

Open-File 86-2

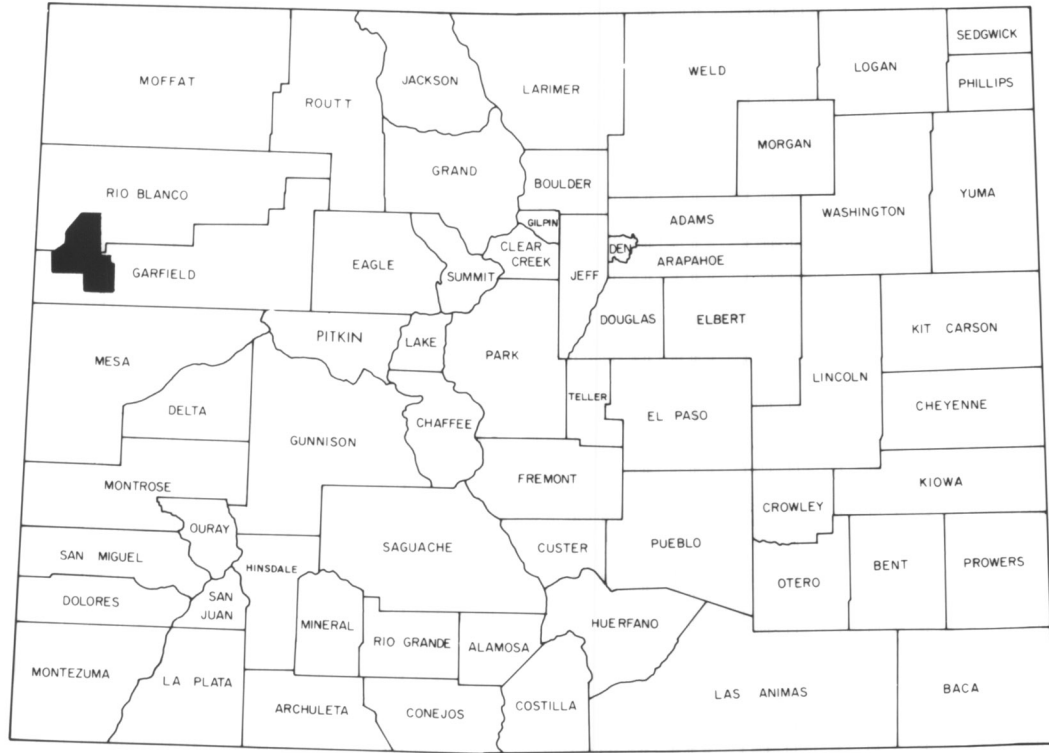
**Surficial - Geologic
and Slope Stability Study
of the
Douglas Pass Region**

