DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

CONSTRUCTION MATERIALS MAP OF THE SUGAR HOUSE QUADRANGLE, SALT LAKE COUNTY, UTAH

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EXPLANATION

SURFICIAL DEPOSITS (from Van Horn, 1972)

CLAY — Clay to sandy clay and small amounts of clayey silt; plastic; calcareous; light to medium gray, light yellowish gray, brown, or light brown; 3 to more than 20 feet thick. Has high calcium carbonate content. Unified Soil Classification (nine samples): SC-CL-ML, SC-SM, SC-CL, ML (3), CL-ML (2), CL. In the past, has been used in the manufacture of common brick. Geologic units include clay unit of the Bonneville Formation, clay and silt unit of the Alpine Formation, and undifferentiated lake clay

CLAY AND SILT — Sandy to clayey silt, silt, silty clay, clay, and locally lentils of sand and gravel; calcareous; light to dark gray, black, pale orange, or light to reddish brown; 2-50 feet thick. Unified Soil Classification (14 samples): CL (2), CL-MH (2), ML (3), SC-CL-ML, SM-ML, SC-CL (2), SM (3). Locally carbonaceous and saturated with water. Geologic units include silt and clay unit of the Draper Formation, silt unit of the Bonneville Formation, old lake silt, marsh deposit, youngest alluvial fan deposit (Van Horn, 1972, unit fg₇), artificial fill, undifferentiated landslide deposit, landslide deposit formed by lateral spreading, and earthflow deposit

gray, light grayish brown, or light brown; 1 to more than 15 feet thick. Geologic units include sand units of the Draper, Bonneville, and Alpine Formations, eolian sand, and sand-run deposits SAND AND GRAVEL – Sand and gravel, locally silty and cemented by calcium carbonate, stones rounded, contains small amounts of cobbles and boulders which become more abundant near and within the Wasatch Range; light to dark gray, bluish gray, brownish gray, grayish brown, brown, dark brown, or brown; 1 to more than 30 feet thick; Unified Soil Classification (five samples): GW, GP-GM, SP, SM, SP-SM. Existing sand and gravel pits are in this unit. Locally high content of silt and unsound (crumbly) sand particles require washing before suitable for use as concrete aggregate. Northern deposits may have deleterious reaction when used with high-alkali cement. Geologic units include gravel units of the Draper, Bonneville, and Alpine Formations, lake gravel undifferentiated, glacial outwash, and

SAND – Coarse to fine sand and silty sand; light

fan deposits and old conglomerate

CLAY TO BOULDERS — Bouldery to clayey silt, sand, or gravel, stones angular to subround; dark gray, brown, or moderate brown; 1 to more than 30 feet thick. Geologic units include all alluvial fan deposits except the youngest (Van Horn, 1972, unit fg₇), glacial till of Bull Lake and Pinedale ages, mudflow deposits, slump deposits, and colluvium

all Quaternary stream deposits except alluvial

ROCK FRAGMENTS — Pebble- to bouldersized loose angular rock fragments; 10 to more than 30 feet thick; occurs on steep slopes in mountains. Geologic unit is talus. The fragments are principally quartzite but locally include limestone, dolomite, and sandstone

GRAVEL- TO BOULDER-SIZED ANGULAR

BEDROCK DEPOSITS
(from Crittenden, 1965)

LIMESTONE AND DOLOMITE — Limestone and dolomite, coarse to very fine grained; locally contains nodules, lenses, and thin beds of chert, pebbly sandstone, shale, and oolitic limestone; light to dark gray. Geologic units include Round Valley Limestone, Deseret Limestone, Gardison Limestone, Fitchville Formation, Maxfield Limestone

SILTY LIMESTONE — Silty limestone; olive drab.

