

Edward W. Timmons Jr., P. E.
Consulting Geotechnical Engineer
P.O. Box 2836
Santa Cruz, California 95063
(408) 479 4731

1 August 1994

Mr. and Mrs. Ruben Arriaga
362 Smith Road
Watsonville, CA 95076

Job No. 94-968

Re: Report of Soil Investigation
Residential Construction - Existing Building Site
362 Smith Road - APN 109-112-04
Salsipuedes Rancho Area

Dear Mr. and Mrs. Arriaga:

As requested by you and coordinated with Robin Brownfield, an investigation of the soil and foundation conditions at the subject site has been made by the undersigned Geotechnical Engineer. The purpose of this work was to determine the suitability of the site soils for supporting the proposed residential building construction and to make recommendations for the foundations and other soil-related improvements.

DESCRIPTION OF PROJECT

From discussions with Ms. Brownfield, it is indicated that the proposed residential construction of the subject site will include a new foundation system. No grading of the site will be necessary. It is my further understanding that a new septic system is planned in the front yard area to the south of the building site.

FIELD INVESTIGATION

On July 11, 1994, observations were made of the general site topography, and a close examination was made of the underlying soils exposed in two hand-dug test holes. At that time, the various

soils encountered were classified as to type, strength and settlement characteristics. The location of the test holes are shown on the attached site plan, Figure 1, and the logs of the soils are shown on Figure 2. In addition, available published geologic maps and the County Geologic Hazards Assessment report dated February 18, 1994 were reviewed so as to correlate those previous findings with the actual field findings and to evaluate the seismic conditions at the site.

SITE AND SOIL CONDITIONS

The existing building and proposed improvement area are located on the north side of an existing paved roadway which extends westward from its intersection with Smith Road, approximately one mile north of Casserly Road. In general the site topography is relatively flat along the upper portion of an elongated foothill area with a slight incline to the south toward the paved roadway. To the rear of the site, the topography slopes in a northerly direction fairly gradually for about 80 feet; then, there is a steep downward slope area having an inclination on the order of 3 to 1 (horizontal to vertical). For the most part, the ground surface at the site is covered with low growing grass. There are no indications of excessive erosion around the planned building area, as the site is on the crown of the elongated hill topography. On the nearby steep slope area there are some indications of surface sloughing, but this is from direct rainwater as there is no large runoff area above the steep slope; there does not appear to be any deep rooted slide potential.

Test hole data indicates that the upper strata surface soils at the site consist of loose to medium dense clayey sandy silts extending to a depth of about 1 foot below the ground surface. These soils have only moderate strength and are somewhat compressible in their

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present condition if subjected to direct foundation or slab loads. Immediately underlying these surface soils and extending beyond the depth of the test holes is a dense clayey silty sand formation which has good strength and low compressibility. The underlying soils also have reasonably good permeability which will provide good downward distribution and diffusion of the septic leach field effluent; therefore, adverse lateral flow toward the steep slope area north of the proposed leach field is highly unlikely.

As discussed in the County Geologic Hazards Assessment report, the site is within the Corralitos Fault complex and in close proximity to the San Andreas and Zayante Fault Zones, and therefore subject to ground shaking during any significant earthquake emanating from those faults. The underlying soil conditions at the site are not subject to liquefaction, but there is the potential hazard of the ground shaking effects on the building structure; this, of course, is a hazard shared by all structures in Santa Cruz County.

CONCLUSIONS

Based on the above-described findings, it is my opinion that the site, located at least 75 feet away from the nearby steep slopes area is suitable for the proposed construction providing the foundations obtain proper vertical and lateral support in the strong underlying soils. It is therefore concluded that conventional spread footings will be suitable for the proposed new foundations, and that proper preparation of the surface soils can develop support for any slab-on-grade construction. It is further concluded that planned septic leach field location is satisfactory, and that the potential hazard of ground shaking effects on the building structure can be mitigated by adherence to the applicable provisions of the current Uniform Building Code in the design and construction of the building.