**By
B. K. Stover
Colorado Geological Survey
1985**

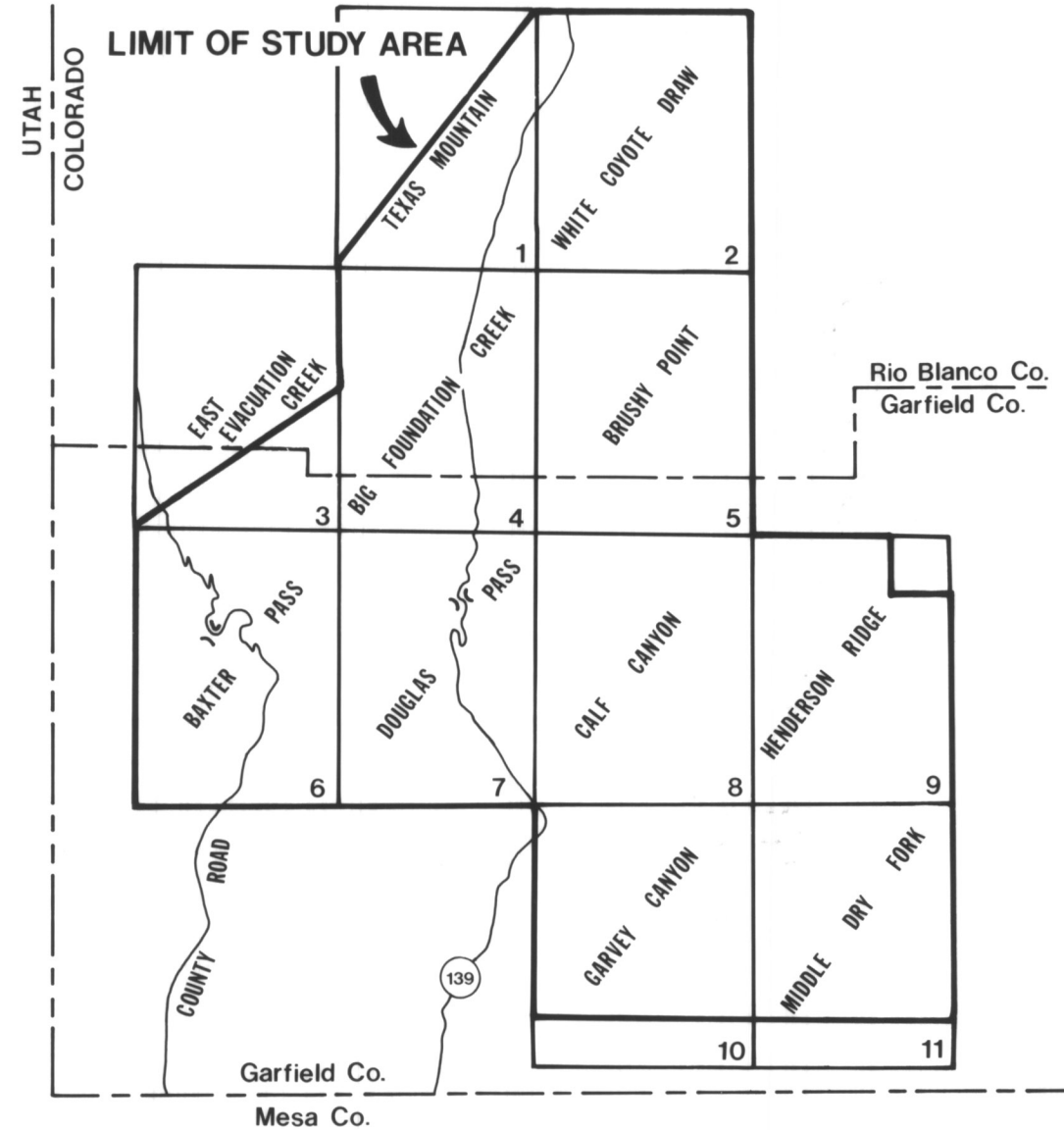
Folio #1 Surficial Geology

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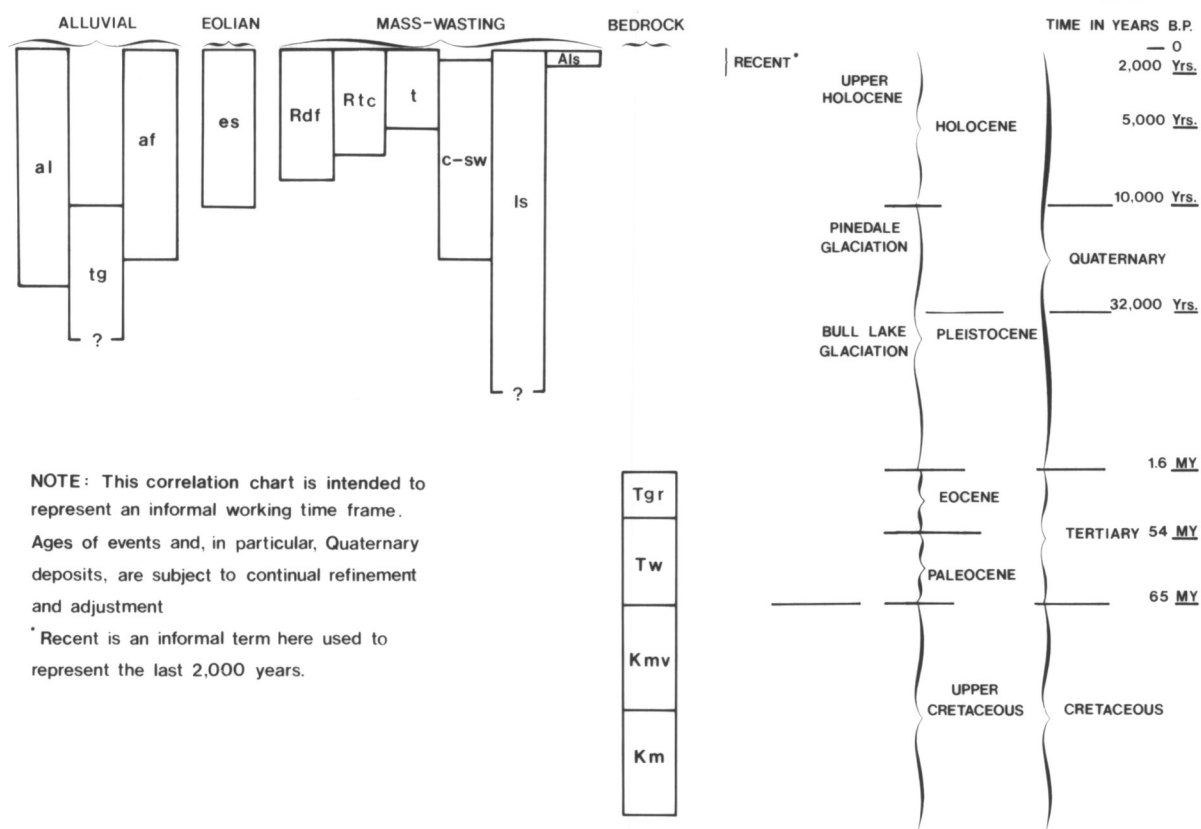
Location Map



Topographical Location Map



Correlation of Map Units



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. L., 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- Soule, J. M., and Stover, B. K., 1984, Unpublished, Surficial geology, geomorphology, and general engineering geology of parts of the Colorado River Valley, Roaring Fork River Valley, and adjacent areas,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.

Is

Landslide, Slump, and Earthflow Deposits
Mass wastage slope-failure deposits consisting of homogenous masses of admixed clay, silt, sand, cobbles, and boulders. Also includes torva 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 formal contact in the Douglas Pass Area.