Existing cement rock quarry in this unit. Geologic unit is Twin Creek Limestone

LIMESTONE, SANDSTONE, AND SHALE — Thick to thin layers of limestone, sandstone, and shale. Limestone is fine grained to dense, dark gray, and locally contains chert; sandstone is fine grained to shaly and is brown to tan weathering; shale is olive green, dull red, gray, or black. Geologic units include Thaynes Formation, Park City Formation, Doughnut Formation, Humbug

Formation, Ophir Formation

SHALE — Shale, mudstone, siltstone, and locally sandstone; brown to reddish brown, reddish purple, red (bright, grayish, dark, or purplish), olive-green or greenish to blue gray. Used in the past to make refractory clay products. Geologic units include upper member and Mahogany Member of the Ankareh Formation, Woodside Shale, shale or siltstone unit of the Big Cottonwood Formation

SANDSTONE — Sandstone, medium-grained, locally contains quartzite, limestone, or dolomite; pale orange or pale gray. Geologic units include Nugget Sandstone, Weber Quartzite

QUARTZITE — Quartzite, locally pebbly to bouldery, some shale beds south of Neffs Canyon; white, gray, green, brown, or pale purple. Geologic units include Gartra Grit Member of the Ankareh Formation, Tintic Quartzite, Mutual Formation, quarzite unit of the Big Cottonwood Formation

DIKE ROCKS — Too thin to be used so not shown

INTRODUCTION

Urban growth is covering many valuable mineral resources, which means that they are virtually withdrawn from public use. This withdrawal means that alternative, and probably more expensive, resources must be developed. The rapid growth in the Sugar House quadrangle, which inloudes the southeastern part of Salt Lake City, is representative of the situation in the rest of Salt Lake City and other parts of Salt Lake County. For example, about 80 percent of the sand and gravel in the Sugar House quadrangle has been covered by urban development and no longer is readily available for mining. When the pioneers first walked into the area around Salt Lake City, there were 65 million cubic yards of high-quality sand and gravel and an additional 65 million cubic yards of fair- to good-quality sand and gravel in the Sugar House quadrangle. In the following 120 years urban growth covered 100 million cubic yards of such material in the quadrangle, and another 9 million cubic yards were mined. As of 1969, about 20 million cubic yards of the remaining sand and gravel had not been covered or mined. Similarly, about 75 million cubic yards of clay that could be used in the manufacture of common brick are present in the quadrangle, but urban growth has covered 70 million cubic yards of this material.

The construction materials map of the Sugar House quadrangle can be used by persons interested in land-use planning, zoning, and development for preparing comprehensive plans for optimum use of the land. Such plans can provide for utilizing mineral resources, such as sand and gravel, and provisions for the beneficial restoration after mining of the resulting

Sand- and gravel-pit plans for excavations must take into consideration geologic factors that will be affected by land use. For instance, the sand and gravel deposits in the East Bench area (the old high lake terraces that lie against the Wasatch Range front between 4,500 feet and 5,200 feet above sea level) provide the main recharge area for ground water in the Jordan Valley to the west. If these deposits are destroyed, or covered with concrete and asphalt, the ground-water resources would eventually be reduced drastically. Parts of the sand and gravel deposits can, and should be, exploited but they should not be haphazardly stripped off without providing an alternative method for recharging the ground water.

Proper planning should provide for reclaiming excavations in a beneficial way after mining

Proper planning should provide for reclaiming excavations in a beneficial way after mining has ceased. A good example of beneficial use is the Eastwood School at 3900 South Street and Wasatch Boulevard, which was built in an abandoned gravel pit. A less fortunate earlier use of this pit as a dump for sewage effluent resulted in local pollution of the ground water. Another beneficial use of old excavations is illustrated by the nicely landscaped residential area that was formerly the site of a clay pit near 3100 South and 1500 East Streets.