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RECOMMENDATIONS

- 1) Foundations - It is recommended that the foundations consist of spread footings extending to a minimum depth of 18 inches below the existing ground surface. At this depth an allowable bearing pressure of 2500 psf for combined dead and live vertical loads can be used. To resist lateral seismic forces on the foundations, the passive soil pressures equivalent to a fluid unit weight of 250 pcf acting against the vertical face of the 18-inch embedded footings will be adequate.
- 2) Slab-On-Grade Construction - Prior to the placement of any concrete slab construction, the cleanly exposed surface soils should be recompactd so as to provide a uniformly firm subgrade. If any portion of the slab-on-grade is to be carpeted, tiled or painted, it is additionally recommended that a moisture vapor barrier be installed on the prepared subgrade prior to the concrete placement. A commonly used barrier consists of a 4-inch thick capillary break layer of open graded rock or gravel covered with a Visqueen or equivalent plastic sheet and topped with 2 inches of clean sand; Figure 3 shows the recommended materials and construction details.
- 3) Drainage - It is recommended that all roof, patio and driveway drainage be directed toward the frontage road area to the south of the planned improvement area, so as to divert any concentrated flows of storm water runoff away from the steep slope area to the north. Within 20 feet of the building and septic leach field areas, the drainage should be routed into closed pipes or lined ditches so as to prevent erosion or surface ponding in these areas.

1 August 1994

The conclusions and recommendations presented in this report are based on the findings of test holes made in the accessible areas of the site, and it is reasonable to assume uniform variation between these points of exploration. Periodic inspection of the site preparation and foundation excavation work should be provided by the soil engineer so that if any variations or undesirable conditions are encountered during the construction, supplementary recommendations can be made, if necessary.

The recommendations in this report have been discussed with Robin Brownfield, but should there be further questions, please contact me. Otherwise, please keep me posted as to your construction schedule so that the necessary inspections can be arranged.

