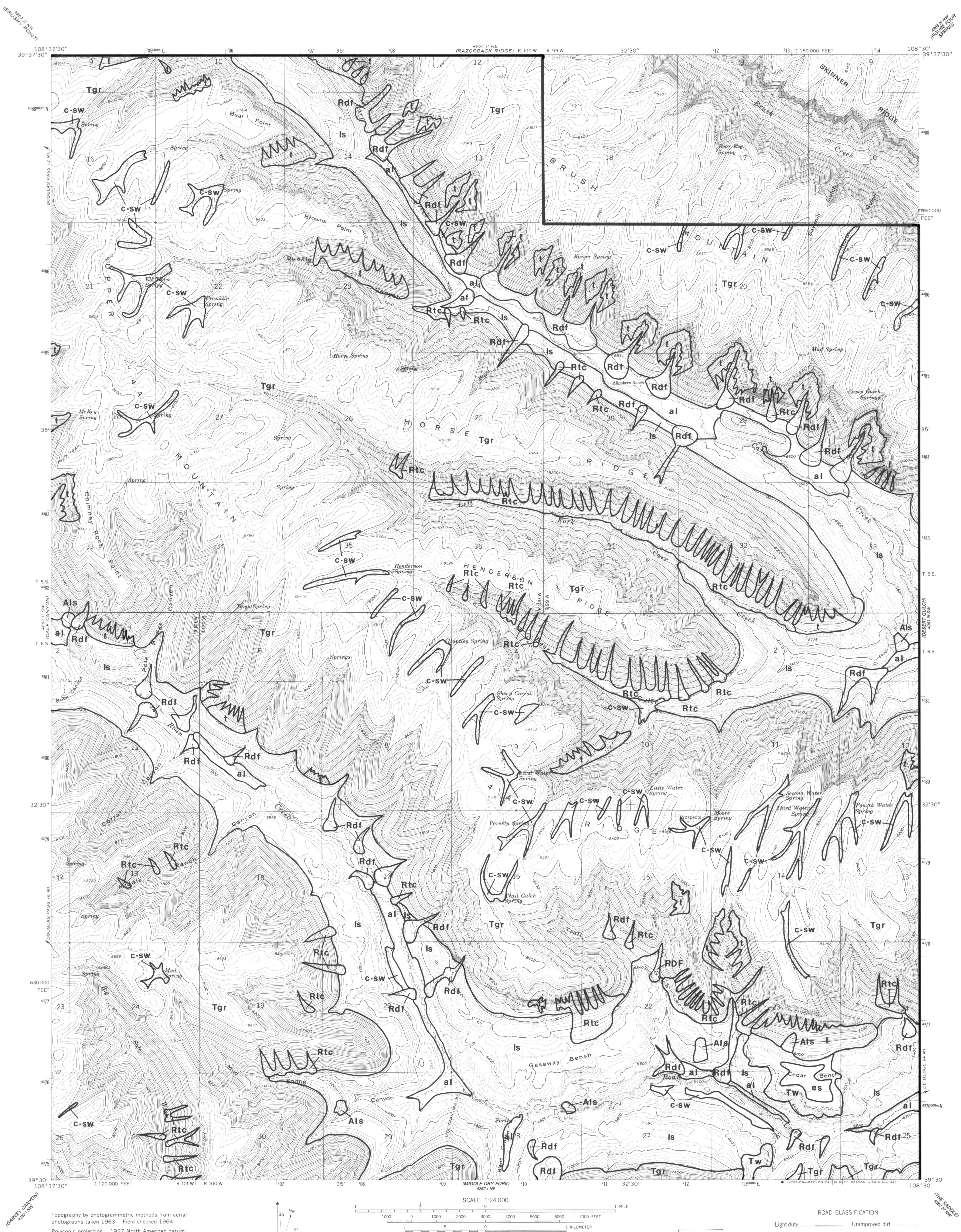
QUADRANGLE LOCATION

ROAD CLASSIFICATION

Unimproved dirt

CALF CANYON, COLO.