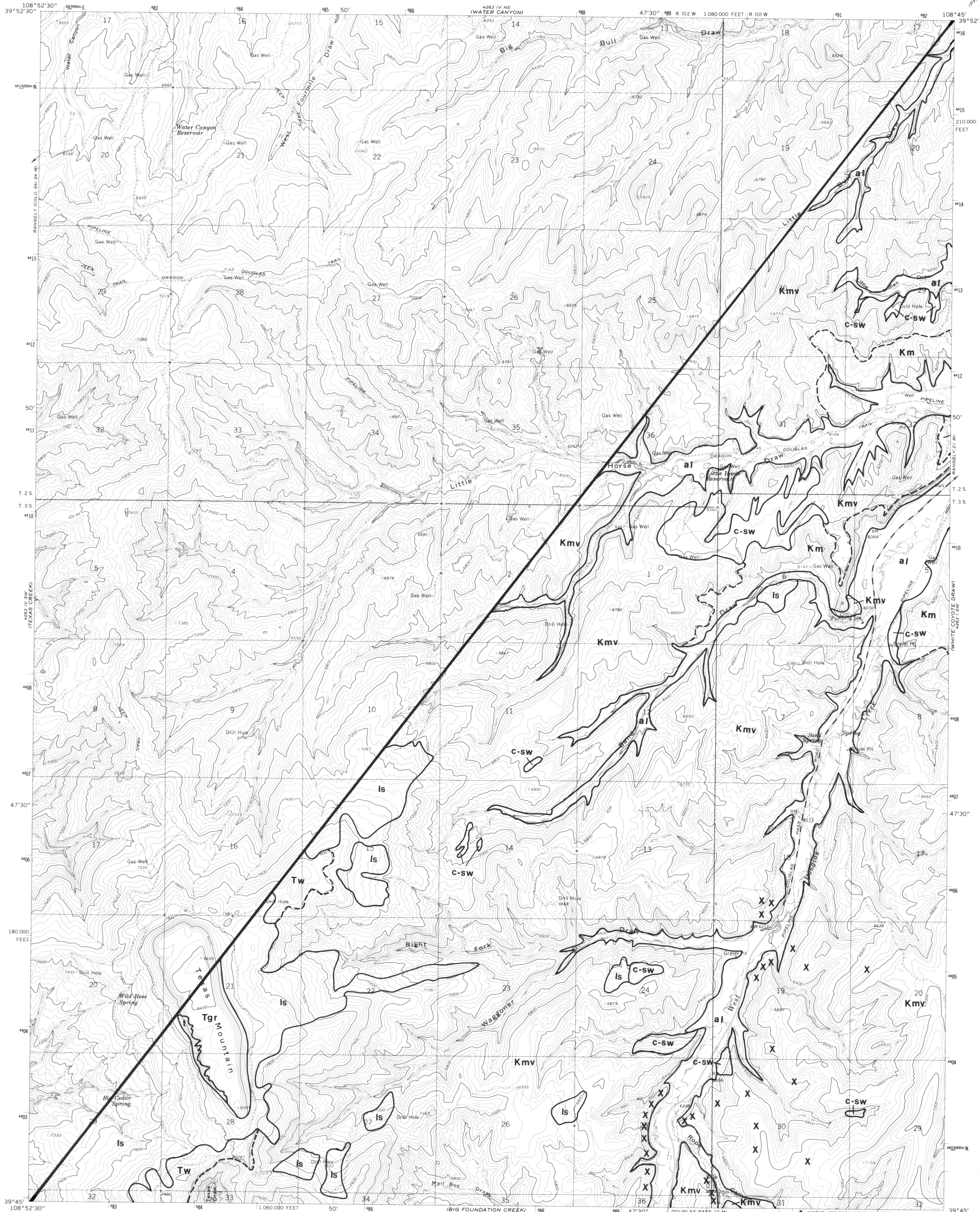
Kmv

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.

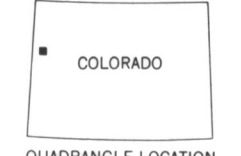
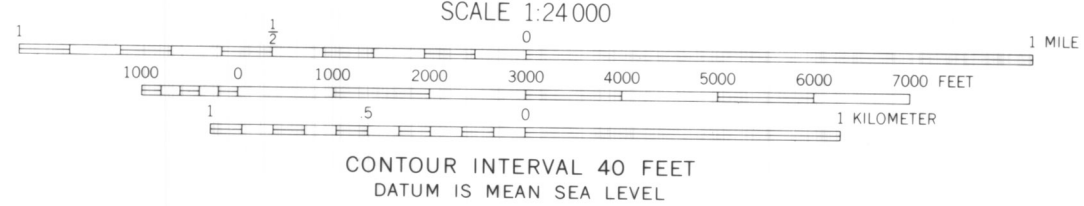
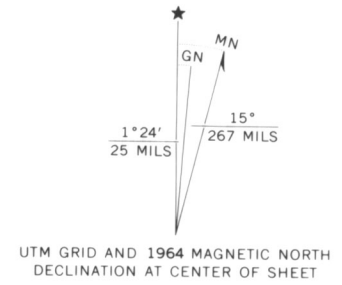
Km

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.

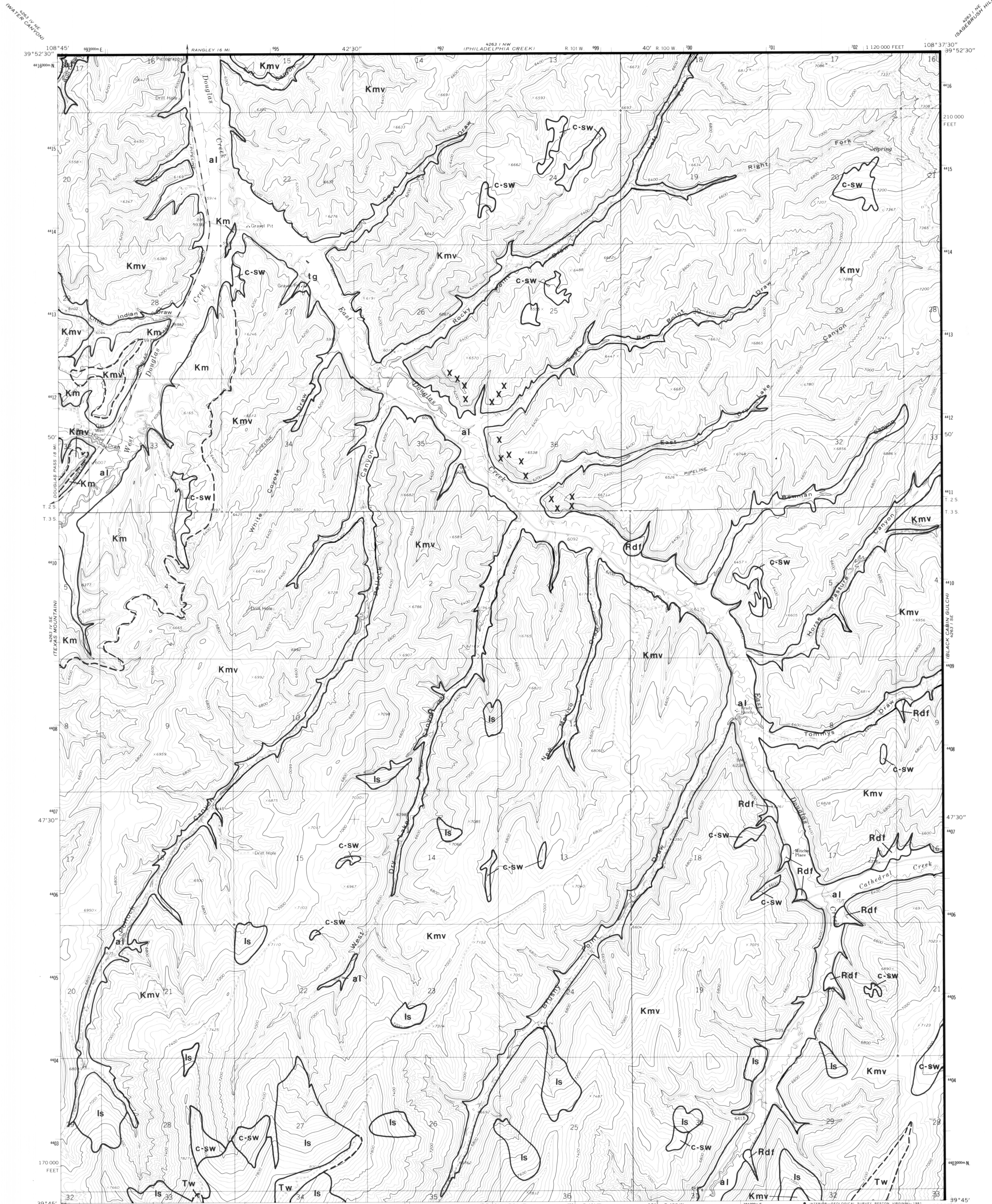


Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964
 Polyconic projection. 1927 North American datum
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 1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue

