

36°00'
112°00'

ARIZONA 419

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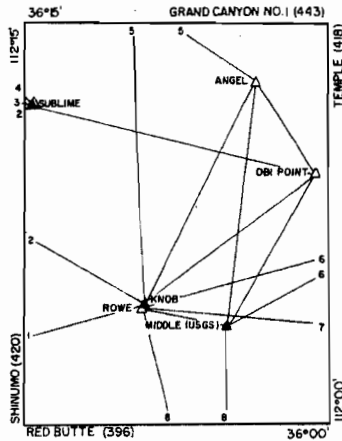
HRIZ 419

THIRD-ORDER TRIANGULATION
North American Datum of 1927

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

BRIGHT ANGEL QUADRANGLE
ARIZONA 419
N3600-W11200/15

FILE COPY



Coconino County
Edition of 6/27/58
Numbered lines indicate listed azimuths and distances to the following stations not on the quadrangle:
1. Post
2. Signal Hill (C&GS)
3. VAB: 7555
4. Emerald (C&GS)
5. Crystal
6. Royal (USGS) (C&GS)
7. Navajo Point (C&GS)
8. Red (C&GS)

▲ Positions determined by U.S.C. & G.S.
Books: 3386-97, PH 473-474

ANGEL Coconino County ARIZONA
W. L. Settlementer, 1956

Located at U. S. NPS North Rim Headquarters about 400 ft. SE. of Headquarters building at NPS Tree Tower No. 1.

Station mark: Standard tablet stamped "ANGEL 1956" cemented in top of a buried rock centered directly under NPS Tree Tower No. 1 (A leaning 48-in. white fir tree.)

Reference mark No. 1: Copper nail and washer in triangular blaze on 24-in. pine tree, 98 ft. from station mark in azimuth 219°33'10".

Reference mark No. 2: Copper nail and washer in triangular blaze on 20-in. pine tree, 67.42 ft. from station mark in azimuth 291°49'.

ARIZONA ZONE CENTRAL
X= 457,861.4 V. A. elevation 8339 ft.
Y=1,897,210.8

Latitude: 36°12'51.131" Longitude: 112°03'34.255"

To Station	Azimuth	Back Azimuth	Feet
Middle (USGS) (C&GS)	07°01'38.9"	187°00'48.8"	56,948.9
Knob (C&GS)	28 13 54.3	208 10 34.0	58,964.4
Crystal	123 36 58.5	303 33 23.0	35,854.1
OBI Point	325 28 58.8	145 30 40.1	24,834.1

KNOB (C&GS) Coconino County ARIZONA
USC&GS, 1920, 1934
R. C. Hathorne, 1956

Described by U. S. Coast & Geodetic Survey in description list No. 627, p. 3.

Note by R.C.H., 1956: Station was found as described. All marks were in good condition.

Note: Center of Hopi L.O.T. is 4.75 ft. from station mark in azimuth 235°41'.

ARIZONA ZONE CENTRAL
*X= 429,895.29 Elevation 7060 ft. (By Plane table levels)
*Y=1,845,306.66

*Latitude: 36°04'17.257" *Longitude: 112°09'14.002"

To Station	Azimuth	Back Azimuth	Feet
Post	77°27'23.4"	257°19'28.6"	67,891.2
Signal Hill (C&GS)	121 05 27.4	300 58 17.1	69,891.6
Crystal	178 22 34.3	358 22 19.6	71,826.8
Angel	208 10 34.0	28 13 54.3	58,964.4
OBI Point	233 03 43.3	53 08 44.7	52,464.5
*Red (C&GS)	348 05 28.2	168 07 45.5	93,360.

**Values by USC&GS

* Marked on Middle (USGS) (C&GS) in back table book.

New Desc. 172

MIDDLE (USGS) (C&GS)

Coconino County

ARIZONA

H. L. Baldwin, 1902
USC&GS, 1934
R. C. Hathorne, 1956

Described in Bul. 216, pp. 152 and 153 as follows:

"Station is located on the NW. point of the prominent headland about 3.0 mi. E. of the Bright Angel Hotel.

"Station mark: A bronze tablet set in the flat limestone ledge.

"Reference mark: A small pine tree. True Azimuth from tablet 223°40'; distance 6.17 ft."

Recovered by U. S. Coast & Geodetic Survey in description list 627, p. 2.

Two reference marks were set by USC&GS in 1934.

Station mark: Standard USGS tablet stamped "ELEV 7268 FEET", set in outcropping bedrock.

