HYDROGEOLOGIC OVERVIEW OF MARION COUNTY AS IT RELATES TO STORMWATER MANAGEMENT & PERCOLATION PONDS

POND WORKSHOP - MARION COUNTY

prepared by

Devo Seereeram, Ph.D., P.E.
Professional Geotechnical Engineer

NOVEMBER 1, 1996

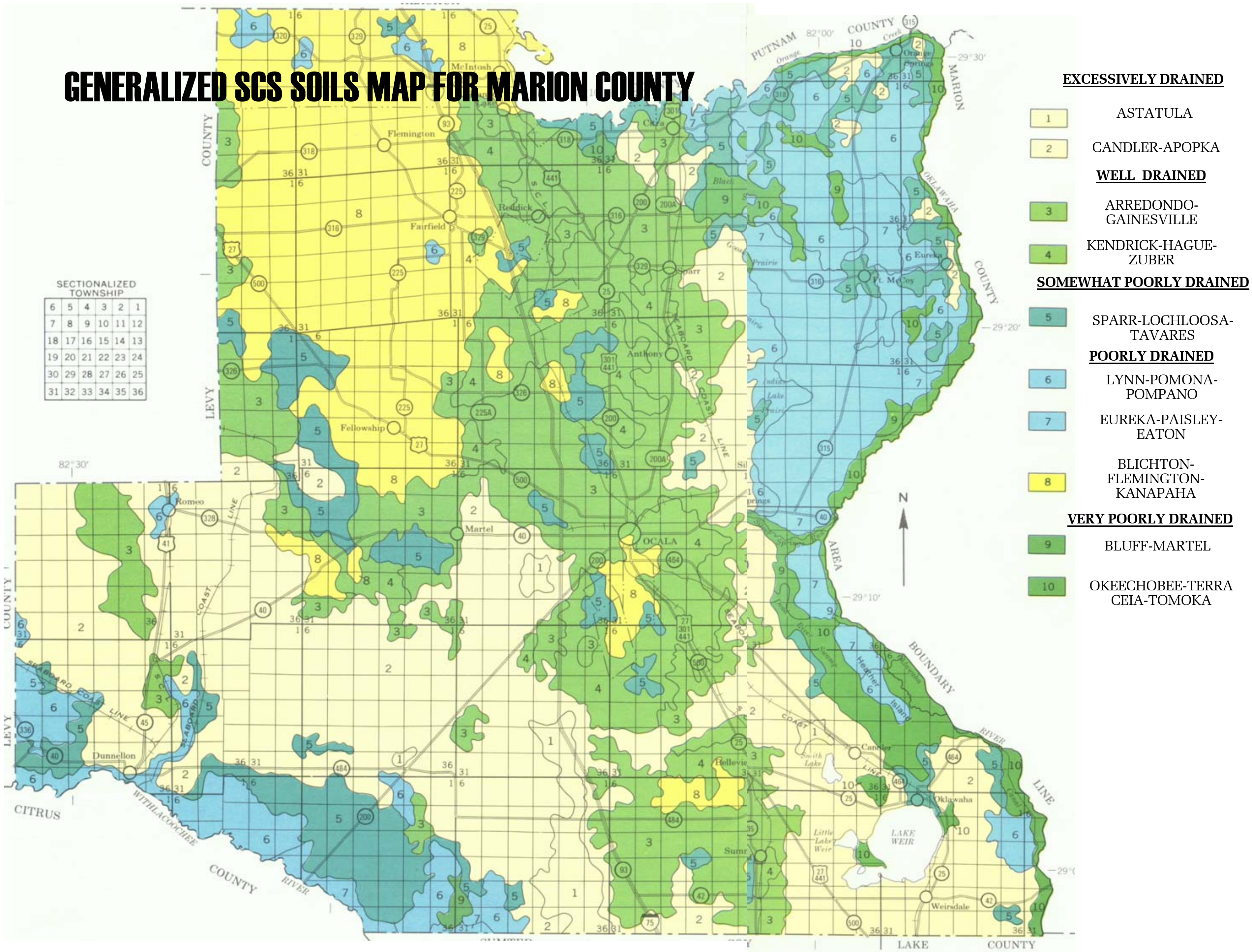
PUBLISHED REFERENCES

Marion County is fortunate in that there is good base of published hydrogeologic data, mainly because of the barge canal study and sensitive hydrogeology of area (i.e., Silver Springs). Favorite references on the geologic characteristics of Marion County are:

Faulkner, G.L. March 1973. *Geohydrology of the Cross-Florida Barge Canal Area With Special Reference to The Ocala Vicinity*. Water-Resources Investigation 1-73, U.S. Geological Survey.

Phelps, G.G. 1994. *Hydrogeology, Water Quality, and Potential for Contamination of the Upper Floridan Aquifer in the Silver Springs Ground-Water Basin, Central Marion County, Florida.* U.S. Geological Survey Water Resources Investigations Report 92-4159.

GENERALIZED SCS SOILS MAP FOR MARION COUNTY



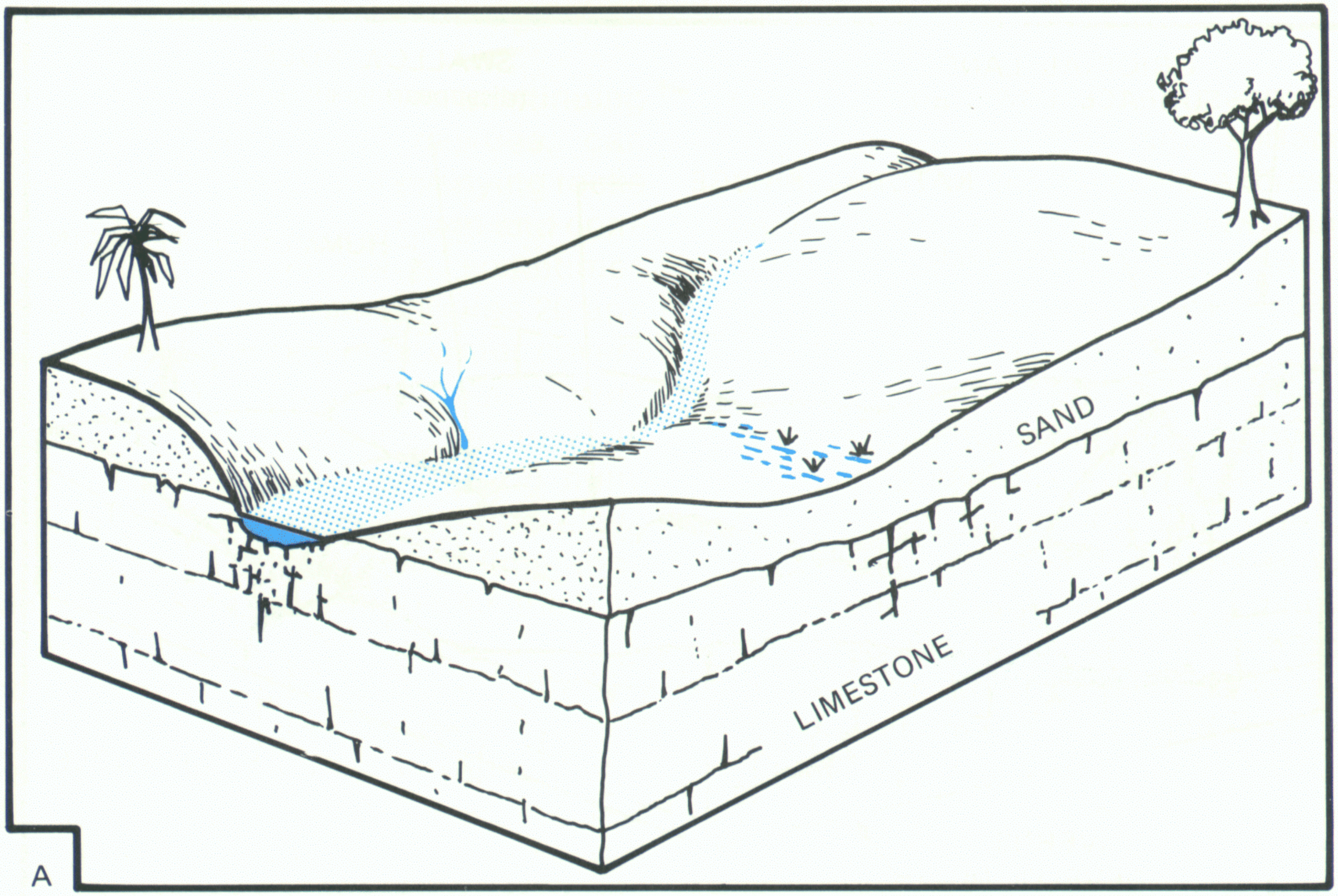


Figure 19a. Relatively young karst landscape showing underlying limestone beds and sandy overburden with normal, integrated surface drainage. Solution features are just beginning to develop in the limestone (after Lane, 1986).