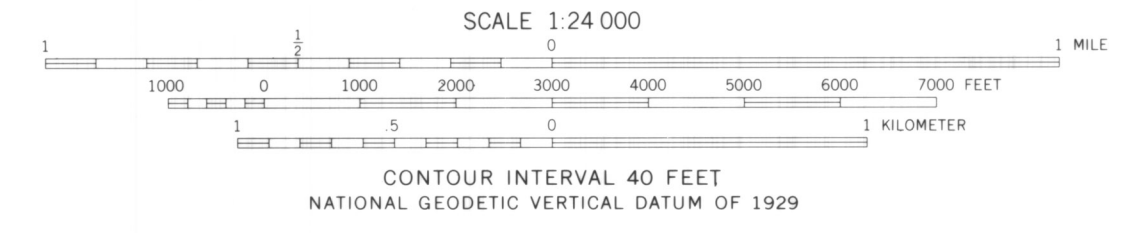
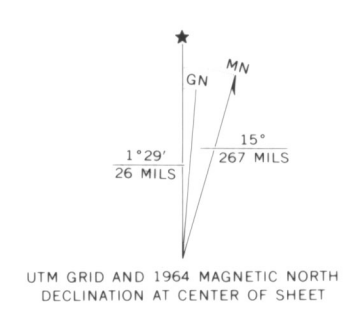


ROAD CLASSIFICATION
 Medium-duty ——— Light-duty - - - - -
 Unimproved dirt ······

TEXAS MOUNTAIN, COLO.

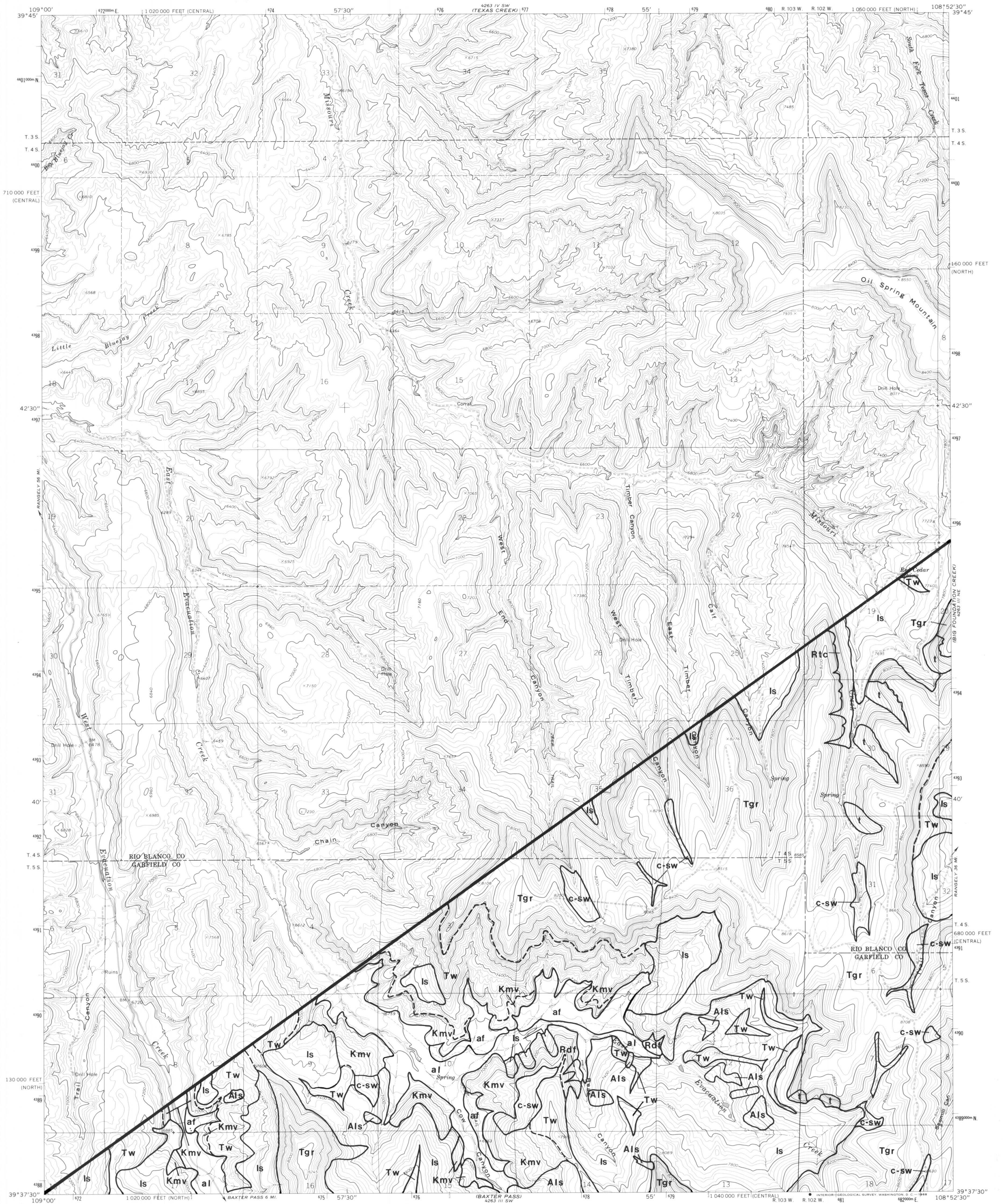


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 Polyconic projection. 1927 North American datum 10,000-foot grid based on Colorado coordinate system, north zone
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 To place on the predicted North American Datum 1983 move the projection lines 7 meters north and 57 meters east as shown by dashed corner ticks
 Map photoinspected 1973
 No major culture or drainage changes observed

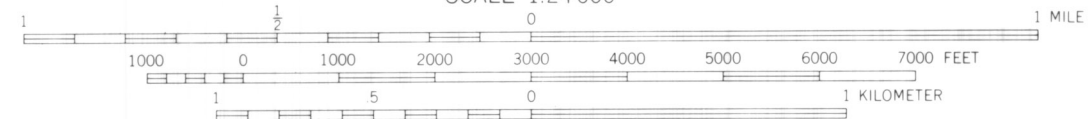
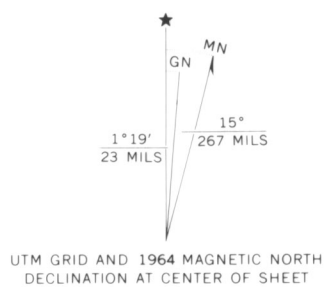


ROAD CLASSIFICATION
 Medium-duty ——— Light-duty ———
 Unimproved dirt - - - - -

WHITE-COYOTE DRAW, COLO.