Note by R.C.H., 1956: Station found as described by USC&GS, all marks in good condition.

ARIZONA ZONE CENTRAL

*X= 450,811.59
*Y=1,840,705.52

V. A. elevation 7260 ft.

*Latitude: 36°03'32.180" *Longitude: 112°04'59.109"

To Station	Azimuth	Back Azimuth	Feet
*Red (C&GS)	1°08'23.68"	181°08'11.37"	86,816.0
Rowe (7075 Canyon)	104 26 02.4	284 23 33.5	21,446.3
Angel	187 00 48.8	07 01 38.9	56,948.9
OBI Point	210 14 56.6	30 17 27.7	41,748.1
*Royal (USGS) (C&GS)	241 55 46.05	62 00 32.25	45,180.4

**Values by USC&GS

OBI POINT

Coconino County

ARIZONA

W. L. Settlementer, 1956

Located about 4.6 mi. SE. of U. S. NPS Headquarters, North Rim, and 4.3 mi. NW. of Cape Royal, on OBI Point on North Rim of Grand Canyon.

To reach from U. S. NPS Headquarters on North Rim, drive N. along State Highway 67 for 1.8 mi. to jct. of Cape Royal Road; turn right and follow paved rd. E. and S. toward Cape Royal for 9.8 mi.; turn right at sign "E 4" and follow track rd. S. for 3.1 mi. to jct. of rd. "E 4 & E 4 A"; turn right following rd. "E 4" for 2.2 mi. to deep saddle by Canyon Rim. Jeep can be driven 0.9 mi. SW. across country to OBI Point and station.

Station mark: Standard tablet stamped "OBI POINT 1956" cemented in buried limestone boulder.

Reference mark No. 1: Copper nail and washer cemented in limestone rim, 17.67 ft. from station mark in azimuth 35°04'.

Reference mark No. 2: Copper nail and washer cemented in limestone rim, 17.57 ft. from station mark in azimuth 124°16'.

ARIZONA ZONE CENTRAL

X= 471,902.2
Y=1,876,720.7

V. A. elevation 7928 ft.

Latitude: 36°09'28.744" Longitude: 112°00'42.658"

To Station	Azimuth	Back Azimuth	Feet
Middle (USGS) (C&GS)	30°17'27.7"	210°14'56.6"	41,748.1
Knob (C&GS)	53 08 44.7	233 03 43.3	52,464.5
Rowe (7075 Canyon)	53 43 50.9	238 38 50.6	51,873.5
Sublime (C&GS)	101 54 27.6	281 46 02.3	71,755.2
Angel	145 30 40.1	325 28 58.8	24,834.2

7071

ROWE (7075 CANYON)

Coconino County

ARIZONA

J. T. Stewart, 1903
R. C. Hathorne, 1956

Described in Bul. 245, p. 186 as follows:

"On Rowe Point, 2.0 mi. NW. of Bright Angel Hotel, near wagon rd.

"Station mark: A bronze triangulation tablet set in rock 24 in. under the surface. Centered over this is an iron bench mark post marked "7075 CANYON". (7071 CANYON)

Note by R.C.H., 1956: Located about 1.0 mi. W. and 1.0 mi. N. of the Grand Canyon Village, on Hopi Point.

To reach from Grand Canyon Village, follow the W. rim drive for 2.7 mi. to station about 100 ft. N. of rd.

FILE COPY

GPO 977011

7671

POWELL CANYON (Continued)

Station mark: Found as described.

ARIZONA ZONE CENTRAL Elevation 7069 ft. (Top of iron pipe)
 X= 430,053.4 Elevation 7065 ft. (Station mark by
 Y=1,846,086.3 *J. T. Stewart)

John T. Stewart 1902
 7065.022 ft. (1963 Adj.)

Latitude: 36°04'24.972" Longitude: 112°09'12.099"

To Station	Azimuth	Back Azimuth	Feet
Signal Hill(C&GS)	120°28'30.4"	300°21'19.0"	69,626.6
Obi Point	238 38 50.6	53 43 50.9	51,873.5
Royal(USGS)(C&GS)	255 15 09.0	75 22 24.3	62,688.8
Navajo Point(C&GS)	277 01 09.4	97 12 35.5	96,465.9
Middle(USGS)(C&GS)	284 23 33.5	104 26 02.4	21,446.3

SUBLIME(C&GS) Coconino County ARIZONA

USC&GS, 1934, 1952
 J. McLaughlin, 1956

Described by U. S. Coast & Geodetic Survey in description
 list No. 530, pp. 12 and 16.

