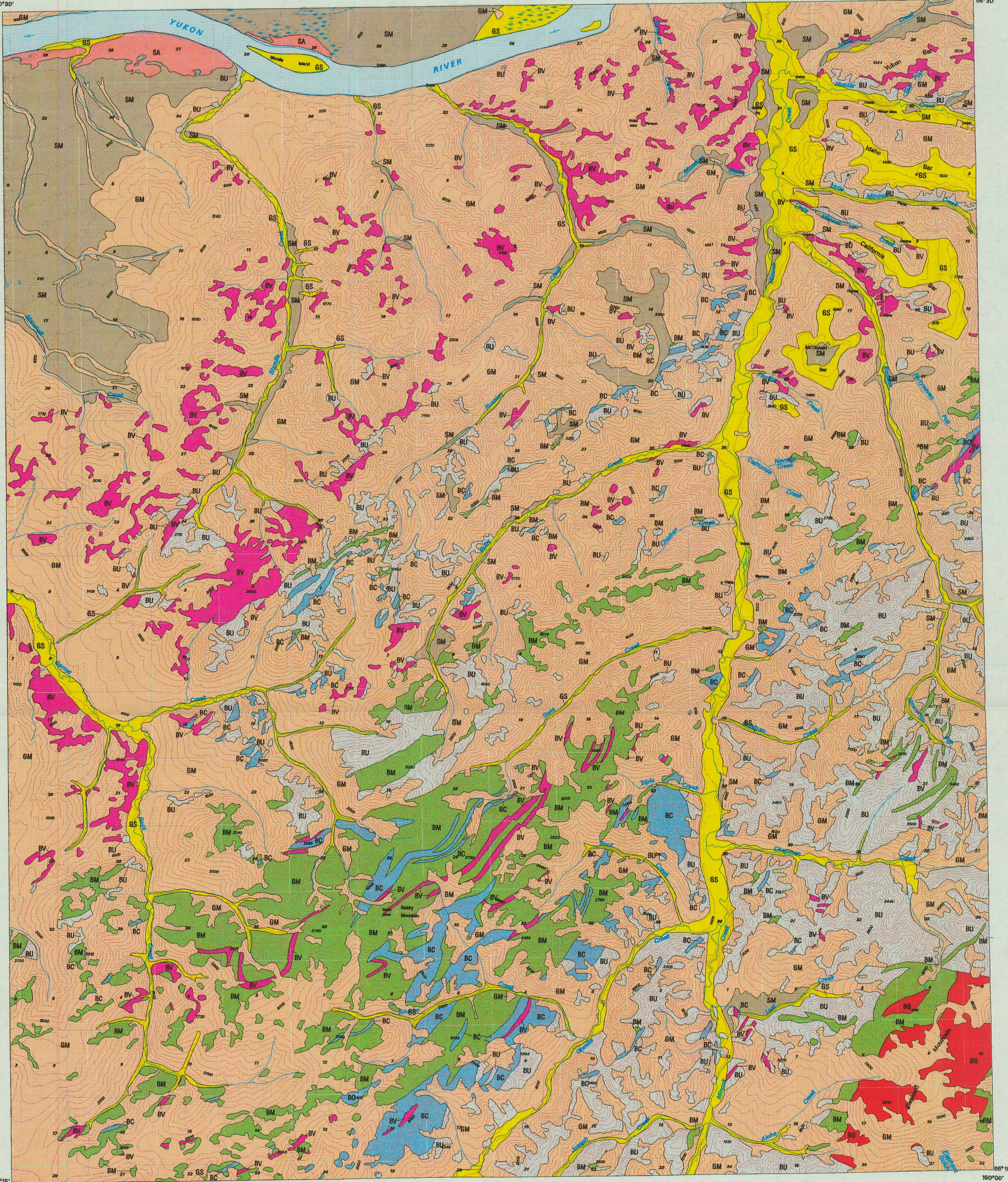
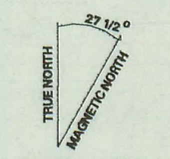
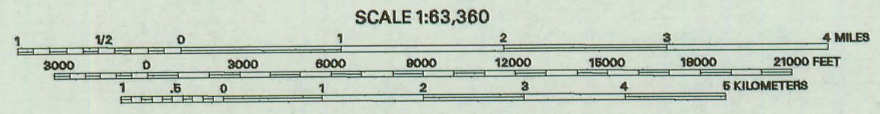
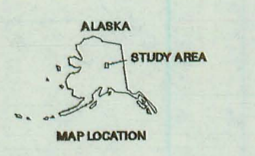