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



CONTOUR INTERVAL 40 FEET
 DATUM IS MEAN SEA LEVEL

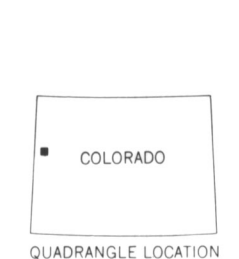
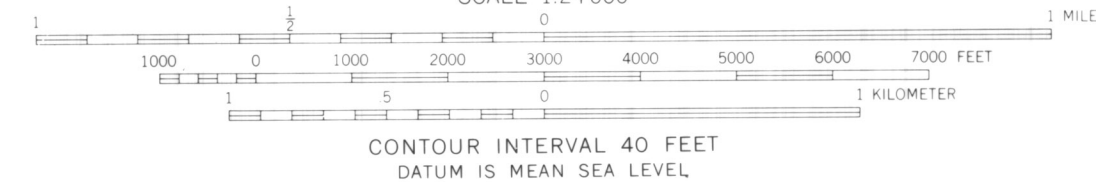
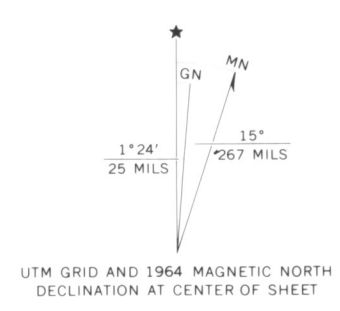


ROAD CLASSIFICATION
 Light-duty ——— Unimproved dirt - - - - -

EAST EVACUATION CREEK, COLO.

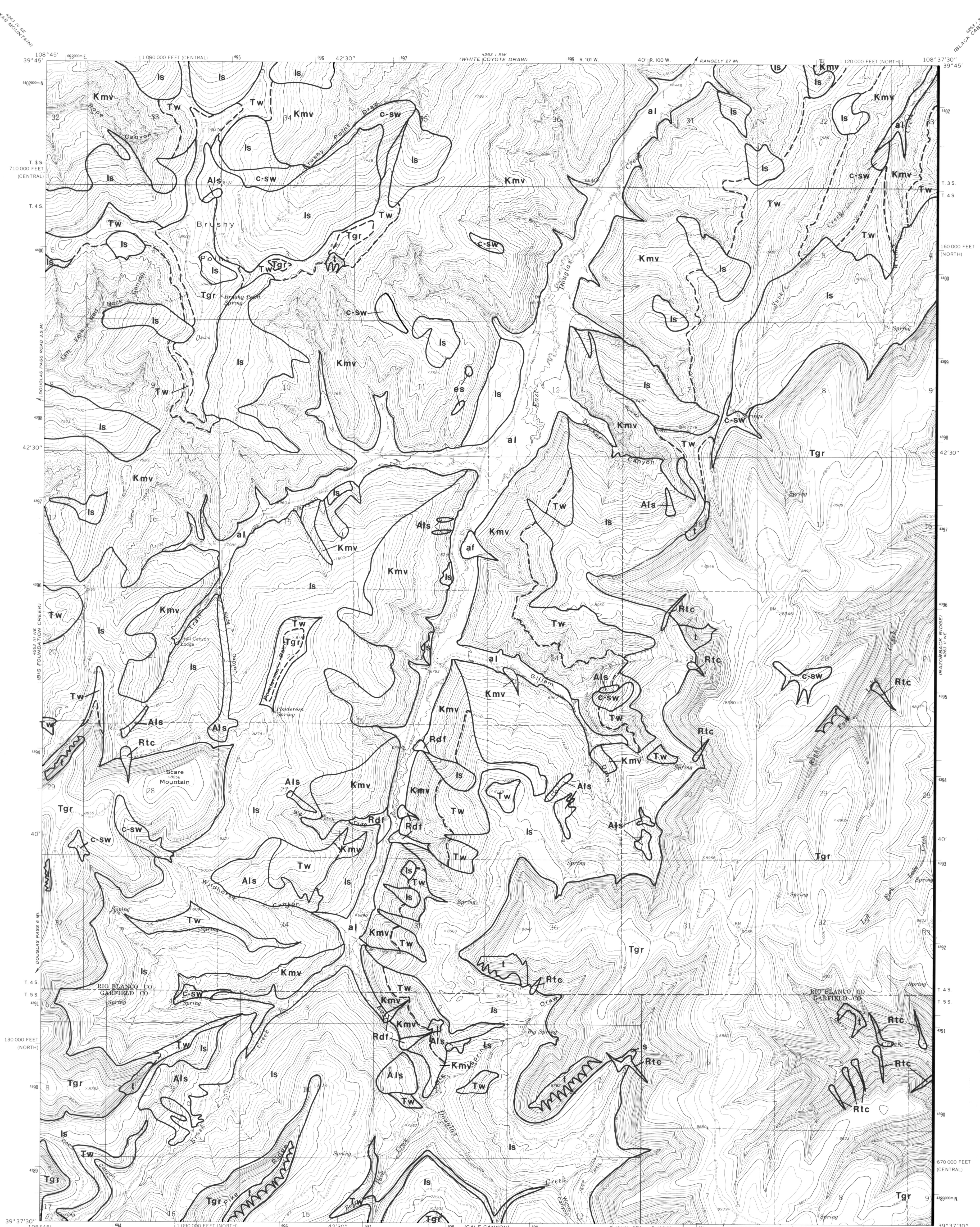


Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964
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 1000-meter Universal Transverse Mercator grid ticks, zone 12, shown in blue
 Fine red dashed lines indicate selected fence lines