1–8

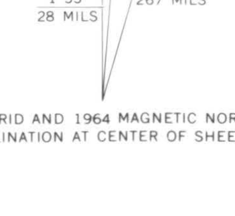


Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964

Polyconic projection. 1927 North American datum
10,000-foot grid based on Colorado coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

Fine red dashed lines indicate selected fence lines

To place on the predicted North American Datum 1983 move the projection lines 6 meters north and 57 meters east as shown by dashed corner ticks

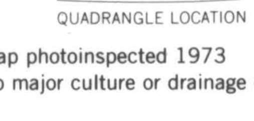


UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

1 MILE — 1000 0 1000 2000 3000 4000 5000 6000 7000 FEET — 1 KILOMETER

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



QUADRANGLE LOCATION

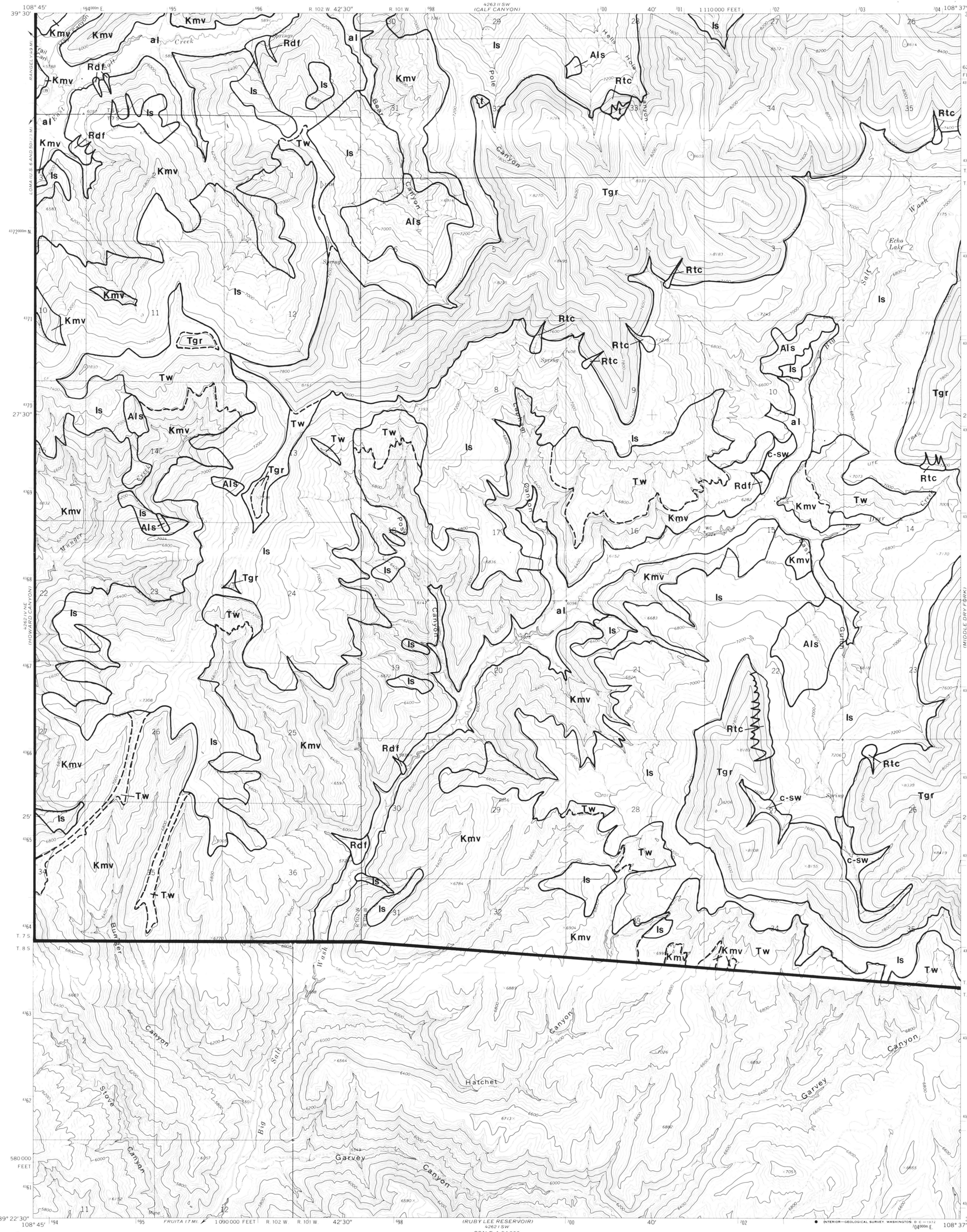
Map photoinspected 1973
No major culture or drainage changes observed

ROAD CLASSIFICATION

Light-duty — Unimproved dirt

HENDERSON RIDGE, COLO.