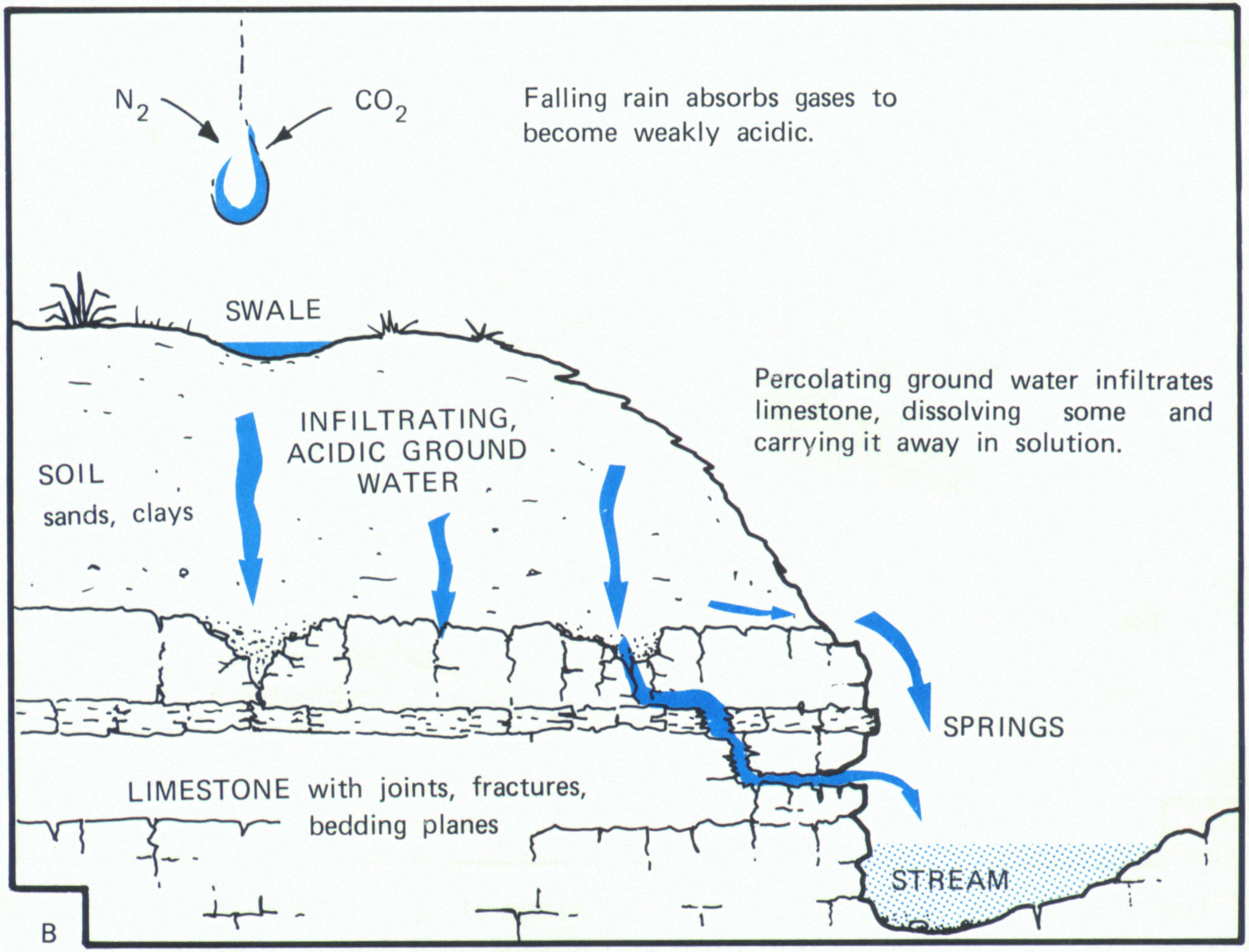


Figure 19b. Detail of Figure 19a showing early stages of karst formation. Limestone is relatively competent and uneroded. Chemical weathering is just beginning, with little internal circulation of water through the limestone. Swales, forming incipient sinkholes act to concentrate recharge (after Lane, 1986).

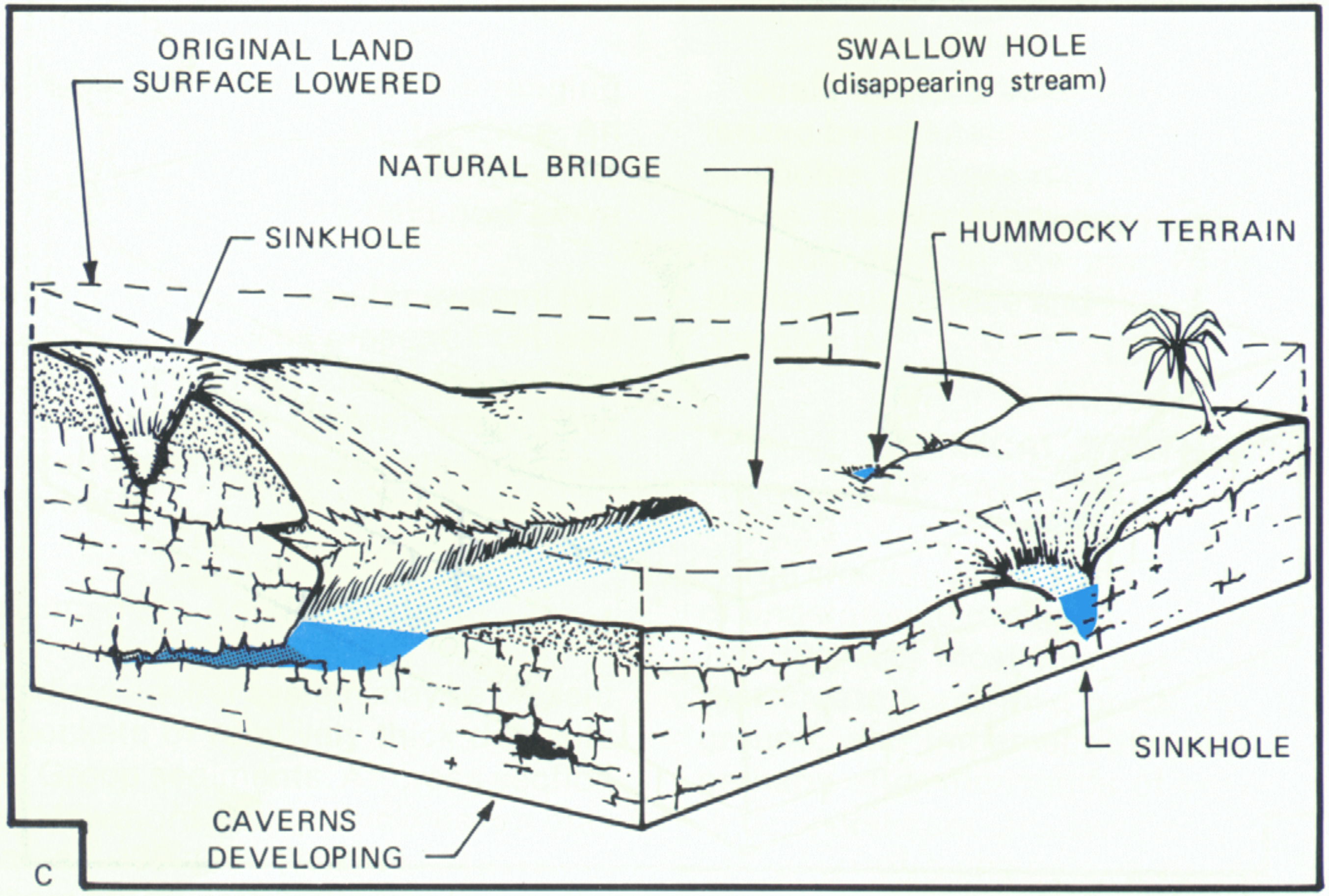


Figure 19c. Advanced karst landscape. Original surface has been lowered by solution and erosion. Only major streams flow in surface channels and they may cease to flow in dry seasons. Swales and sinkholes capture most of the surface water and shunt it to the underground drainage system. Cavernous zones are well-developed in the limestone (after Lane, 1986).