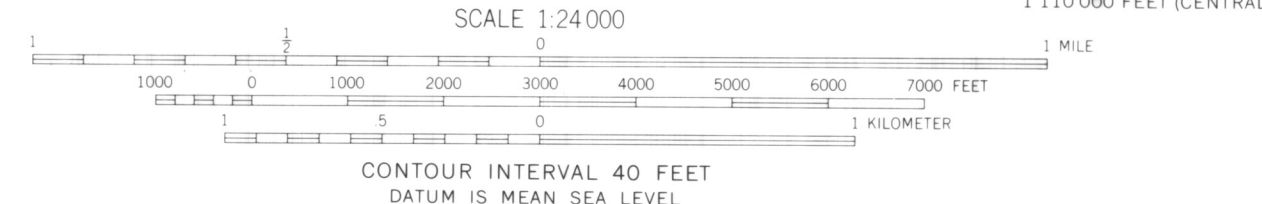
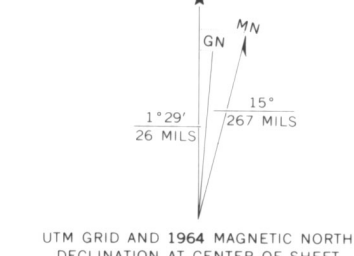


ROAD CLASSIFICATION
 Light-duty ——— Unimproved dirt - - - - -

BIG FOUNDATION CREEK, COLO.



Topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964
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 10,000-foot grids based on Colorado coordinate system, north and central zones
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 Fine red dashed lines indicate selected fence lines

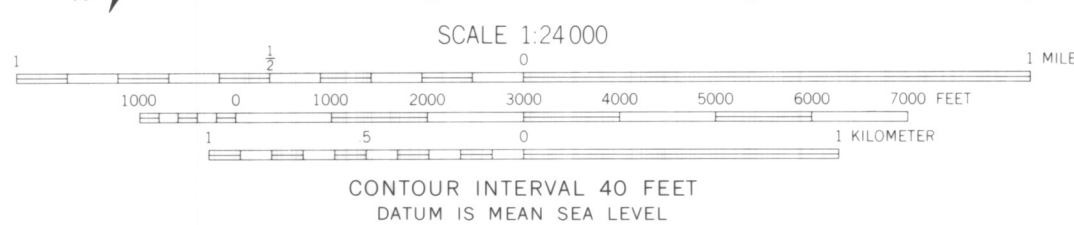
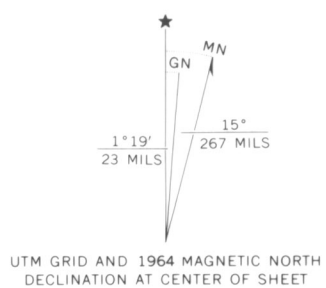


ROAD CLASSIFICATION
 Light-duty ——— Unimproved dirt ———

BRUSHY POINT, COLO.



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



ROAD CLASSIFICATION
 Light-duty ——— Unimproved dirt - - - - -

BAXTER PASS, COLO.



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

SCALE 1:24,000
 1 MILE
 1 KILOMETER
 CONTOUR INTERVAL 40 FEET
 DATUM IS MEAN SEA LEVEL

ROAD CLASSIFICATION
 Light-duty ——— Unimproved dirt - - - - -
 State Route ○

QUADRANGLE LOCATION
 COLORADO

DOUGLAS PASS, COLO.

1-7

39° 37' 30" N
108° 45' W

39° 37' 30" N
108° 37' 30" W



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 67 meters east as shown by dashed corner ticks.

Map photospected 1973.
 No major culture or drainage changes observed.