Note by J.M., 1956: Station found as described. All marks
 were recovered in good condition.

ARIZONA ZONE CENTRAL V. A. elevation 7458 ft.
 X= 401,712.28
 Y=1,891,602.88

*Latitude: 36°11'54.307" *Longitude: 112°14'59.251"

To Station	Azimuth	Back Azimuth	Feet
*Signal Hill(C&GS)	72°07'43.00"	252°03'55.88"	33,142.2
*VAB 7555	134 54 36.2	314 50 41.6	45,869.0
*Emerald(C&GS)	149 36 48.58	329 34 08.34	43,851.7
Obi Point	281 46 02.3	101 54 27.9	71,755.2

**Values by USC&GS

The following secondary station and/or intersected objects
 were not included in the adjustment of the basic third-order net.
 They are not recommended for use in the further extension of third-
 order horizontal control by triangulation

SUBLIME Coconino County ARIZONA

J. T. Stewart, 1903

Described in USGS Bul. 245, p. 188, as follows:

"Near the south end of the headland known as Point Sublime.
 There is a blazed trail to the point, and the station can be
 reached by pack train. There is scattering timber on the point
 and a little clearing had to be done around the station.

"Station mark: A bronze triangulation tablet cemented in
 the rock, about 12 inches under surface of ground."

ARIZONA ZONE CENTRAL
 X= 401,672.17
 Y=1,819,590.18

Latitude: 36°11'54.18" Longitude: 112°14'59.74"

FILE COPY

REPORT ON PERMANENT SURVEY MARK

AREA OFFICE

STATE ARIZONA COUNTY _____ QUADRANGLE Bright Angel (419)

QUOTE PRIMARY REFERENCE _____
(Direction and distance)

DESIGNATION { LISTED MIDDLE USGS
STAMPED ELEV 7268 TYPE OF MARK: BM _____ TT _____ TRIANG. X

Lat. 36 ° 03 ' 32.180 ' CONDITION
Disturbed
Long. 112 ° 04 ' 59.109 ' Destroyed
Elev. _____ feet Not Found
ESTABLISHED BY
USGS USBR
USC&GS State GS
USNPS USNFS
USGLO } (Other)
USBLM }

REMARKS OR REVISED DESCRIPTION:

Station mark vandalized. Drill hole remains. Apparently the reference marks are still in place.

A copper stud 5.2 ft NE. of station site has 3rd order elevation of 5260.204 ft.

SUBMITTED BY Brad Washburn
TITLE Director
AGENCY Museum of Science

DATE 7/24/72

Marks found in good condition need not be reported.

FILL IN ALL AVAILABLE INFORMATION

A2 419

Please prepare in triplicate and send to nearest address shown on reverse side.

MUSEUM OF SCIENCE
AND HAYDEN PLANETARIUM

SCIENCE PARK, BOSTON, MASSACHUSETTS 02114

* DENVO

TELEPHONE (617) 742-1

June 21, 1972

2	ARE	
	PP	
	AO	
23	PS	
	RH	
	C	
	MTD	
3A	GEOD	
	PLAB	
	PEND	
4	FILE	

U. S. Geological Survey
Mr. Robert H. Bruce
345 Middlefield Road
Menlo Park, CA 94025

Dear Mr. Bruce:

We have just returned from another three weeks of work at the Grand Canyon and have two things to report to you:

1. The disc at Triangulation station Middle, located at Yaki Point, which you share with the USC & GS has been twisted off (like Royal last year) and should be replaced. We found the bent disc a few yards away lying in the rocks. These kids were real vandals. All they wanted to do was to destroy the station --- they didn't even care about stealing the disc! In relocating it: the stem is still in place, 44.03 ft. west of our station "Yaki" on the stone parapet at Yaki Point. It is also 5.2' SW of our copper leveling stud put there last year by your Ed Kraemer. The altitude of this plug is 7260.204 ft. if you care to relevel to the surface of your new disc when installed (the surface of your old disc, leveled last year for us from the USC & GS station near Park Hq. was 7259.973). In putting in a new disc, it should be carefully inset below the level of the adjacent rock in an effort to prevent these vandals from getting a chisel under the edge. The old mark was an easy prey for them, projecting above the rock like a low mushroom --- o.k. in 1930 but no good today.