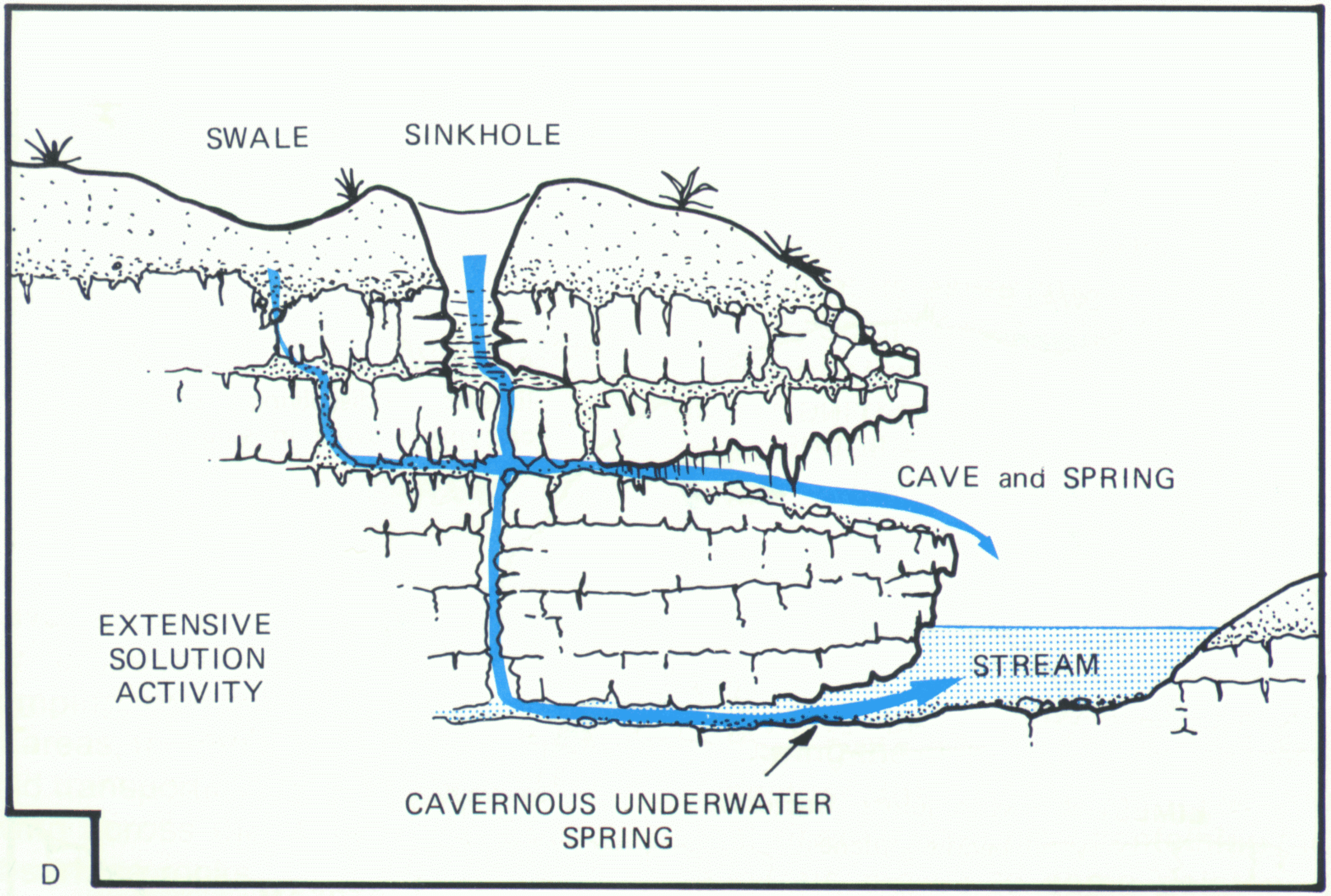


Figure 19d. Detail of Figure 19c showing advanced stage of karst formation. Limestone has well-developed interconnected passages that form an underground drainage system, which captures much or all of prior surface drainage. Overburden has collapsed into cavities forming swales or sinkholes. Caves may form. Land surface has been lowered due to loss of sand into the limestone's voids. Silver Spring is an example of a cavernous underwater spring (after Lane, 1986).

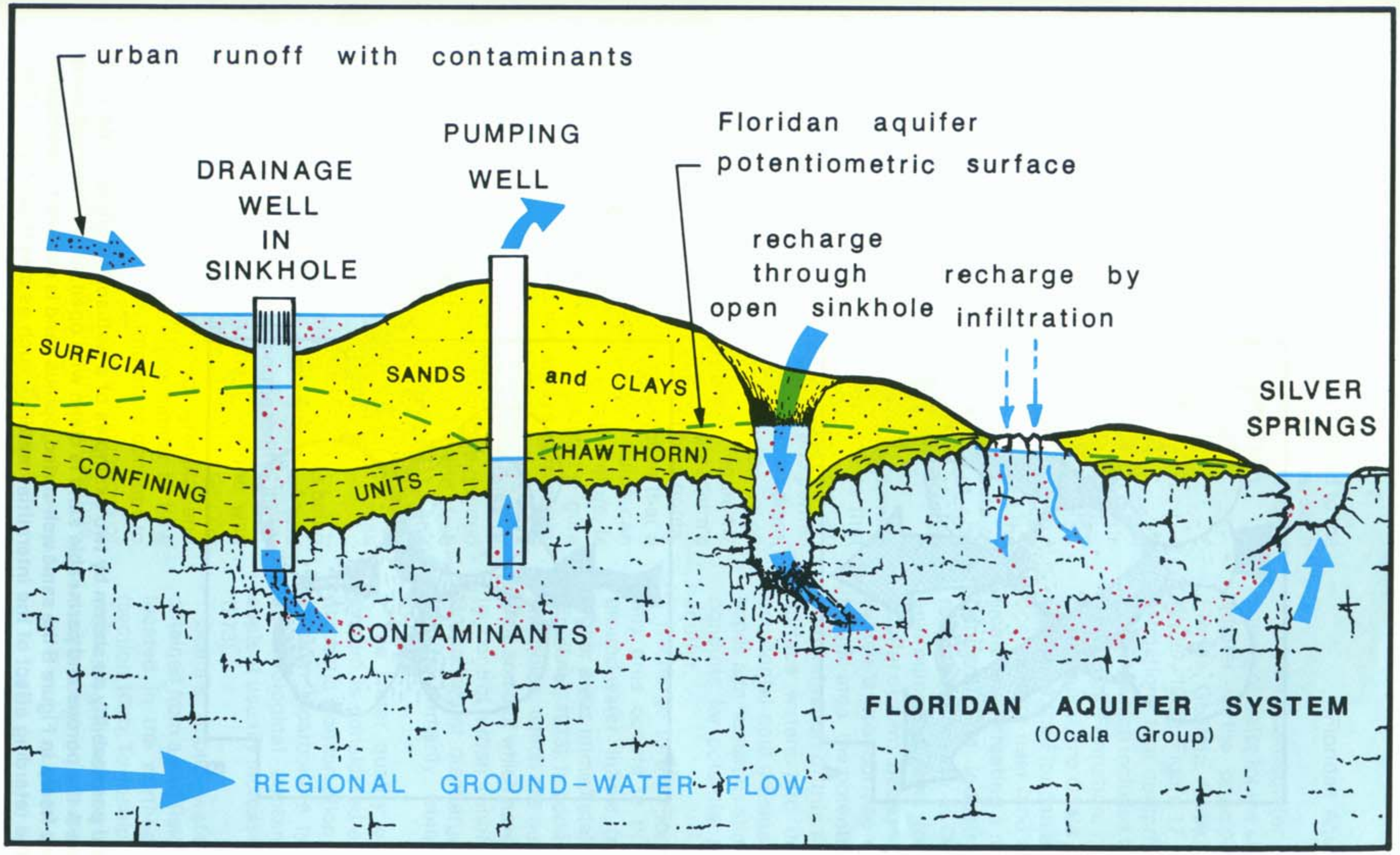


Figure 15. Generalized cross-section showing hydrogeological features common to the Ocala area. Recharge to the Floridan aquifer system can occur in several ways: (1) by infiltration from rain through thin, sandy soil or where limestone crops out at the surface; (2) through sinkholes that breach the confining units; or (3) by drainage wells. Drainage wells pose a threat to the aquifer due to contaminants in urban runoff. Discharge from the aquifer is by pumpage or at springs.