1—9



Topography by photogrammetric methods from aerial photographs taken 1967. Field checked 1968

Polyconic projection. 1927 North American datum
10,000-foot grid based on Colorado coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

Certain land lines are omitted because of insufficient data

UTM GRID AND 1968 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

Light-duty road, all weather, improved surface

Unimproved road, fair or dry weather

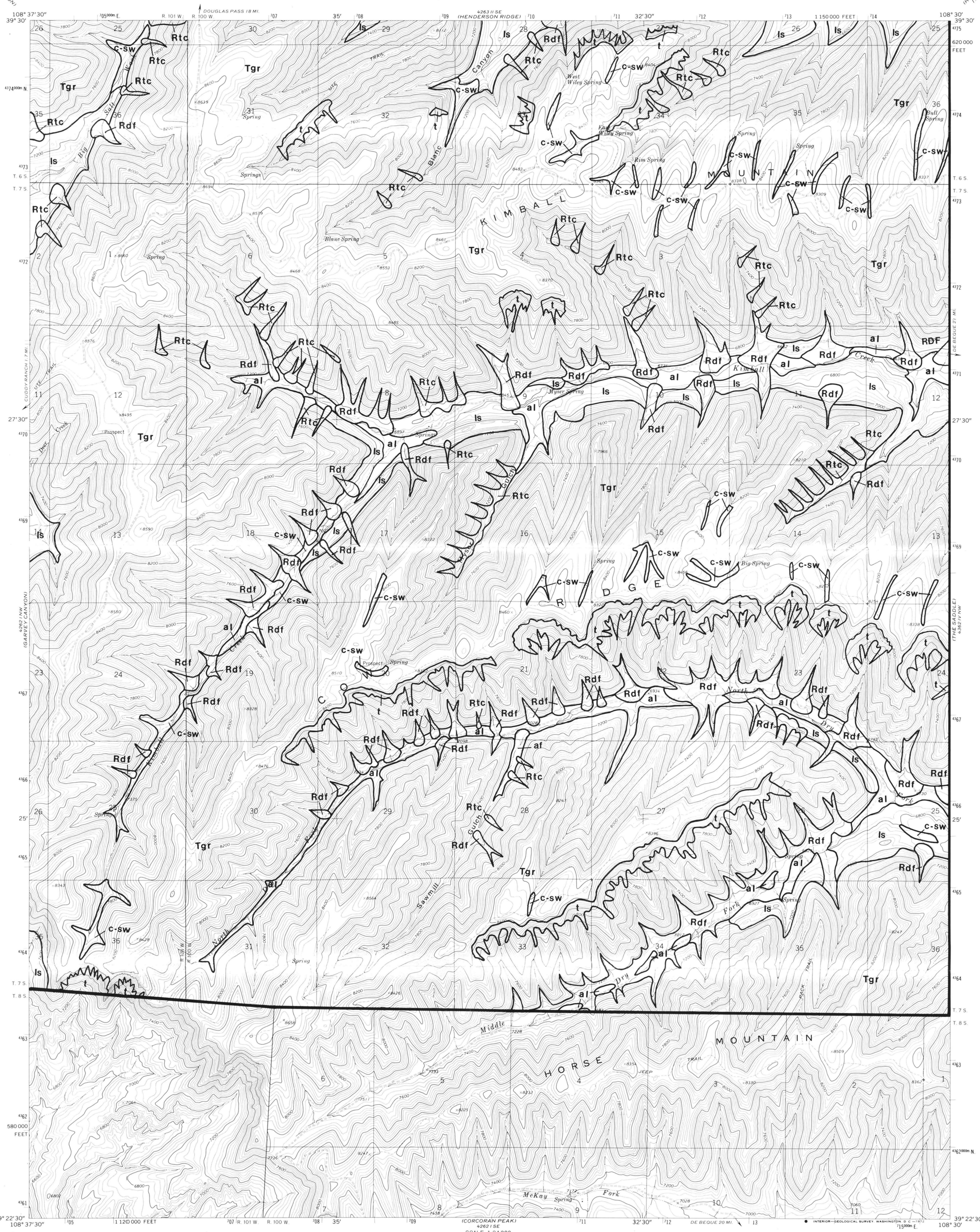
State Route

QUADRANGLE LOCATION

INTERIOR—GEOLOGICAL SURVEY WASHINGTON D C—1972

GARVEY CANYON, COLO.

1—10



Topography by photogrammetric methods from aerial photographs taken 1967. Field checked 1968

Polyconic projection. 1927 North American datum
10,000-foot grid based on Colorado coordinate system, central zone
1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

Certain land lines are omitted because of insufficient data

UTM GRID AND 1968 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION

Unimproved road, fair or dry weather

COLORADO

QUADRANGLE LOCATION

MIDDLE DRY FORK, COLO.

1–11