HOW THE MAP WAS MADE

The construction materials map was made by grouping the different geologic formations shown by Crittenden (1965) and Van Horn (1972) into units that contain similar types of materials. For instance, all geologic formations that consist principally of quartzite are shown simply as quartzite (Q) regardless of age. On the geologic map of Crittenden (1965) these are shown as four separate map units. Similarly, sand and gravel (SG) is shown as one unit on the construction materials map, but on the surficial deposits map of Van Horn (1972) sand and gravel is shown as 15 separate geologic units. The explanation for the construction materials map shows the map units and symbols used in this report and the geologic formations from which they were derived. The first letter in the name of the material is, in general, used for the symbol (for example, S for sand). Where more than one letter is used, the additional letters are used to differentiate deposits that otherwise would have the same first letter (SS for sandstone), or to show other materials that are included in the map unit (LSS for limestone, sandstone, and shale). The letter M is used for silt-sized material. In the Unified Soil Classes given in the explanation the letter L is for clay of low compressibility, P for poorly graded, and W for well graded.

Decisions regarding the various uses for the materials shown in the following table were guided by information in Crawford and Tuttle (1964), the Utah State Department of Highways (1964), the U.S. Geological Survey (1964), the Unified Soil Classification of the material (Van Horn, 1968, 1972), by my observations of use of some of the material, and by my judgment of how some of the material might be used. The reader should remember that the gross characteristics of geologic formations may vary significantly within a few feet, so all deposits should be fully investigated before they are developed.

DEFINITION OF TERMS AS USED IN THIS REPORT

BALLAST — Broken stone, gravel, cinders, or slag that is placed between and under railroad ties to hold them in place

BITUMINOUS CONCRETE AGGREGATE — Fragments of hard durable minerals or rocks of sand and gravel size that are nearly free from adherent coatings, soft or shaly lumps, and organic or other deleterious material. Asphalt has a tendency to strip from some kinds of

quartzite so this property should be tested before the quartzite unit is used in asphaltic concrete

BUILDING STONE — Natural stone used for ordinary masonry construction

CEMENT ROCK — A low-magnesium limestone containing clay and silica in the correct proportions to make Portland cement

CLAY PRODUCTS — Clay used for the manufacture of clay products should be plastic and should harden when fired; if resistant to breakage from heat after firing, it is refractory grade; if not, it is common grade

CLAY-BOUND SURFACING MATERIAL — Clay, silt, and sand, sandy limerock, or calcareous sandstone used to form a moderately durable road surface

CONCRETE AGGREGATE — Fragments of hard durable minerals or rocks of sand and gravel size that are nearly free from adherent coatings, soft or shaly lumps, and organic or other deleterious material

CRUSHED STONE — Hard durable particles of angular gravel-size stone

DECORATIVE BOULDERS — Boulders more than 2 feet in maximum dimension, of hard durable stone with rounded corners, and of pleasing color or texture

FILL — Boulders, gravel, sand, silt, or clay that does not swell and is relatively free of trash or organic matter such as sod, peat, and similar material

GRAVEL AND CRUSHED ROCK FOR SURFACING — Durable particles of stone, sand, or

crushed rock that may contain a limited amount of clay and silt

LIGHTWEIGHT AGGREGATE — Any material suitable for use as aggregate in producing concrete that weighs less than 120 pounds per cubic foot. The aggregate should contain a high percentage of enclosed voids and be porous but impermeable

LIME - Calcium oxide prepared by heating limestone to near fusion

MINERAL AGGREGATE - Clean, hard, durable, and uncoated particles of rock or sand and gravel used for base course, surface course, or armor course

MINERAL FILLER - Any finely divided inert mineral material that mixes easily with mineral

aggregate

RIPRAP — Broken rock used to protect a wall, embankment, or other structure from wave or current action. The rock should be heavy, hard, durable, and form large solid blocks

ROCK WOOL — Manufactured from any rock or mixture of rocks that contains 40-65 percent calcium carbonate or calcium and magnesium carbonates with the balance being made

up of silica and alumina. The rock is heated to fusion and formed into fibers

SOIL BINDER — Particles of sand, silt, and clay that form a binding matrix for coarser particles, used mainly in highway contruction

REFERENCES

Crawford, A. L., and Tuttle, C. F., 1964, Nonmetallic mining and processing in Salt Lake County, in Geology of Salt Lake County: Utah Geol. and Mineralog. Survey Bull. 69, p. 125-139.
Crittenden, M. D., Jr., 1965, Geologic map of the Sugar House quadrangle, Salt Lake County, Utah: U.S. Geol. Survey Geol. Quad. Map GQ-380.