Very truly yours,



Edward W. Timmons, Jr., G.E. 830

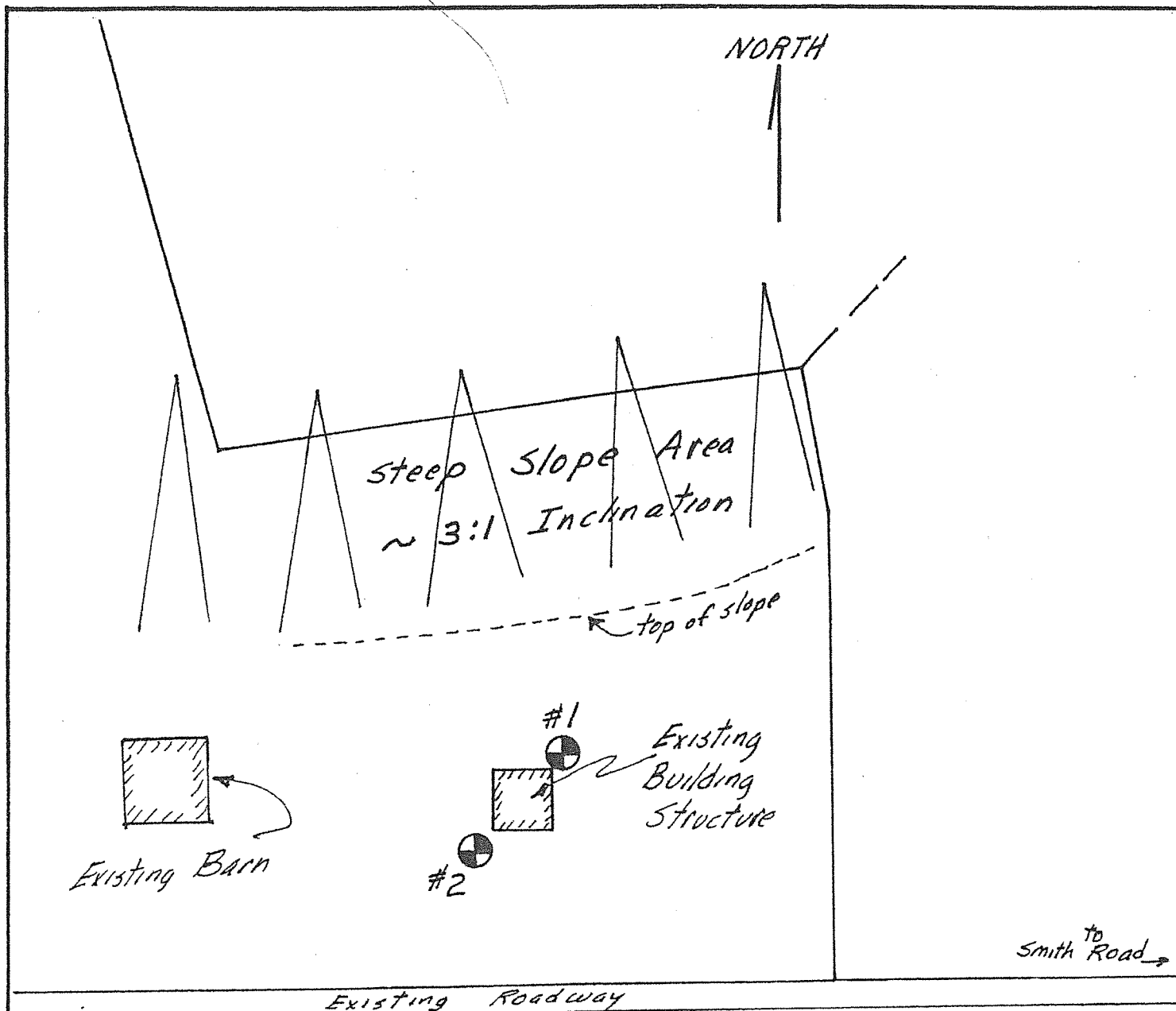


EWT/pmw

Attachments: Figures 1-3

copies: (3) Robin Brownfield

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SITE PLAN
Scale: 1"=100' (approx.)
Test Hole



PROJECT *Arriaga Residence-Smith Road*

BORING NOS:

1 & 2

DATE OF BORING

TYPE OF BORING

SURFACE ELEVATION

HAMMER WEIGHT

S A M P L E S

DEPTH IN FT.

SAMPLE

NUMBER -
DIAMETER

BLOWS/FT.

DRY DENSITY
P.C.F.

MOISTURE
CONTENT %

UNCONFINED
COMPRESSION
STRENGTH, P.S.F.

OTHER
TESTS

#1 DESCRIPTION OF MATERIALS:

*Loose to Medium Dense Red-Brown
Clayey Sandy Silt with roots*

*Very Dense Orange-Tan
Clayey Sand*

Bottom of Hole

5

#2

Grass

*Medium Dense Brown
Clayey Sandy Silt*

*Dense to Very Dense
Orange-Tan Clayey Sand*

Bottom of Hole

5

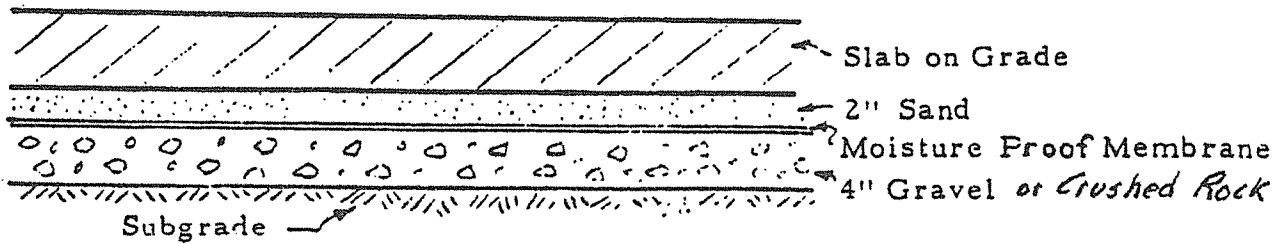
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#94-968

Edward W. Timmons Jr., P.E.

Figure

2



TYPICAL SECTION

MATERIALS

The mineral aggregate for use under floor slabs shall consist of clean *crushed rock*, rounded gravel and sand. The aggregate shall be free from clay, vegetable matter, loam, volcanic tuff, and other deleterious substances.