Base modified from U.S. Geological Survey Tanana B-1 Quadrangle, Alaska (1956). Universal Transverse Mercator projection, 1927 North American datum.





For technical map review I thank R.A. Combellick (DGGS) and R.D. Reger. This work was performed in cooperation with the U.S. Geological Survey under STATEMAP Agreement. Digital cartography by D.S. Pinney and S.A. Haug.



DERIVATIVE GEOLOGIC-MATERIALS MAP OF THE TANANA B-1 QUADRANGLE, CENTRAL ALASKA

By
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1997

DISCUSSION

This map illustrates potential near-surface sources of various geologic materials that may be useful for construction. Field observations indicate that each geologic unit (for example, stream alluvium) has a definite composition or range of composition. Therefore, the probable presence of materials is interpreted from the distribution of geologic units on the geologic map of this quadrangle. This map is generalized and is not intended to show exact locations of specific materials. The purpose is to indicate general areas that deserve consideration for certain materials and to eliminate other general areas from consideration for these materials. Local variations are common, especially near unit boundaries.

Potential uses of map units are qualitatively summarized in Tables 1 and 2, below, which show potential availability of various construction materials in each geologic-materials unit. Precise economic evaluations of specific deposits as sources of construction materials will require detailed examination of each deposit, including areal extent, volume, grain-size variation, thickness of overburden, thermal state of the ground, and depth to water table as well as logistical factors, demand, and land ownership.

This map was derived electronically from the geologic map of the area (Reifenstuhl and others, 1997) using Geographic Information System (GIS) software.

DESCRIPTION OF MAP UNITS

Unconsolidated Materials

GS — Fluvial and glaciofluvial gravel, sand, and silt. Chiefly (estimated >80 percent) clean sand and gravel. Grain size, sorting and degree of stratification are variable. Permafrost may be present, especially in older deposits. Older deposits may contain highly weathered clasts and thus may not be suitable as construction materials. Rare oversized materials. Includes primarily GP and GW of the Unified Soil Classification (Wagner, 1957).

GM — Poorly- to moderately well-sorted clay, silt, sand, gravel, and diamicton of colluvial and fluvial origins. Includes angular, unsorted talus debris and chaotically deformed colluvium derived from landslides. Engineering applications vary widely due to large range of grain size and sorting properties. Commonly frozen. Estimated 20-80 percent coarse, granular deposits with considerable oversized material. Includes primarily GC and GM of the Unified Soil Classification (Wagner, 1957).

SM — Silt deposited primarily by wind and reworked by fluvial and colluvial processes. May be organic rich. Commonly frozen and ice-rich, especially on north-facing slopes. Chiefly fine materials. Estimated >80 percent silt, sand, and clay. Includes primarily ML, MH, and SM of the Unified Soil Classification (Wagner, 1957).

SA — Well sorted sand deposited by wind. Mostly thawed and dry. Chiefly (estimated 80 percent) sand. Includes primarily SW and SP of the Unified Soil Classification (Wagner, 1957).

Bedrock Materials

BC — Medium-jointed, fine- to coarse-grained sedimentary carbonate rocks and their metamorphic equivalents. Includes limestone, dolostone, and marble.

BG — Coarse-jointed, coarse-grained igneous lithologies. Chiefly granitic rocks.