BARGE CANAL ROUTE

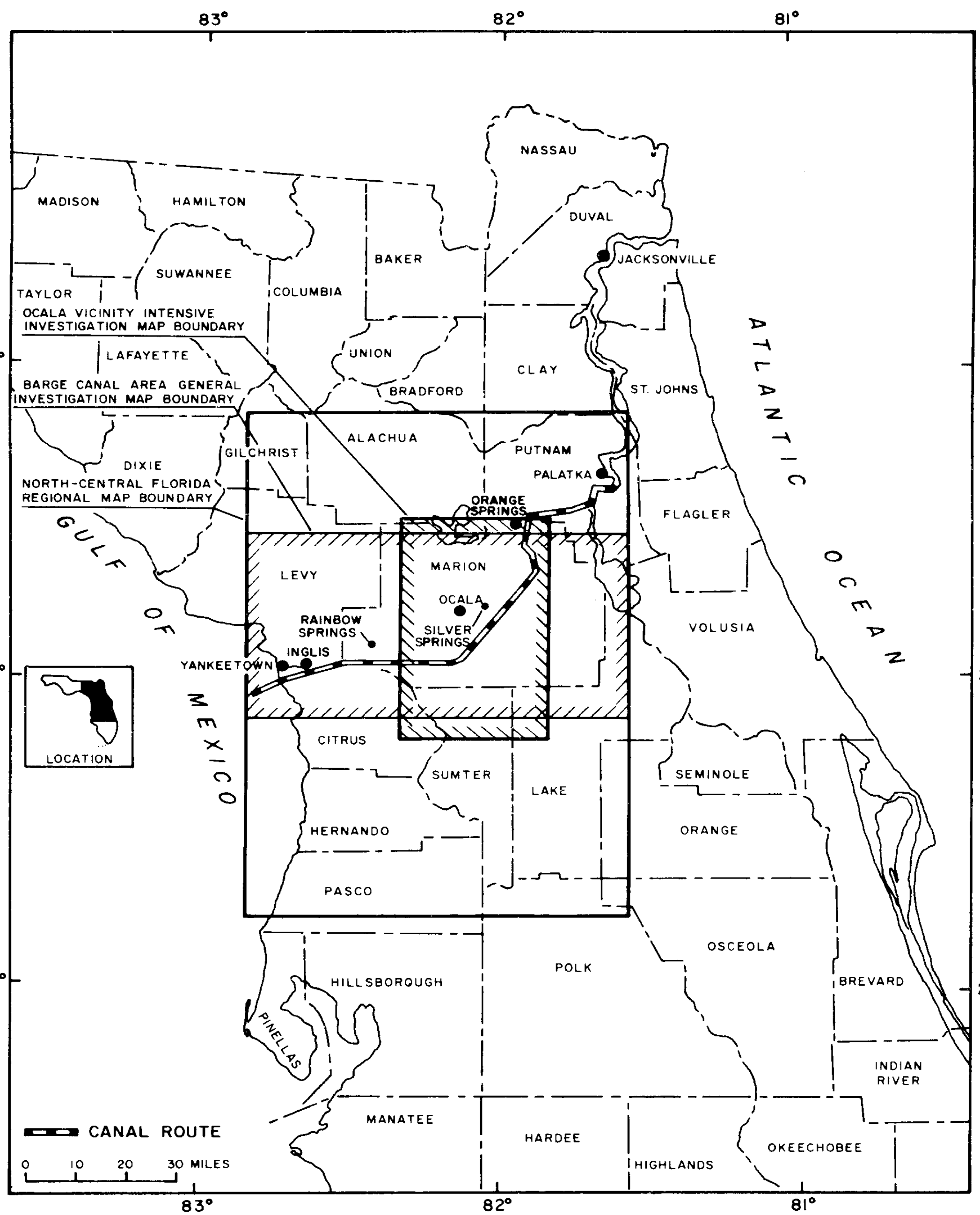


Figure 1. Index map of North Florida showing route of Cross-Florida Barge Canal, outlines of geohydrologic investigation areas, and monitoring network area.

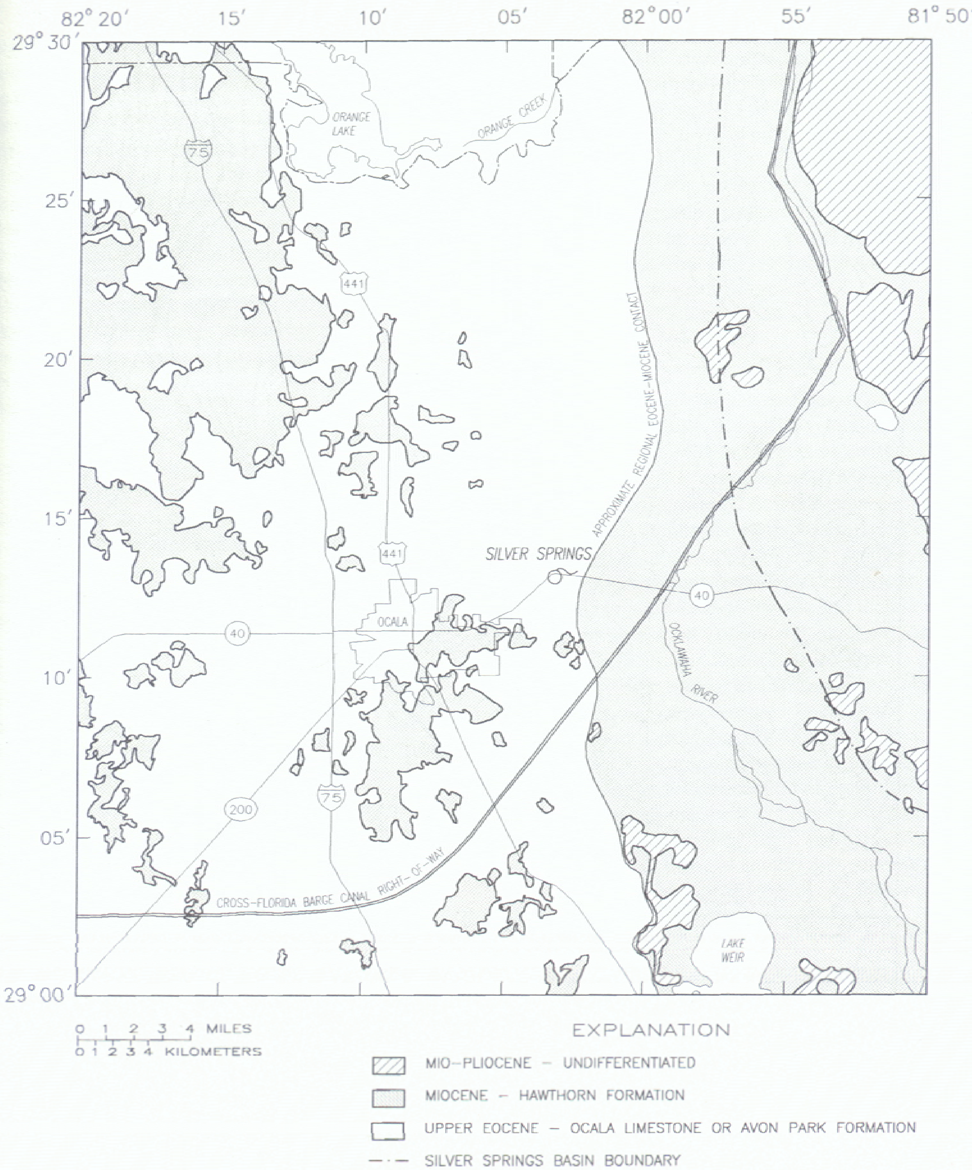
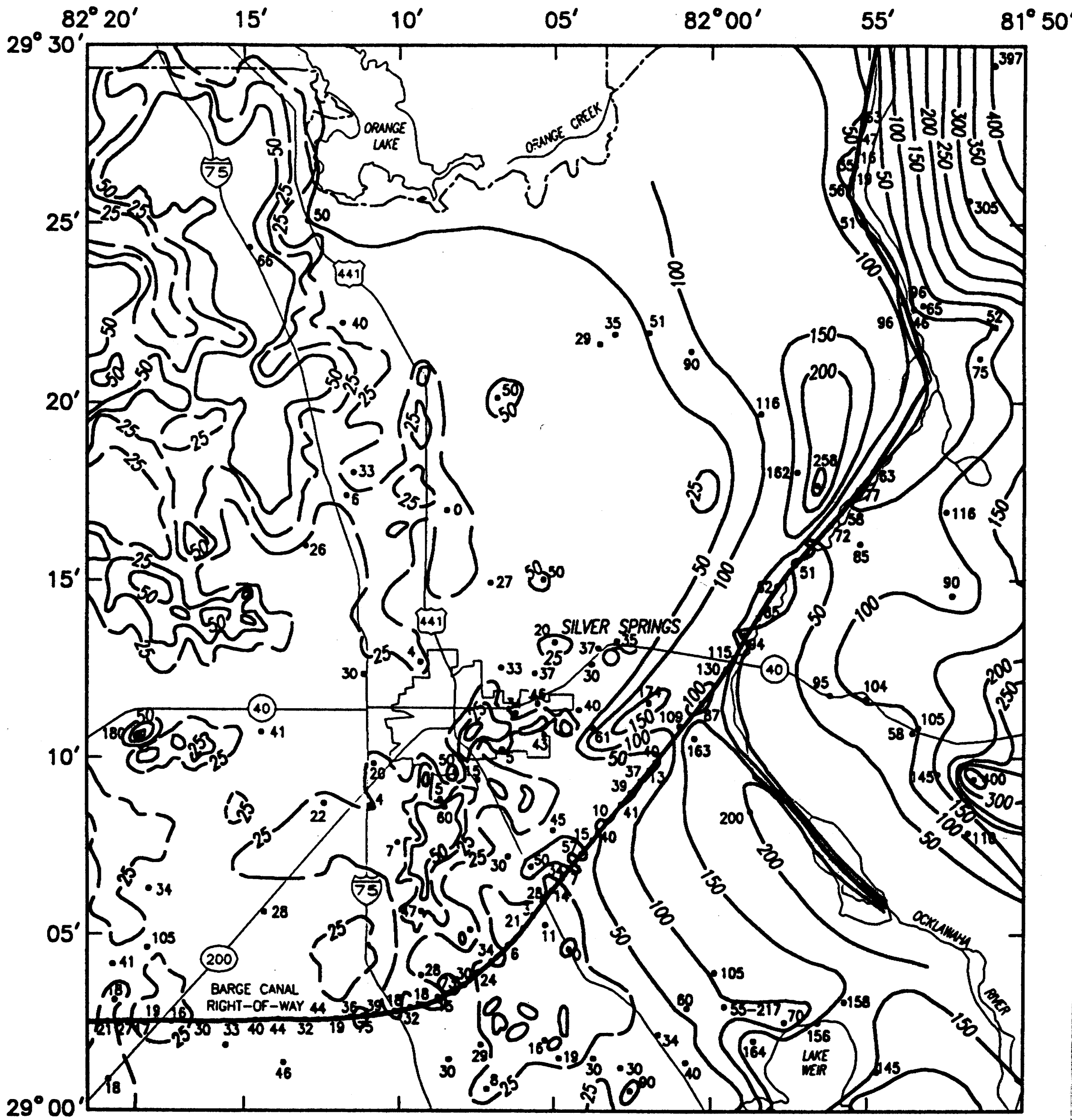