GRADATION

The mineral aggregate shall be of such size that the percentage composition by dry weight as determined by laboratory sieve (U.S. Series), will conform to the following grading:

<u>Sieve Size</u>	<u>Percent Passing</u>	
	<u>Gravel or Rock</u>	<u>Sand</u>
1"	100	
3/4"	90-100	
3/8"		
No. 4	0-5	100
No. 8		
No. 30		0-30
No. 50		
No. 200		

MOISTURE PREVENTION BENEATH SLAB ON GRADE FLOORS

PLANNING DEPARTMENT

GOVERNMENTAL CENTER



COUNTY OF SANTA CRUZ

701 OCEAN STREET SANTA CRUZ, CALIFORNIA 95060
FAX (408) 454-2131 TDD (408) 454-2123

February 18, 1994

Ruben Arriaga
362 Smith Road
Watsonville, CA 95076

Subject: GEOLOGIC HAZARDS ASSESSMENT, APN 109-112-04
LOCATION: 362 Smith Road
OWNER: Arriaga

Dear Mr. Arriaga:

I performed a site reconnaissance of the parcel referenced above on February 16, 1994, where a new mobile home on a permanent foundation is proposed. The mobile home will be placed where the old farmhouse is currently standing.

The parcel was evaluated for possible geologic hazards due to its location in the Corralitos Fault Complex. The building area is in the extreme eastern corner of the parcel, adjacent to the right of way off Smith Road. This corner of the parcel is in a different geologic setting than the portion at lower elevation, in the alluvial valley. Therefore, the conclusions in this letter apply only to the proposed mobile home site, and not necessarily to the rest of the parcel.

This letter briefly discusses my site observations, outlines permit conditions and any requirements for further technical investigation, and completes the hazard assessment for this property.

Completion of this hazards assessment included a site reconnaissance, a review of maps and other pertinent documents on file with the Planning Department, and an evaluation of aerial photographs. The scope of this assessment is not intended to be as detailed as a full geologic or geotechnical report completed by a state-registered consultant.

SEISMIC HAZARDS

This property is located in a seismically active region of northern California, as the October 17, 1989 earthquake amply demonstrated. Figure 2, the county fault map, gives an overview of the tectonic setting of the

parcel. The parcel is located approximately .75 miles south of the San Andreas fault zone, one mile north of the Zayante Fault Zone, and is within the Corralitos Fault Complex.

The Corralitos Complex is a zone of relatively short, parallel to subparallel, northwest trending lineations and fault traces that lies between the more throughgoing and better defined Zayante Fault to the south and San Andreas Fault to the north. The genetic relationship between the complex and the two other faults it intersects is not known.

The location of specific fault traces within this zone, based on field studies and air photo interpretation, varies among different studies and authors. Figures 3 and 4 show two fault maps with the parcel plotted on them. The specific location of fault traces is important because structures must be located a minimum of fifty feet from active or potentially active fault traces.

The building area is a relatively flat, raised terrace, which slopes down to the north to an incised drainage. Figure 3 of Coopersmith shows a "possible" fault trace following the drainage at the base of the slope. The indication of the trace is the unusually straight alignment of the creek. There is no clear evidence in the field to either corroborate that the feature is a fault trace, or to dismiss the possibility. There is a linear side hill depression parallel to the creek on the north facing slope, which could be related to grading or may be related to faulting. In either case, the suspected fault trace is substantially greater than fifty feet from the proposed building site.

As depicted on the Hall map, Figure 4, the parcel is located between a series of parallel photolineaments on the west, and "probable" fault traces on the east. The nearest mapped probable fault trace crosses the orchard on the parcel south of the subject parcel, and terminates on the south side of the right of way. This linear feature is clear on the photos, and is expressed on the ground as a topographic break in slope. The topographic expression becomes more subtle to the northwest.

If this lineation is a fault, there is no field or photo evidence of its trace beyond the head of the south-trending swale on the neighbor property to the south, and no evidence that it encroaches within 50-100 feet of the building site.

Given the distance of these two possible fault traces from the house site, it does not appear that detailed subsurface fault investigation is required for this project. However, it is important to note that the hazard of surface rupture may still exist. The fault maps were largely created from interpretations of fault related features visible on aerial photographs. Topographic, geomorphic and tonal features that might indicate faulting may have been removed from the surface by erosion, grading, and agricultural activities over time. Therefore, the absence of mapped traces in the immediate vicinity of the structures does not guarantee that faults do not exist in this area.

Further, potentially active fault traces can exist without any surface indications. Note that on the County fault map depicting potential for ground surface rupture (Figure 2), the parcel is in the area labeled "insufficient data." Not enough is known about the Corralitos Complex or the location of fault traces to determine where the hazard lies on the continuum from "low" to "high."

