APPENDIX V

ORANGE COUNTY HYDROLOGY MANUAL ADDENDUM NO. l

INTRODUCTION

The criteria and methods used in the 1986 Orange County Hydrology Manual (hereinafter "Manual") yield high confidence (85% confidence interval) peak discharges and volumes that are appropriate for most flood control design purposes. The Manual parameters were originally based on a regional calibration study that was subsequently expanded by the U.S. Army Corps of Engineers in "Derivation of a Rainfall-Runoff Model to Compute N-Year Floods for Orange County Watersheds", November, 1987[1] and by Williamson and Schmid in "Determination of 500-Year Floodplain, Confluence of San Diego Creek and Sand Canyon Wash", March 12, 1991[2]. There are special circumstances where such high confidence discharges may not be appropriate. This addendum establishes criteria for the use of expected value (50% confidence interval) peak discharges for design under such circumstances. Figures A and B show the definition sketches for 85% and 50% confidence intervals.

The addendum provides new guidelines for use of the initial area nomograph (Manual Figure D-1) for both high confidence and expected value calculations.

CRITERIA FOR SELECTING EXPECTED VALUE DISCHARGES

Expected value (50% confidence interval) discharges should be used for the following:

- Calculating incremental increases in peak discharge for purposes of implementing development mitigation requirements.
- Flood plain delineations under existing conditions.
- Estimation of water resources related variables such as sedimentation and water quality.
- Evaluating protection level provided by existing facilities.

FIGURE A

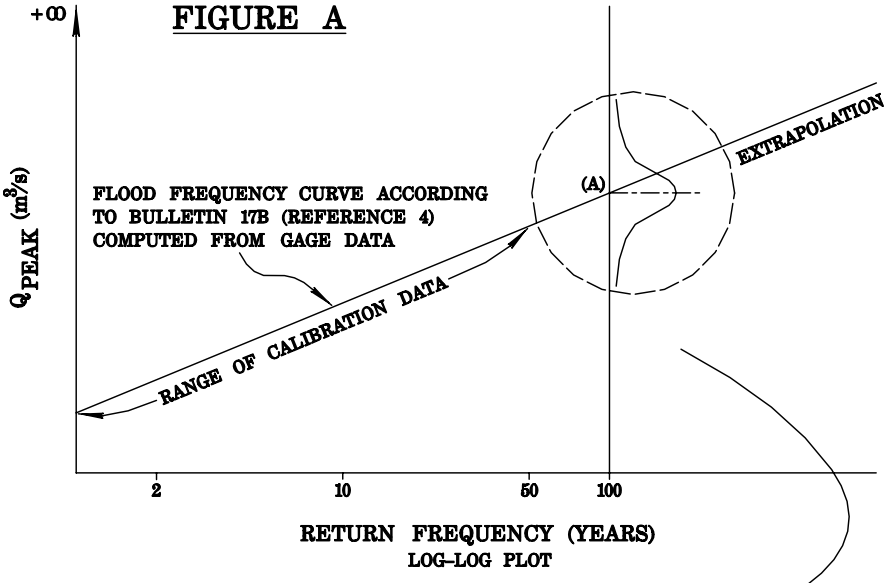
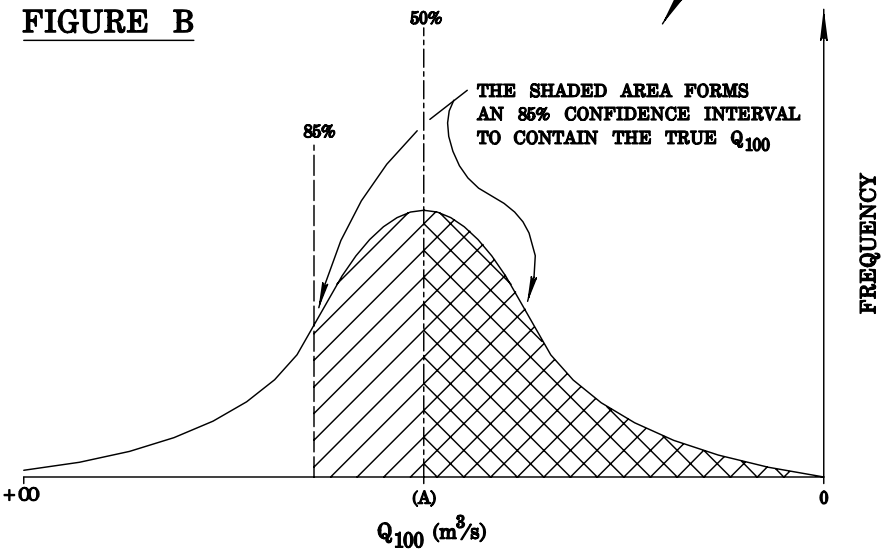


FIGURE B



FREQUENCY DISTRIBUTION OF Q_{100} VALUES
(VARIATION IN Q_{100} VALUES DUE TO SAMPLING ERROR)

ORANGE COUNTY
HYDROLOGY MANUAL

Metric

ADDENDUM NO.1
DEFINITION SKETCHES FOR
85% AND 50% CONFIDENCE INTERVALS

The Manual's criteria and parameter values remain in force for development proposals, subdivision improvement plans and regional flood control design as described herein. On an individual basis and where appropriate, expected value (50% confidence interval) discharges may be authorized by the Chief Engineer, Public Facilities and Resources Department for design and reconstruction of flood control facilities. However, under no circumstance should the design discharge be less than the Federal Emergency Management Agency's 100-year discharge, where such FEMA discharge is known and/or available.

