relatively fine grained compared with other talus deposits. Con-

Gravel deposits

Gravel deposits, undivided (prehistoric? to post-dam (1963)

age)-Unconsolidated, cobble- to boulder-size gravel with

coarse-sand matrix. Deposits consist of subrounded to rounded

clasts of local Proterozoic and Paleozoic formations: exposed

thickness 4-5 m. Dash-dot line shows flood line of 1983 flood

to well consolidated, cobble- to boulder-size gravel with coarse-

sand matrix. Deposits consist of subrounded to rounded clasts of local Proterozoic and Paleozoic formations and scattered

pebbles and small cobbles of far-travelled porphyritic rocks.

Thickness greater than 20 m. Overlain by distinctive coarse-

grained, mostly unconsolidated sand south of Lava Canyon

(shown by dotted line). Contact with underlying bedrock is

strongly concave and dips steeply toward river, indicating deposition in a channel that was incised into bedrock. Unit

forms terrace-like feature on west side of river downstream

from Lava Canyon. Elevation at base of deposit is about

boulder-size gravel with coarse-sand matrix. Deposits consist of

subrounded to rounded clasts derived from local Paleozoic for-

mations, scattered well-rounded pebbles of far-travelled

porphyritic rocks, and include locally abundant boulder-size angular to sub-angular clasts of rockfall or debris-flow origin;

thickness greater than 25 m. East of map area contact with

underlying bedrock is strongly concave and dips steeply toward

river. Unit forms high-level terrace and terrace-like features

near mouth of Palisades Creek; elevation at base of deposit

Arroyo deposits (1890 to 1992)-Very fine grained to coarse-

Alluvial-fan deposits (1150-1200? to 1992)—Pebble- to small-

Ponded deposits (1830-1880 to 1992)—Coarse-grained,

(umt), locally overlies the alluvium of Pueblo-II age (ap)

Deposits of Lava Canyon (1890 to 1992) -Very poorly sorted and moderately sorted, granule- to small-boulder-size gravel; silty to sandy matrix; partly fills active channel of Lava Canyon.

Very poorly sorted dark-colored gravel is of debris-flow origin; light-colored gravel with sandy matrix results largely from

clavey, grayish-red (5R 4/2) silt; thickness in auger hole about

10-20 cm. Overlies fluvial sand of the upper mesquite terrace

boulder-size gravel, derived from erosion of older gravel depos-

grained sand and granule to cobble gravel composed of local

bedrock; thickness 0 to 1 m. Occurs in channels of small-tributary arroyos of the Colorado River. Deposited largely by streamflow during local rainfall; coincident with erosion of the

Older gravel deposits (late Pleistocene)—Consolidated, cobble- to

818-820 m

its (gvo)

streamflow

0 5 KILOMETERS

Edited by Julia Thomas; cartography by Roger D. Carroll

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LOCATION OF MAP AREA, EASTERN

Geology mapped in 1990-92

GRAND CANYON NATIONAL PARK, ARIZONA

adjacent to river is 850-860 m

Tributary stream deposits

Channel alluvium in arroyos or gullies

Alluvial fans

Playa-like deposits

Channel-fill and debris-flow deposits, undivided

Younger gravel deposits (late Pleistocene)—Weakly consolidated

sists of angular, platy clasts of the reddish Middle Proterozoic Dox Formation of Huntoon and others (1986). Active rockfall Coarse-grained talus deposits (1992?)—Pebble- to very large boulder-size gravel consisting of dark-gray, angular, platy to blocky clasts of the Middle Proterozoic Cardenas Lavas of Huntoon and others (1986), as large as 3-4 m on an edge, and

light-colored blocks and slabs of the Paleozoic Tapeats Sandstone as large as 2 m on an edge. Blocks appear fresh and unweathered, although evidence for recent rock-fall activity is Talus (late Pleistocene?)—Pebble- to very large boulder-size gravel consisting of angular, platy to blocky clasts of consolidated gravel derived from the older gravel deposits (gvo). Moderately

consolidated to well consolidated; truncated by erosion and deepening of Palisades Creek **EOLIAN**

Coppice sand dunes (before 1890 to 1992)—Fine-grained, mod-

erately well sorted sand; silt and clay content less than 6 per-

Sand dunes and sheets

Coppice sand dune deposits

cent; typically associated with mesquite shrubs. Form dune field south of Palisades Creek; elsewhere form isolated mounds or dune-like features Sheet-like sand deposits

Sheet sand (1992)—Fine-grained, moderately well sorted sand. Forms sheet-like sand deposit north of Lava Canyon that results from sand movement upslope

Bedrock (Middle Proterozoic)—Light-red (5R 6/6) to moderatered (5R 5/4) sandstone, siltstone, and shale of the Dox Formation of Huntoon and others (1986)¹, and dark-gray (N3) basalt and basaltic andesite of the Cardenas Lava (Hendricks and Stevenson, 1990)1

Contact—Dashed where approximately located or inferred

Radiocarbon (14C) sample locality at point of arrow. Number refers to table 1

Repeat photograph station

Abandoned wood or stone structure

Channel or arroyo—Identified photogrammetrically. Arrow indicates end of drainage that does not reach the Colorado River

NATIONAL GEODETIC VERTICAL DATUM OF 1929 MAP SHOWING SURFICIAL GEOLOGY AND GEOMORPHOLOGY OF THE PALISADES CREEK AREA, GRAND CANYON NATIONAL PARK, ARIZONA Richard Hereford 1996

100 METERS

SCALE 1:2 000

CONTOUR INTERVAL 1 METER

36°08′

Compiled by Photogrammetry Section, Branch of Astrogeology, Flagstaff, Arizona

Aerial Photography of 7 October 1989, Approximate Scale 1:4,600

Water Level at Approximately 140 m³/s.