Figure 3. Geologic formations at or near land surface, central Marion County (from Faulkner, 1973, fig. 14).

THICKNESS OF MATERIAL OVERLYING THE FLORIDAN AQUIFER

N



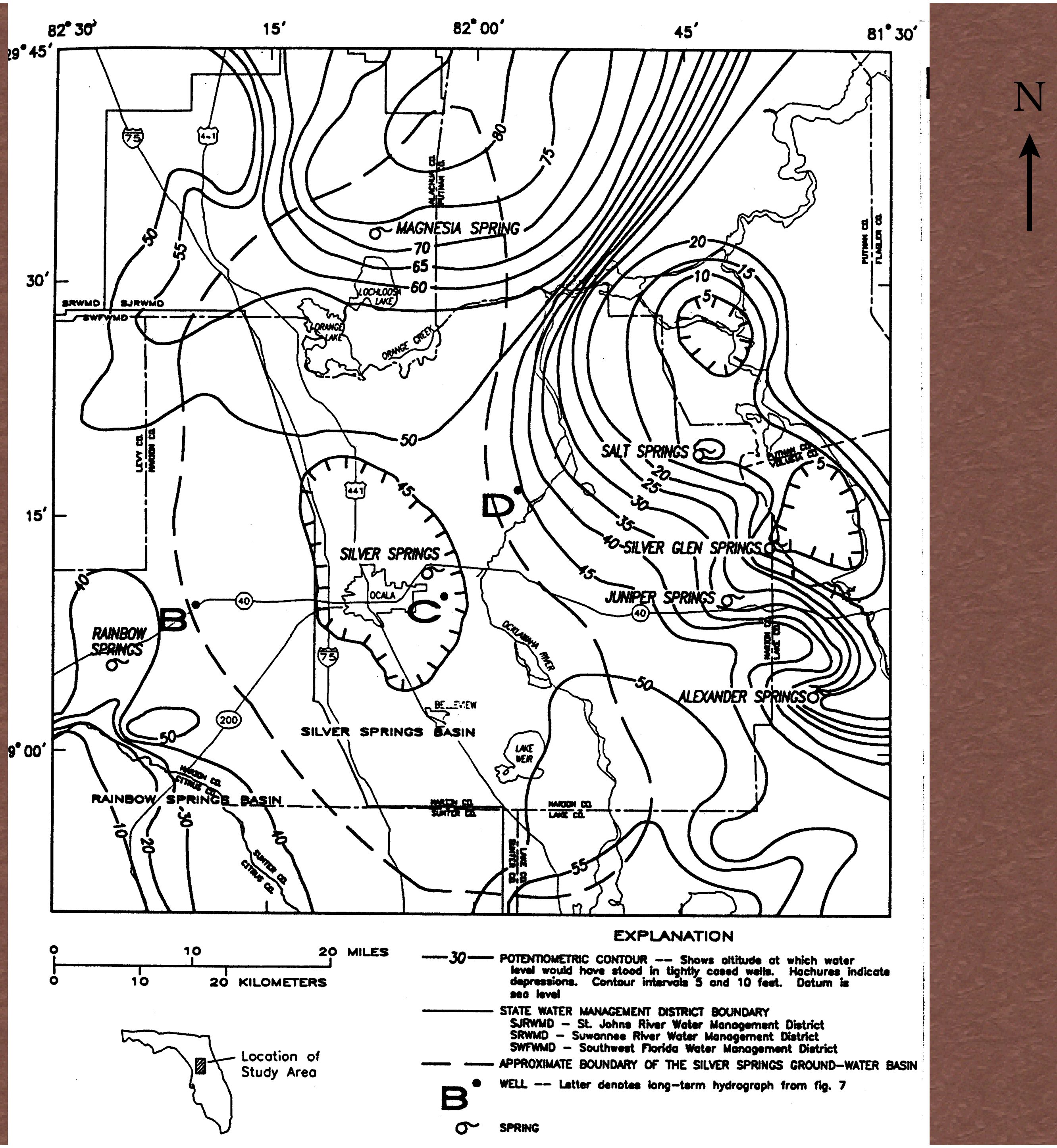
0 1 2 3 4 MILES
0 1 2 3 4 KILOMETERS

EXPLANATION

—— 48 – – LINE OF EQUAL THICKNESS OF MATERIAL OVERLYING THE UPPER FLORIDAN AQUIFER. DASHED WHERE APPROXIMATELY LOCATED. INTERVAL 25 AND 50 FEET

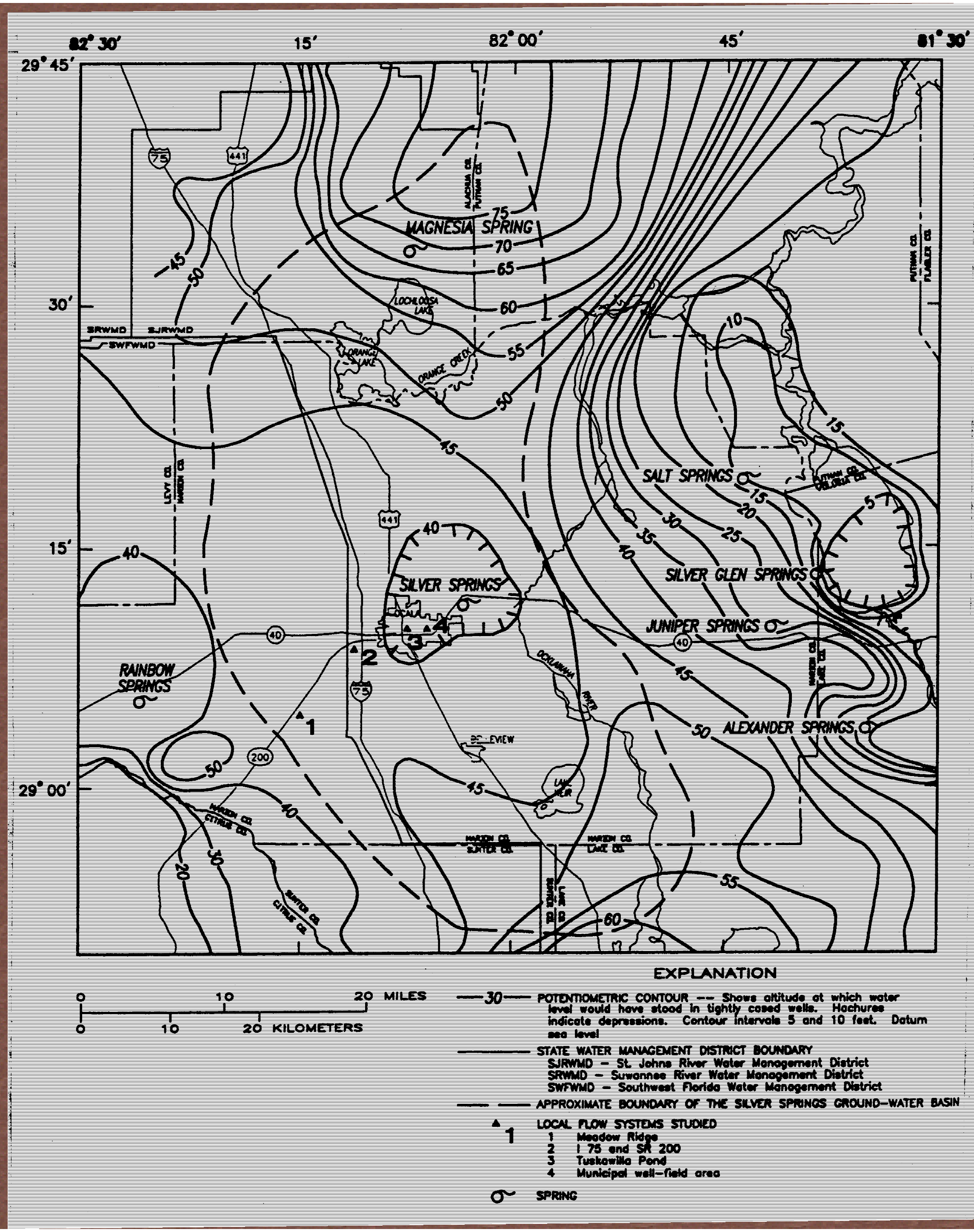
•48 WELL AND THICKNESS OF MATERIAL, IN FEET