UTM GRID AND 1964 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24,000

CONTOUR INTERVAL 40 FEET
 NATIONAL GEODETIC VERTICAL DATUM OF 1929

ROAD CLASSIFICATION
 Unimproved dirt

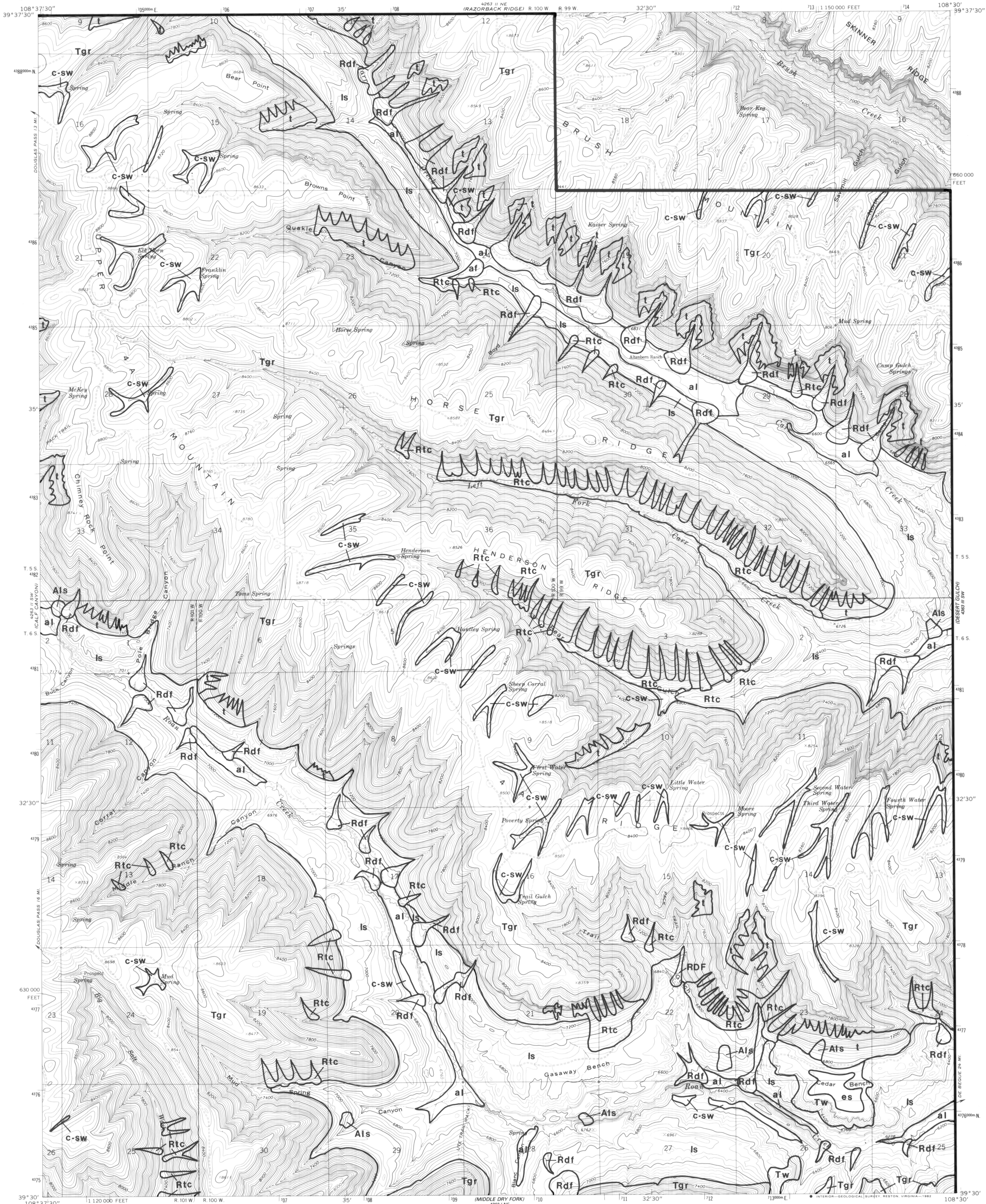
QUADRANGLE LOCATION
 COLORADO

CALF CANYON, COLO.

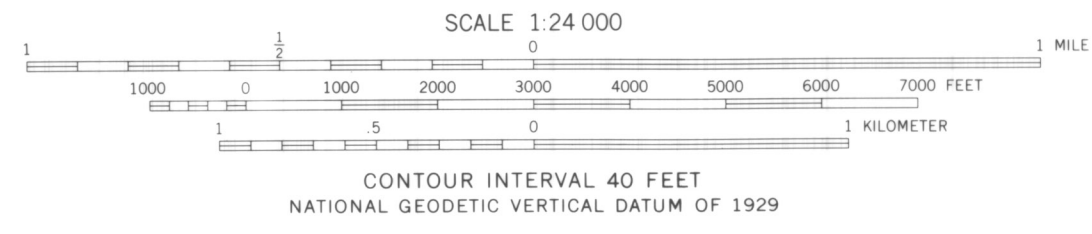
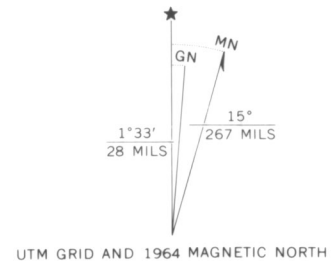
1-8

108° 37' 30" W
39° 37' 30" N

108° 30' W
39° 37' 30" N



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



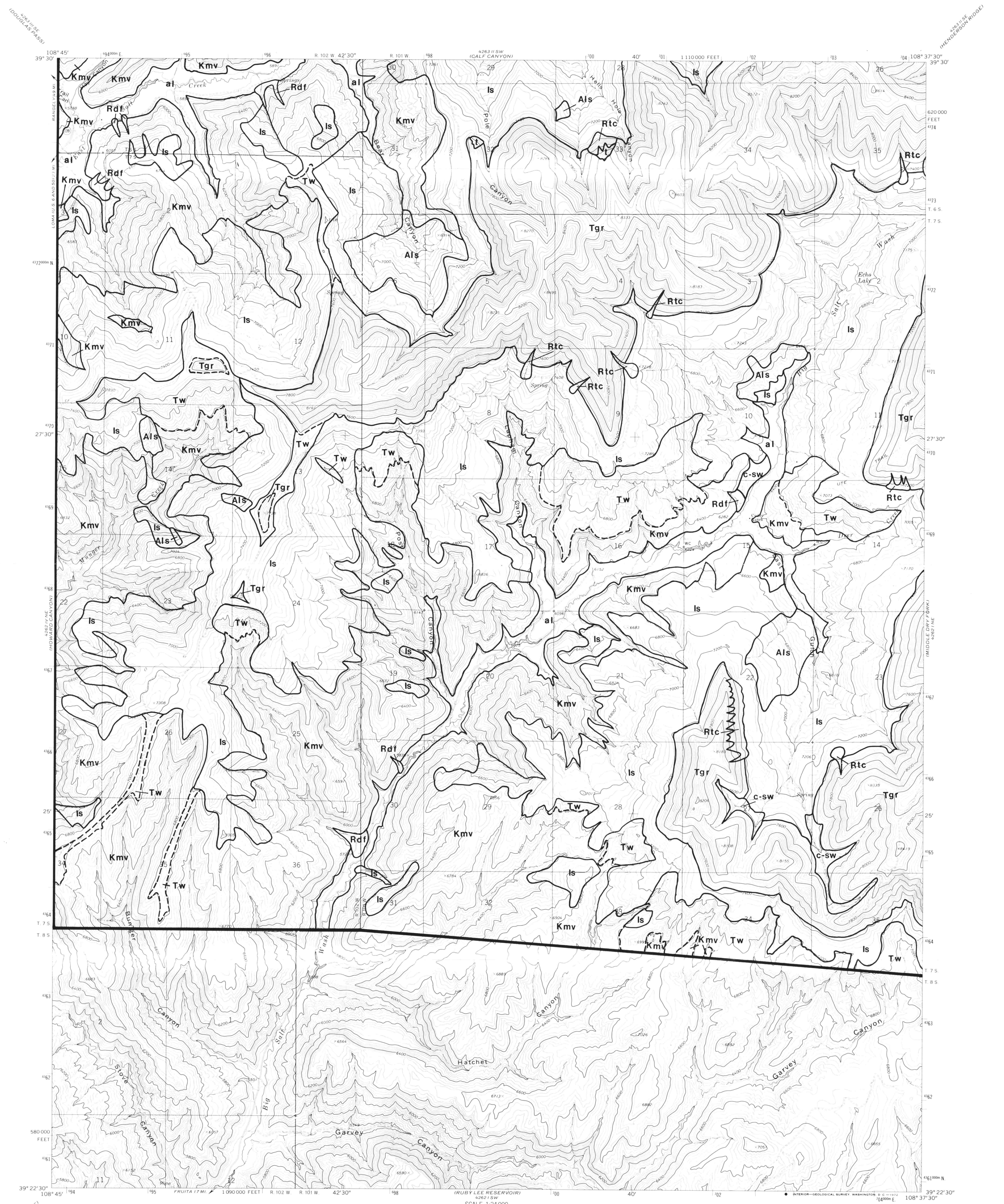
ROAD CLASSIFICATION
 Light-duty ——— Unimproved dirt - - - - -