BM — Medium-jointed, fine- to medium-grained quartzose sedimentary rocks and their metamorphic equivalents. Includes quartzose sandstone and conglomerate, quartzite, chert, and hornfels.

BV — Medium-jointed, fine-grained igneous rocks and their metamorphic equivalents. Chiefly volcanic flow rock, dikes, and greenstone.

BU — Rocks of variable lithology and character that are generally unsuited for use as construction materials.

REFERENCES CITED

Reifenstuhl, R.R., Dover, J.H., Pinney, D.S., Newberry, R.J., Clautice, K.H., Liss, S.A., Blodgett, R.B., Bundtzen, T.K., and Weber, F.R., 1997, Geologic map of the Tanana B-1 Quadrangle, central Alaska: Alaska Division of Geological & Geophysical Surveys Report of Investigations 97-15a, 1 sheet, scale 1:63,360.

Wagner, A.A., 1957, The use of the Unified Soil Classification System by the Bureau of Reclamation: Proceedings, 4th International Conference on Soil Mechanics and Foundation Engineering (London), vol. I, p. 125.

This DGGS Report of Investigations is a final report of scientific research. It has received technical review and may be cited as an agency publication.

Table 1. *Engineering properties of unconsolidated units*

Map unit	Drainage	Permafrost	Frost susceptibility	Slope stability	Bearing strength	Potential primary products	Potential engineering considerations	Component geologic units[a]
GS	Good in recently deposited alluvium above stream level, fair to poor in older alluvium where permafrost has developed and where covered by silty colluvium and peat. Good in younger permafrost-free terrace deposits without significant cover of organic silt. Drainage may be inhibited on older, inactive surfaces mantled by appreciable thicknesses of silt and organic materials.	Absent in younger alluvial deposits; locally present in older deposits mantled by silt and peat. Present discontinuously in older terrace deposits; may be ice rich in organic silt or where silt has infiltrated into gravels by percolating ground water. Sporadic in outwash where accumulations of peat and organic silt promote development of segregated ice. Ice is typically limited to fine-grained overburden. May be present on older, inactive surfaces mantled by appreciable thicknesses of silt and organic materials.	Minimal in well-drained modern alluvium; may be moderate to intense in active layer silt and peat. Terrace gravels generally not susceptible to heave; heave occurs in organic silt that caps older terrace alluvium. Outwash deposits not susceptible unless thickly mantled by silty organic material. Fans are frost stable, except for silt and organic zones on old fan surfaces, especially where shallow permafrost inhibits drainage.	Generally stable, except for ice-rich permafrost-bearing deposits subject to thaw instability and areas adjacent to cutbanks or fan faces, where sudden, rapid collapse may occur due to stream erosion or surface loading. Fill terraces may be subject to slumping and rapid erosion. Fans are generally stable, except where overburden is susceptible to frost heaving.	Variable, but generally good to fair, especially below peat and silt overburden.	Crushed aggregates and miscellaneous clean fill.	Older terrace and fan deposits that contain permafrost and have significant cover of eolian, organic, or colluvial sediments are generally undesirable as materials sources. Very short, steep tributaries of some fans may have high potential for debris flows or snow avalanches. Cutbanks along active streams may fail, thus may not be suitable for structure sites. High flooding potential along margins of streams.	Qal, Qat1, Qat2, Qfo, Qfy, Qh, Qof, QTg
GM	Variable, depending on proportion of silt- and clay-sized material and stage of permafrost development. Deposits on or at the base of steep slopes may be subject to snow avalanches and torrential flooding during periods of snowmelt or heavy precipitation.	Common on north-facing slopes, especially in older deposits. Segregated-ice content may be high where silt and organic materials are prevalent.	High in deposits that contain large proportions of silt or organic silt and in deposits with poor drainage.	Thaw unstable where perennially frozen or where deposit contains excess ice. Deposits of predominantly silty material are susceptible to creep, especially where saturated by near-surface ground water, such as springs along faults. Steep colluvial deposits, such as talus aprons at or near the angle of repose, are generally unstable and may be subject to snow avalanches, debris flows, and rock falls.	Variable but generally fair to poor.	Unclassified fills, although some local pods or lenses may be a source of small quantities of moderately sorted, gravel-rich fluvial sand.	Fan surfaces may be subject to snow avalanches, debris flows, subsidence, and local liquefaction. Therefore, caution should be exercised during excavation and construction activities. Saturated or over-steepened deposits may be subject to slope failure, and local thaw subsidence may occur in areas of permafrost.	Qaf, Qao, Qc, Qca, Qcs, Qct, Qd, Qls
SM	Highly variable depending on stage of permafrost development. Very poor in frozen deposits.	Common in silt deposits. Interstitial ice, segregated ice, and massive ground ice may be present, especially in deposits with appreciable organic content or in areas of limited drainage.	High in deposits with high proportion of silt or organic silt and in areas of poor drainage. Thaw unstable following surface disturbance where deposit contains ice-rich permafrost.	Silt deposits are thaw unstable where perennially frozen or where containing excess ice; subject to slumping and earthflows, especially if organic content is high.	Generally poor.	Silt deposits are generally unsuitable as materials source.	Silt deposits may be subject to slump, slough, subsidence, liquefaction, mudflows, and thaw subsidence.	Qer, Ql
SA	Generally quite good.	Generally absent.	Minimal.	Sand deposits are generally unstable due to lack of cohesiveness.	Generally poor.	May be useful in some construction situations and as unclassified fine fills.	Instability due to lack of cohesiveness of sand may require surface stabilization for construction activities.	Qes