CONFIDENCE INTERVAL: WHAT IT MEANS

A regional calibration considering the relationship between measured rainfall and measured peak discharges on seven Southern California watersheds was accomplished in order to determine the rainfall data to be used in the County's hydrologic models. This relationship between rainfall and peak discharges expressed in a statistical regression equation yields an "expected value" for each required recurrence interval (N-year) peak discharge (Figure A). On a regional basis half of the peak discharges calculated with these calibrated parameters would be less than the expected value and the other half would be greater than the expected value, whereas with 85% confidence interval, only a 15% probability exists for the N-year peak discharge to be exceeded. Further a probability always remains that the true N-year peak discharge may be larger or smaller than the peak discharge calculated for a given confidence interval.

MITIGATION OF DEVELOPMENT EFFECTS ON RUNOFF

The need to mitigate effects of increased runoff from developments on downstream segments of watersheds has made it necessary to consider the more frequently occurring storm flows (e.g., 2-year and 5-year). The criteria in the present Manual, mainly aimed at predicting 100-year peak discharges, is not well suited to analyze more frequently occurring storm flows that are used for mitigation. Table 2 provides the loss rate and precipitation model input required for regionally calibrated expected value 2-year and 5-year results.

LOSS RATE CALCULATIONS AND PRECIPITATION MODEL INPUT

Table l presents the T-year precipitation required to obtain the N-year expected value peak discharges for F_p = 7. 6 mm/hr (0.3 in/hr) and AMC-II condition. The pervious loss rates (F_p) using AMC-II for 2-year and 5-year events will be 15.2 mm/hr (0.6 in/hr) and 12.7 mm/hr (0.5 in/hr) respectively, based on "Investigation of Mitigation Needs for Changes in Duration Floodflows Due to Development" by Williamson and Schmid, July, 1989[3] (see Table 2).

INITIAL SUBAREA NOMOGRAPH

After extensive review within the County and with other agencies, the maximum distance of unchannelized flow over lawns and parking lots will be limited to 100 m (330') in developed areas, i.e., residential subdivisions and commercial lots. In well defined arroyos, a maximum length of 100 m may be used. The initial subarea nomograph (Manual Figure D-1) with the maximum length limit of 300 m (1000') should only be used, after appropriate justification, for flat areas such as farmland with conservation tillage, artificial surfaces like baseball/football fields, public parks, and other similar conditions.

The initial subarea nomograph, (Manual Figure D-1) which applies to both high confidence and expected value calculations, should never be used for the blueline streams shown on USGS 1:24000 quadrangle maps.

TABLE 1[a]

T-year Precipitation Required From Depth-Duration-Frequency Tables Assuming a Pervious Loss Rate F_p = 7.6 mm/hr (0.3 in/hr) and AMC-II	
Expected Value N-year Runoff	T-Year Precipitation Model Input
10	5
25	10
50	15
100	25
500[b]	125[b]

TABLE 2[c]

Expected Value N-Year Runoff	Pervious Loss Rate F_p AMC-II	Proportion of N-Year Precipitation Model Input
2-yr	15.2 mm/hr (0.6 in/hr)	0.7
5-yr	12.7 mm/hr (0.5 in/hr)	0.7

Notes:

a. Table 1 is derived from “Derivation of a Rainfall-Runoff Model to Compute N-Year Floods for Orange County Watersheds”, U.S. Army Corps of Engineers, Los Angeles District, November, 1987 (Reference 1).

b. Values have been extracted from “Determination of 500-Year Floodplain, Confluence of San Diego Creek and Sand Canyon Wash”, Williamson and Schmid, March 12, 1991 (Reference 2).

c. Table 2 is derived from “Investigation of Mitigation Needs for Changes in Duration Floodflows Due to Development", Williamson and Schmid, July, 1989 (Reference 3) and may be used for 2 and 5-year existing conditions estimates.

CONCLUSION

Notwithstanding Addendum No. 1, Manual criteria and parameter values remain in force for development proposals, subdivision improvement plans and regional flood control design, except for the initial area nomograph changes as discussed above.

REFERENCES

1. "Derivation of Rainfall-Runoff Model to Compute N-Year Floods for Orange County Watersheds", U. S. Army Corps of Engineers, Los Angeles District, November, 1987.
2. "Determination of 500-Year Floodplain, Confluence of San Diego Creek and Sand Canyon Wash", Williamson and Schmid, March 12, 1991.
3. "Investigation of Mitigation Needs for Changes in Duration Floodflows Due to Development", Williamson and Schmid, July, 1989.
4. "Guidelines for Determining Flood Flow Frequency, Bulletin 17B", U. S. Department of the Interior, Geological Survey, Office of Water Data Coordination, revised September 1981.