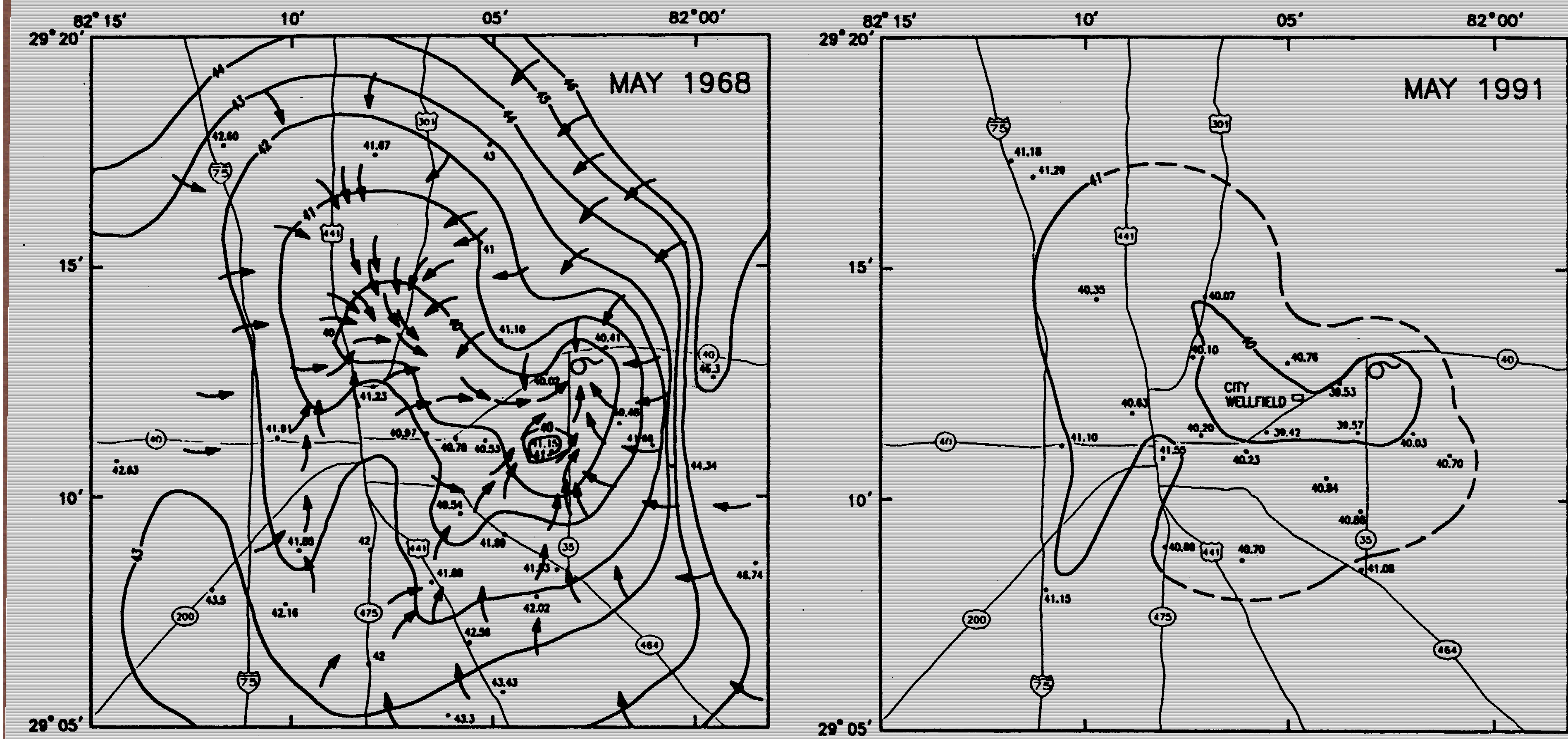
MAY 1989 POTENTIOMETRIC SURFACE OF UPPER FLORIDAN AQUIFER



SEPT 1990 POTENTIOMETRIC SURFACE OF UPPER FLORIDAN AQUIFER

N





N

0 1 2 3 4 MILES
0 1 2 3 4 KILOMETERS

EXPLANATION

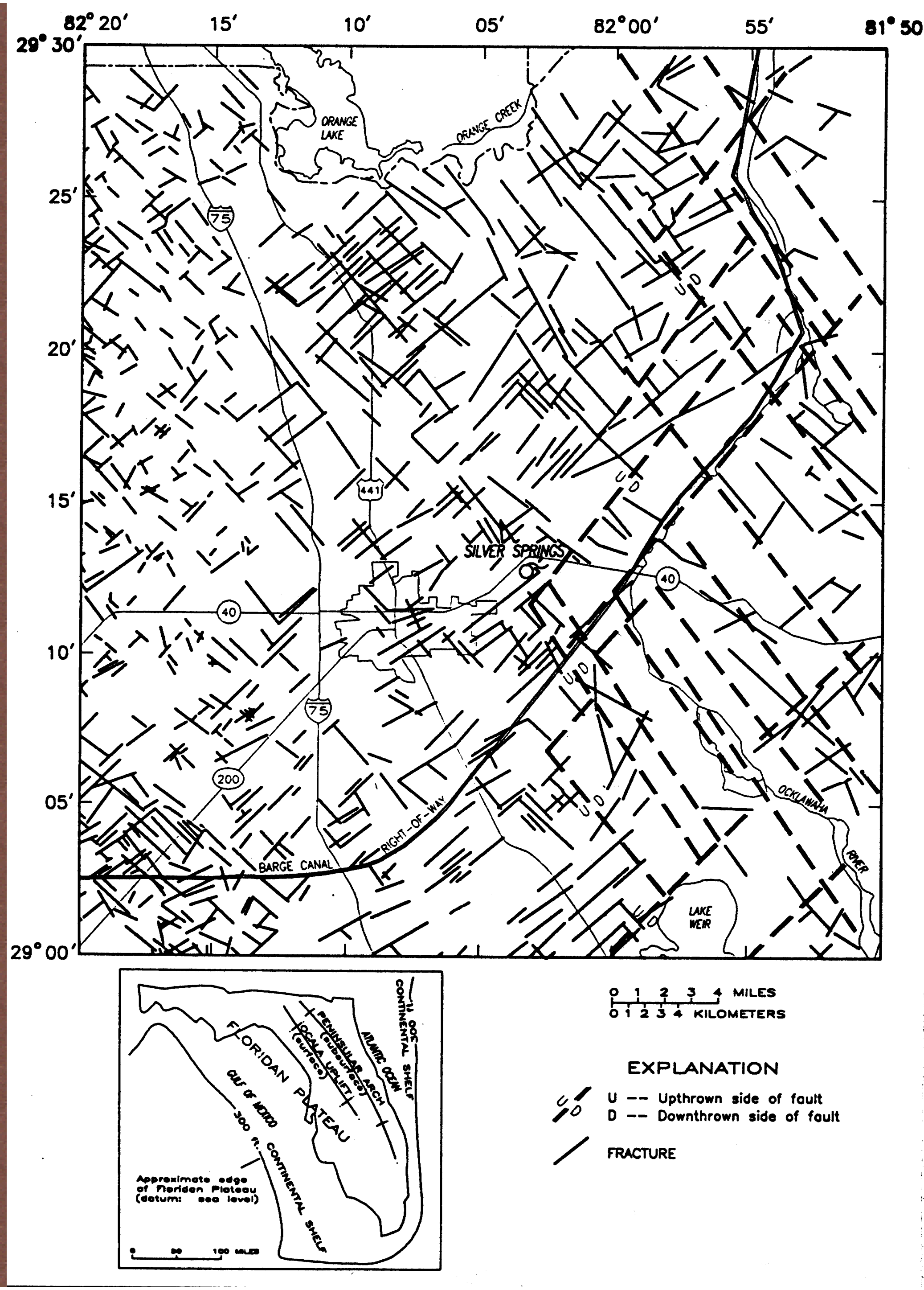
—40— — POTENTIOMETRIC CONTOUR -- Shows altitude at which water level would have stood in tightly cases wells. Hochures indicate depressions. Contour interval 1 foot. Datum is sea level. Dashed where inferred

