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REPORT FOR
CAVE CREEK FLOOD MAPS
PROJECT NO. ST-74248.00

April, 1975

HYDRO LIBRARY

YOST AND GARDNER ENGINEERS
2619 North Third Street
Phoenix, Arizona 85004

Job No. 5205



Cave Creek Flood Maps

1. Sources of information

- a. City of Phoenix 1/4 Section Contour Maps - 1" = 100' scale
- b. Same maps reduced to 1" = 200' and to 1" = 400' scale
- c. U.S.G.S. 7½ minute quadrangles for:
 - Cave Creek
 - Curry's Corner
 - Sunnyslope
 - Union Hills
 - Wildcat Hill
- d. Flood Insurance Study, Phoenix, Arizona - September 1973
- e. Corps of Engineers - Computer Program "HEC-2 Water Surface Profiles". February 1972

2. Method

The study was accomplished in the following manner. The work that had previously been done for the "Flood Insurance Study" was assembled and evaluated. The 100-year discharge values from the Flood Insurance Study were adopted. These are shown on Figure 1 and are for present (pre Central Arizona Project) conditions. Each of the three water courses was treated as a component but separate part of the total job.

Cave Creek

The original cross sectional data for Cave Creek were examined and in a number of instances were recoded. This recoding reflected changes in selected cross section locations to include flooded portions of the East Fork, additional coverage of the suspected Cave Creek breakout area, and correction of previous errors. This new information was run for a 100-year flood with natural conditions and a 100-year flood with 1-foot encroachment.

Here, a word about the 1-foot encroachment is in order. Refer to page 8 in the Flood Insurance Study for a description of the encroachment technique. Encroachment is permitted in an overbank area only when the flow velocity in that overbank area is less than 5 feet per second under natural conditions. In order to determine where this occurs, a flow distribution printout was called for on all computer runs. This procedure divides the flow cross-section into sub-areas and gives corresponding velocities in each. With flow distribution data and the encroachment run, acceptable encroachment limits can be established.

The Cave Creek run revealed the likelihood of a breakout above Union Hills Drive into the upper reaches of the West Branch of the East Fork of Cave Creek. The encroachment run showed that this area could be encroached upon and classified as fringe. A separate run, with multiple discharge rates, was made to determine the appropriate values for both discharge and velocity. This run was made from a point just north of Bell Road to the breakout point north of Union Hills Drive. The best fit of water surface was for a discharge of 300 cfs. The velocities were generally in the 3 to 4 f.p.s. range. Because of the low velocity and because Flood Insurance criteria set a lower width limit of 250 feet, it was decided to not designate this a preliminary floodway above Bell Road but to leave it as part of the Cave Creek fringe area.

East Fork of Cave Creek

The main channel of the East Fork was depicted in the Flood Insurance Study as crossing 7th Street at Bell Road. This was an error. It actually crosses 7th Street about 900 feet south of Bell Road. A field inspection

was made to determine the location of the main channel east of 7th Street. The channel courses almost due East (proceeding upstream) for about a half mile. It is more a wide shallow, tree and brush lined swale, than a channel. From here, part of the "channel" continues generally east as a low brushy area. This portion has a fairly small contributing area, however, and is probably a secondary contributor. The bulk of the drainage area is to the northeast. This led to the conclusion that the northeast leg (which intersects Bell Road near 16th Street) is a reasonable choice for the main channel location. The 100-year discharge used for this portion of the East Fork was 9,200 cfs. Refer to Attachment #1 for this computation.

West Branch of East Fork

The West Branch was run as a preliminary floodway from the East Fork to Bell Road. That portion of the West Fork that lies north of Bell Road has previously been discussed under the heading Cave Creek. At Bell Road the West Fork is joined from the west by another breakout from Cave Creek (See Plate A), as well as a small stream from the northeast. This combination of flows is sufficient to cause the West Fork to be designated as a floodway below Bell Road. Even though the reach north of Bell Road is not a designated floodway, the profile for this reach is included on Figures 8 and 9 for information purposes.