2. As you know, we have been unhappy about your (and our) inability to relocate most of the 1902 benchmarks along the Bright Angel Trail below the S. Rim. We tried a new trick this time --- which promptly worked on one benchmark, and on our next trip we'll try it on others down the trail: It was evident to us that the USGS distances down the trail for these BMs were very much in error, so we took along a precise aneroid and began looking along the trail in the proper altitude area --- result: we immediately relocated one of these things which had been "lost" for years: '5866 Canyon' is 1.3 miles below the S. Rim along the Bright Angel Trail (not 7/10). It is located 32 feet N. of the N. edge of the trail, 123 ft. E. of the 1.27 mile corner of the trail. None of these facts appear to have the slightest relationship with the original description. We were having some trouble with our measuring wheel and will reconfirm these exact distances later, but this data is a big improvement over what you have got.

United States
Department of the Interior

Geological Survey

Description
Horizontal Control Station

NGS Quad No. 36 112 22

USGS Quad No. 419

Station Jupiter USGS

Diagram Grand Canyon

County Coconino

State AZ

THIRD order TRIANGULATION

Established By USGS

Year 1903

Project 3386-97

USGS UNADJUSTED 1981 coordinates

Latitude: N36 10 49.384

Longitude: W112 7 39.975

Unverified Elevation: 7762 feet 2366 meters

UTM Zone 12 (Meters): x: 398584.26 y: 4004344.29

Mapping Angle: -0 39 56

AZ State Zone C (Feet): x: 437700.10 y: 1884937.33

Mapping Angle: -0 7 29

AZ State Zone W (Feet): x: 978778.79 y: 1888934.21

Mapping Angle: +0 57 26

Located on point Jupiter which extends farthest S. between mouth of Bright Angel Creek and point surline, on extrimity point beyond any large timber.

To reach from Bright Angel Spring, take saddle horses.

Station Mark: Standard Brass Tablet, stamping unknown, set in limestone rock.

United States
Department of the Interior

Geological Survey
Form No. 9-322.3 Rev. 1977

Description
Horizontal Control Station

USGS Quad No. 36 112 22
USGS Quad No. 419

Station JUPITER USGS

Diagram GRAND CANYON

County COCONINO

State AZ

THIRD order TRIANGULATION

Established By USGS

Year 1903

Project 33P6-97

USGS UNADJUSTED 1981 coordinates

Latitude: N36 10 49.384

Longitude: W112 7 39.975

Unverified Elevation: 7700 Feet 2366 Meters

UTM Zone 12(Meters): X: 398564.26 Y: 4004344.29

Mapping Angle: -0 39 50

AZ State Zone 0(Feet): X: 437700.10 Y: 1884937.33

Mapping Angle: -0 7 29

AZ State Zone 4(Feet): X: 978778.79 Y: 1888934.21

Mapping Angle: +0 57 20

LOCATED ON POINT JUPITER WHICH EXTENDS FARTHEST S. BETWEEN MOUTH
OF BRIGHT ANGEL CREEK AND POINT SUBLINE, ON EXTREMITY OF POINT
BEYOND ANY LARGE TABLE?

TO REACH FROM BRIGHT ANGEL SPRING, TAKE SADDLE HORSES.

STATION MARK: STANDARD BRASS TABLET, STAMPING UNKNOWN, SET IN
LIMESTONE ROCK.

REMARKS: NONE SET.

6.152 A

Coconino County

Ariz. (119)

W. L. Settlemyer, 1956

1927 N.A.D. (Unadj.)

Books: PH 473-474

Located about 2.1 mi. S. of Bright Angel Ranger Station and 3.5 mi. E. of Tiyo Point on highest point of Oza Butte in Grand Canyon.

Station mark: A 3-in. round hole in top of solid rock.

Signal: White flag over fluorescent tgt. on fir pole centered over station mark.

Signal data:	Top white flag	11.7 ft.
	Top fluorescent tgt.	7.0
	Bottom fluorescent tgt.	4.5

Image point No. 1: Lone tree, 25 ft. from station mark and 10.7 ft. lower in azimuth $104^{\circ}01'$

Image point No. 2: Sharp point of rocks, 435 ft. from station mark and 126 ft. lower in azimuth $148^{\circ}44'$.

Image point No. 3: Point between two trees, 92 ft. from station mark and 19.2 ft. lower in azimuth $270^{\circ}26'$.

Photo No. 6-152 (station pricked)

ARIZ ZONE CENTRAL

X=455,871.

V.A. elevation 8065 ft.

Y=1,885,930.

Lat 36 10 59.54 Long 112 03 58.53

FILE COPY

11/19/56 mk *mk*