42 WELL -- Number is altitude of water level in feet above sea level.

SILVER SPRINGS

DIRECTION OF GROUND WATER FLOW

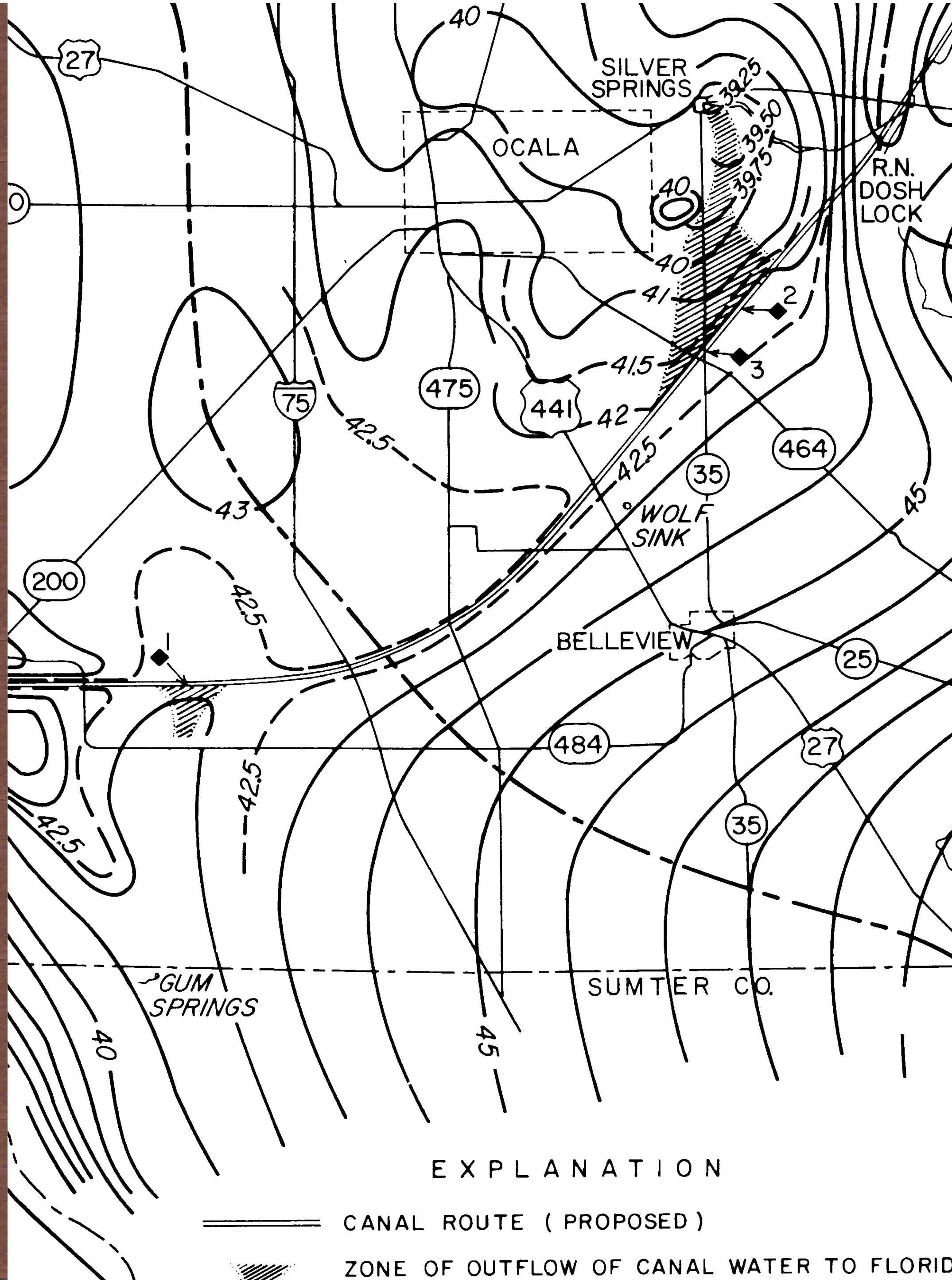
FRACTURE TRACES



N

INTERPRETED FROM AERIALS

USGS AQUIFER TEST LOCATIONS



SITE 1

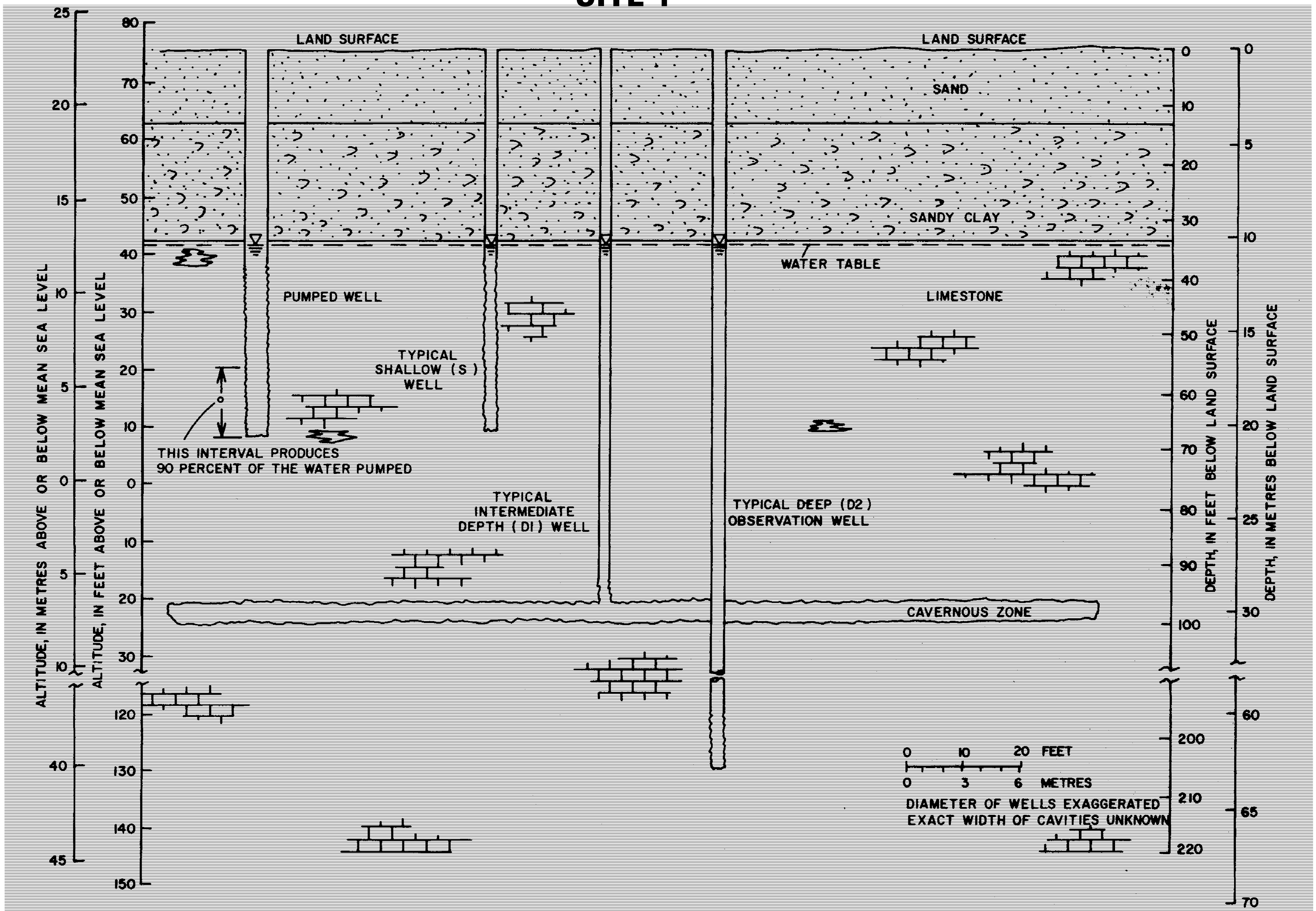


FIGURE 3.--SECTION SHOWING GENERALIZED GEOLOGY AND WELL CONSTRUCTION OF PUMPED WELL AND TYPICAL OBSERVATION WELLS AT AQUIFER TEST SITE 1.