Conclusions

The conclusions reached by this study are presented in the exhibits which follow:

	<u>Figure No.</u>
Flow Sheet	1
Flood Profiles	2 - 9
Floodway Map Index	10
Area Map	11
Floodway Map	Plate A
Floodway Map	Plate B

Attachment #1

100 year discharge for East Fork
of Cave Creek

The 100 year discharge for the East Fork of Cave Creek is 13,300 cfs from the confluence with Cave Creek Wash to a point just west of 7th Street and just south of Bell Road. This value was adopted from the Corps of Engineers data for Check Point No's. 16 and 18 of the Flood Insurance Study for Phoenix, Arizona, dated September 1973.

At this point on the East Fork of Cave Creek just west of 7th Street, the total tributary area is 32.90 square miles (Y & G), (see Figure 11). This will be called Area B. A small tributary area (2.97 s.m.) is part of this total area and its contribution joins the East Fork from the north at this point, (this will be called Area A).

In accordance with an accepted criterion prorating design flows at junctions, the flow division at this point was computed in the following manner:

$$\frac{\log A}{\log B} \times Q_{\text{total}} = Q_A$$

$$\frac{\log 2.97}{\log 32.90} \times 13,300 = 4,100 \text{ cfs}^{\dagger}$$

East of 7th Street

$$\begin{aligned} \text{East Fork } Q &= Q_{\text{total}} - Q_A \\ &= 13,300 - 4,100 = \underline{9,200 \text{ cfs}} \end{aligned}$$

March 17, 1975

Memorandum
Proj. ST-74247.00
City of Phoenix
Cave Creek Wash

A meeting was held on Monday, March 17, 1975 with Dave Burris, City of Phoenix, and Dave Shoaf, Yost and Gardner Engineers. The work done on the project to this point was presented and discussed. Based on this discussion, certain conclusions were reached. They are as follows:

1. The location of the East Fork at Cave Creek that is to be used is one that we have depicted on the 200 scale contour maps. This shows the East Fork crossing 7th Street about 900 feet south of Bell Road and intersecting Bell Road just west of 16th Street.
2. The small portion of Cave Creek that breaks out above Union Hills Drive will be depicted as Floodway Fringe.
3. A separate profile of this breakout will be shown.
4. The Q for the East Fork Cave Creek will be diminished at 7th Street based on $\frac{\log A}{\log B}$ for the contributing areas A and B.

D.N.S.

Table 1 - BASE FLOOD WATER SURFACE ELEVATIONS

Stream	Cross-Section Number	Elevation in Feet (M.S.L.)	
		Existing Conditions	With Allowable Encroachments
Cave Creek	15.32	1328.0	1328.0
	15.42	1331.3	1331.3
	15.49	1336.3	1336.3
	15.67	1338.5	1339.5
	15.80	1342.0	1342.8
	15.89	1344.1	1345.1
	16.01	1348.4	1348.4
	16.13	1350.3	1351.3
	16.23	1353.8	1354.8
	16.38	1360.0	1360.9
	16.54	1364.5	1365.5
	16.65	1369.2	1369.2
	16.68	1369.5	1369.5
	16.81	1370.8	1371.8
	16.95	1374.7	1375.7
	17.11	1380.0	1380.9
	17.27	1385.0	1386.0
	17.40	1387.2	1388.2
	17.56	1393.2	1394.2
	17.74	1399.1	1400.1
17.89	1403.7	1404.2	
18.08	1407.5	1408.5	
18.26	1413.8	1414.8	
18.50	1423.6	1424.1	
18.73	1429.8	1429.8	
18.89	1435.5	1435.6	
19.20	1445.5	1446.5	
East Fork Cave Creek	1.04	1350.6	1350.6
	1.20	1355.1	1356.1
	1.36	1357.8	1358.5
	1.54	1361.5	1362.5
	1.80	1369.9	1370.3
	2.00	1375.1	1375.2

Table 1 - BASE FLOOD WATER SURFACE ELEVATIONS

Stream	Cross-Section Number	Elevation in Feet (M.S.L.)	
		Existing Conditions	With Allowable Encroachments
East Fork Cave Creek (continued)	2.18	1379.2	1380.0
	2.37	1383.2	1384.1
	2.56	1389.2	1389.2
	2.79	1395.7	1396.4
	2.95	1401.3	1401.5
	3.11	1406.6	1407.6
West Branch East Fork Cave Creek	0.36	1361.6	1361.6
	0.53	1364.5	1364.6
	0.73	1370.3	1370.4