[a]Source of geologic units: Reifenstuhl, R.R., Dover, J.H., Pinney, D.S., Newberry, R.J., Clautice, K.H., Liss, S.A., Blodgett, R.B., Bundtzen, T.K., and Weber, F.R., 1997, Geologic map of the Tanana B-1 Quadrangle, central Alaska: Alaska Division of Geological & Geophysical Surveys Report of Investigations 97-15a.

Table 2. *Engineering properties of bedrock units*

Map unit	Principal rock characteristics	Potential primary products	Component geologic units[a]
BC	Medium-jointed, fine- to coarse-grained sedimentary carbonate rocks and their metamorphic equivalents.	• Dimension stone • Ornamental stone • Crushed rock • Cement	pTam, Pzll, PzPad, TrMrl, TrPl
BG	Coarse-jointed, coarse-grained igneous lithologies.	• Dimension and ornamental stone • Riprap, armor, gabion and drain rock • Crushed rock and grüs	Kgs, Kms, Kmzd
BM	Medium-jointed, fine- to medium-grained quartzose sedimentary rocks and their metamorphic equivalents.	• Riprap and drain rock • Crushed rock • Unclassified fills	Khs, KJwq, pTaq, Pzlca, Pzlg, PzPwg, TrPc, TrPp
BV	Medium-jointed, fine-grained igneous rocks and their metamorphic equivalents.	• Riprap and drain rock • Crushed rock • Unclassified fills	Kf, Pzlv, PzPag, Tb, Tdm, TKq, Tr, Trd, Tsy, TrMrb, TrMrg
BU	Rocks of variable lithology and character.	• Unclassified fills	KJws, Kwc, pTas, PzPac, PzPws, TrMra, TrMrs, TrMru, TrPa, TrPs, TrPv, Ts

[a]Source of geologic units: Reifenstuhl, R.R., Dover, J.H., Pinney, D.S., Newberry, R.J., Clautice, K.H., Liss, S.A., Blodgett, R.B., Bundtzen, T.K., and Weber, F.R., 1997, Geologic map of the Tanana B-1 Quadrangle, central Alaska: Alaska Division of Geological & Geophysical Surveys Report of Investigations 97-15a.