Van Horn, Richard, 1968, Physical property and construction use data sheet for surficial deposits: Assoc. Engineering Geologist Bull., v. 5, no. 1, p. 18-22.

1972, Surficial geologic map of the Sugar House quadrangle, Salt Lake County,

1972, Surficial geologic map of the Sugar House quadrangle, Salt Lake County,
 Utah: U.S. Geol. Survey Misc. Geol. Inv. Map I-766-A.
 U.S. Geological Survey, 1964, Mineral and water resources of Utah: U.S. Cong., 88th, 2d sess., Senate Comm. Interior and Insular Affairs, Comm. Print, 275 p. [reprinted as Utah Geol. and Mineralog. Survey Bull. 73].
 Utah State Department of Highways, 1964, Aggregate sources and geology of Salt Lake

County: Utah State Dept. Highways, Utah Materials Inventory, 20 p.

POSSIBLE USES OF POTENTIAL CONSTRUCTION MATERIALS

USE ¹	MATERIAL	Clay (C)	Clay and silt (CM)	Sand (S)	Sand and gravel (SG)	Clay to boulders (CB)	Gravel- to boulder-sized angular rock fragments (GB)	Limestone and dolomite (LD)	Silty limestone (LM)	Limestone, sandstone, and shale (LSS)	Shale (SH)	Sandstone (SS)	Ouartzite (O)
Concrete aggregate		N	N	N	G ²	N	P ³	P ^{3,2}	?	?	N	P ³	P ³
Bituminous concrete aggregate (with asphalt)		N	N	N	G	N	P ^{3,4}	G ³	F ³	F ³	N	G ³	P ³
Mineral aggregate		N	N	P	G	N	G ³	G ³	?	P ³	N	G^3	G
Gravel and crushed rock for surfacing roads		N	N	P	G	P ³	F ³	G ³	P ³	P ³	N	F ³	F
Ballast		N	N	N	G	P	G ³	G ³	P ³	P ³	N	G ³	G
Riprap		N	N	N	N	P	F	?	N	?	N	P	G
Decorative boulders		N	N	N	N	G	F	N	N	N	N	N	N
Mineral filler (for mineral aggregate)		N	P	N	N	N	N	N	N	N	N	N	N
Soil binder		N	P	P	N	N	N	N	N	N	N	N	N
Clay-bound surfacing material		N	P	P	N	P	N	N	P	N	?	N	N
Clay products	Common	G	P	N	N	N	N	N	N	N	P	N	N
	Refractory	N	N	N	N	N	N	P ⁵	N	N	P	N	N
Fill		P	F	G	E	F	P	P	F	P	P	F	F
Lightweight aggregate		N	N	N	N	N	N	N	N	N	P	N	N
Cement rock		N	N	N	N	N	N	P	E	N	N	N	N
Lime		N	N	N	N	N	N	G^6	P	P	N	N	N
Rock wool		N	N	N	N	N	N	P	P	P	N	N	N
Crushed stone		N	N	N	P	P	P	G	F	F	N	G	C
Building stone		N	N	N	N	N	N	P	P	P	N	G^7	P

¹ Selective mixing of materials can upgrade the quality for the desired use.
² Some sources of aggregate contain potentially reactive materials.

Requires crushing.
 Asphalt may strip from surface of quartzite.

Aspnait may strip from surface of 5 Dolomite only.

6 Limestone only.

⁶ Limestone only.

⁷ Nugget Sandstone only.