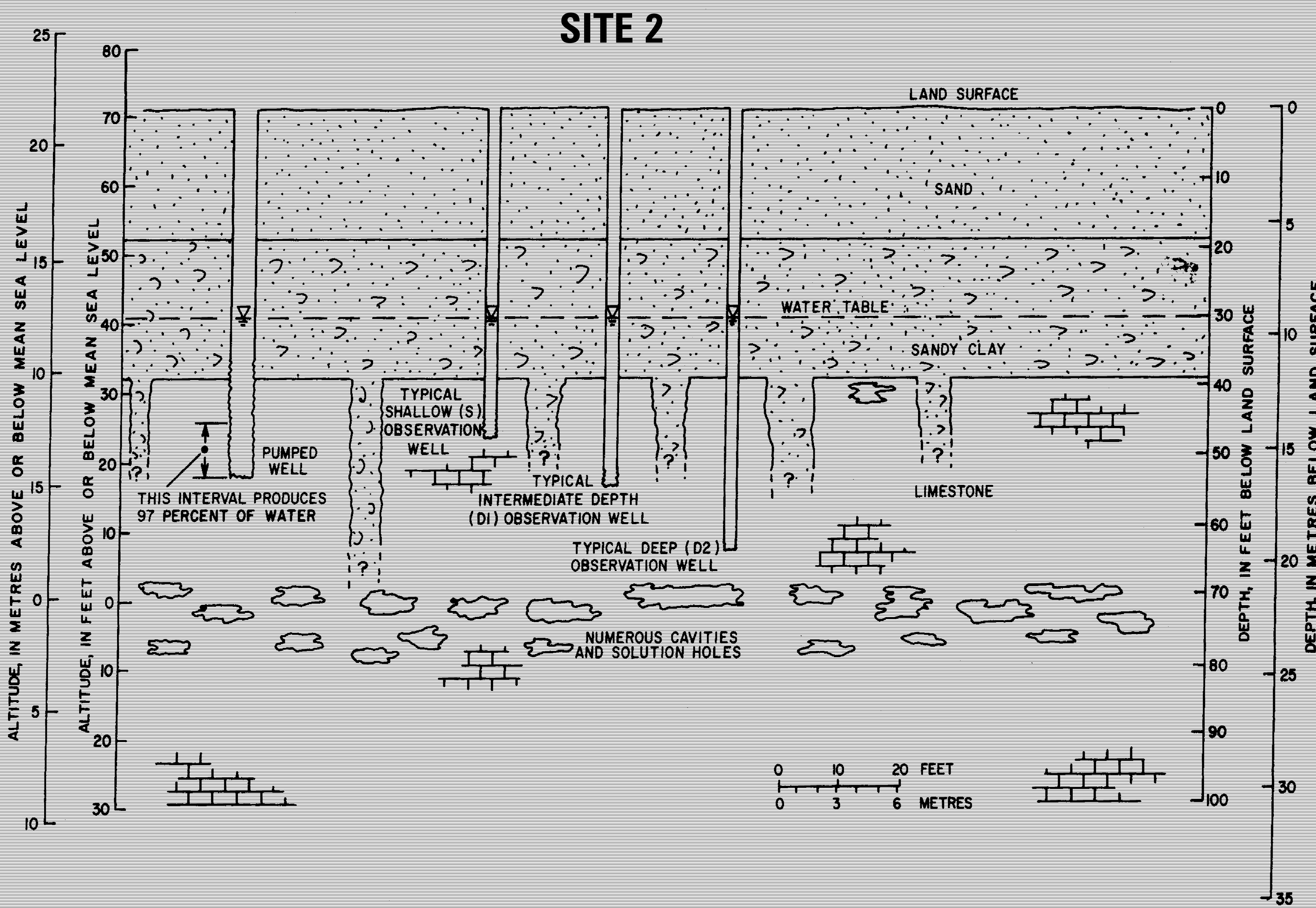


FIGURE 10.—SECTION SHOWING GENERALIZED GEOLOGY AND WELL CONSTRUCTION OF PUMPED WELL AND TYPICAL OBSERVATION WELLS AT AQUIFER TEST SITE 2.

SITE 3

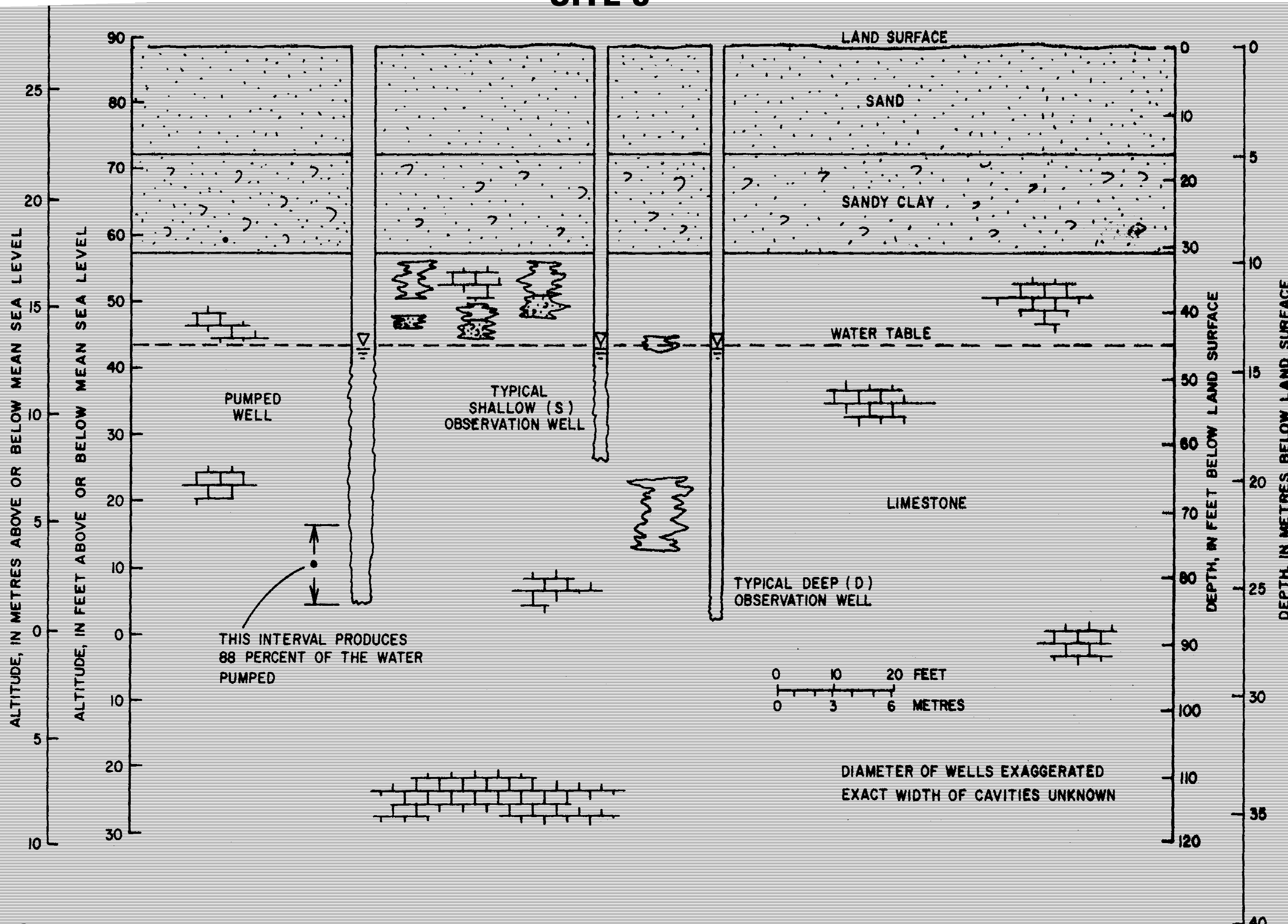


FIGURE 15.--SECTION SHOWING GENERALIZED GEOLOGY AND WELL CONSTRUCTION OF PUMPED WELL AND TYPICAL OBSERVATION WELLS AT AQUIFER TEST SITE 3.