QUADRANGLE LOCATION
 COLORADO

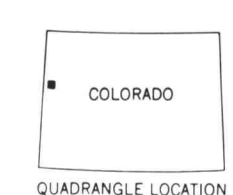
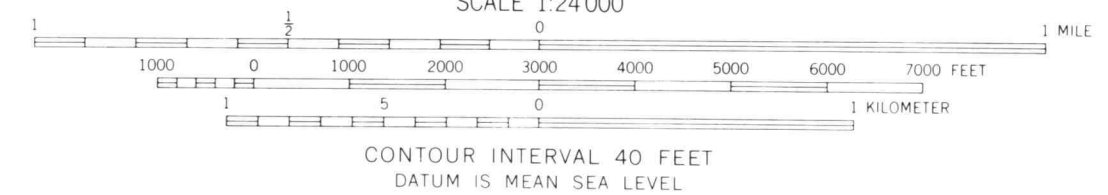
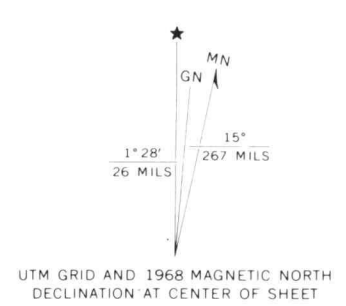
Map photoinspected 1973
 No major culture or drainage changes observed

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.



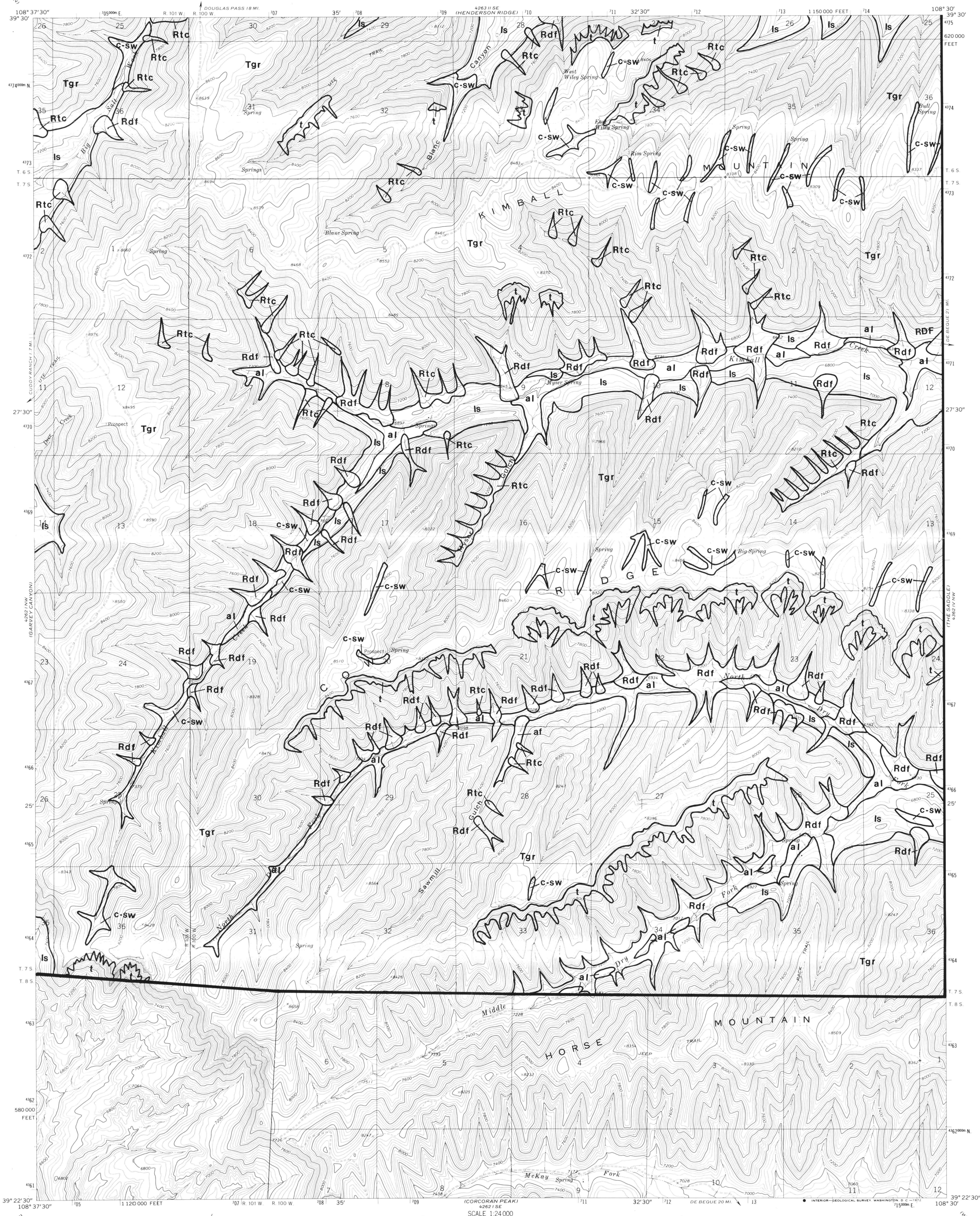
ROAD CLASSIFICATION
 Light-duty road, all weather. Unimproved road, fair or dry weather
 improved surface weather

State Route

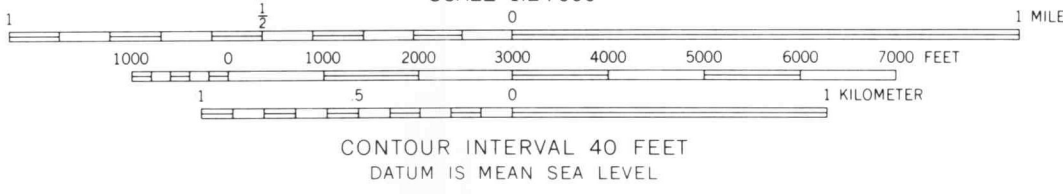
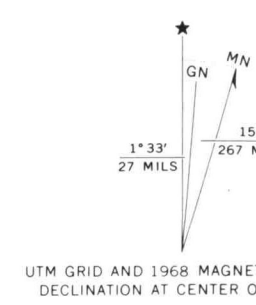
GARVEY CANYON, COLO.

29° 37' 30" N
108° 37' 30" W
(CANYON)

29° 37' 30" N
108° 37' 30" W
(MOUNTAIN)



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.



ROAD CLASSIFICATION
 Unimproved road, fair or dry weather - - - - -

MIDDLE DRY FORK, COLO.