The anticipated lifetime of the proposed dwelling and, therefore, proper structural and foundation design is imperative. In addition to the San Andreas, Zayante, and Corralitos Complex faults, other nearby fault systems capable of producing intense seismic shaking on this property include the San Gregorio, Sargent, Hayward, Butano, and Calaveras faults, and the Monterey fault complex. In addition to intense ground shaking hazard, development on this parcel could be subject to the effects of lateral spreading, lurch cracking, ground cracking, or seismically induced landsliding during a large magnitude earthquake occurring along one of the above mentioned faults.

SLOPE STABILITY HAZARDS

A "Preliminary Map of Landslide Deposits in Santa Cruz County" was prepared in 1975 as part of the County's General Plan. This interpretive map was prepared from aerial photographs and was designed only for "regional land use evaluations." The map indicates areas where questionable, probable, or definite past instability is suspected. While not a susceptibility map indicating potential site-specific stability problems, when utilized in conjunction with other published data and documents, the map is a useful planning resource.

A portion of the map (Figure 8) is attached which shows the building site is not within an area where, prior to 1975, large scale instability is suspected to have occurred. A survey of aerial photographs and observations noted during my site visit verify the general stability of the flat building area.

The approximate average gradient of the designated homesite is 5% or less. Eighty five feet to the rear (north) of the farmhouse there is a break in slope. The average gradient of this north facing slope is 40%. This slope may be prone to shallow failures in some circumstances, particularly where oversteepened or subjected to concentrated runoff or excessive rainfall. The geologic material is the poorly cemented, and therefore highly erodible Aromas Formation sandstone. Evidence of erosion and shallow failure is visible on the neighbor property to the east.

The risk associated with slope failure at this location can be maintained at a reasonable level if runoff and drainage associated with development is strictly controlled, and the proposed setback between the rear break in slope and any development, given as greater than seventy five feet on the plot plan, is maintained.

REPORT REQUIREMENTS

Based on my site visit and review of pertinent maps and other documents, further geologic evaluation in the form of a full geologic report is not indicated for your proposed development on this parcel. However, a geotechnical (soils) investigation performed by a state-registered geotechnical engineer is required prior to the Planning Department approval of your proposal. The investigation must include, but not necessarily be limited to, a thorough evaluation of the following concerns:

- a) Development of appropriate foundation design parameters reflecting the seismic shaking potential at the site.
- B) New septic system emplacement must not induce nor exacerbate slope instability; its' location must be approved by your consultant.

When completed, please submit two copies of the investigation to the Zoning Counter at the Planning Department, and pay the \$495.00 fee for a Geotechnical (Soils) Report Review.

PERMIT CONDITIONS

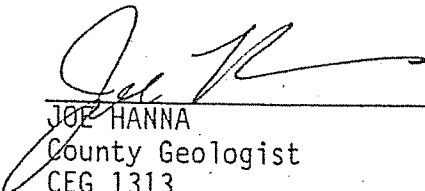
Permit conditions will be developed for your proposal after the technical report has been reviewed. At a minimum, however, you can expect to be required to follow all the recommendations contained in the report in addition to the following items:

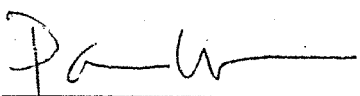
1. Grading activities must be kept to a minimum. This project should not require any grading.
2. Drainage from impermeable surfaces (such as the proposed roof and driveway) must be collected and properly disposed of. Runoff must not be allowed to sheet off these areas in an uncontrolled manner.

Final building plans submitted to the Planning Department will be checked to verify that the project is consistent with the conditions outlined above prior to issuance of a building permit. If you have any questions concerning these conditions, the hazards assessment, or geologic issues in general, please contact me at 454-3178. It should be noted that other planning issues, not related specifically to geology, may alter or modify your development proposal and/or its specific location.

Lastly, you are aware that there is a zoning violation on the property, having to do with the existing mobile home. This violation must be cleared, and enforcement fees paid before new permits can be issued. Please call Ruth Owen at 454-3201 to clear the violation.

Sincerely,


JOE HANNA
County Geologist
CEG 1313


PATIA LEVINE
Geologist
Environmental Planning

3/2/94
Date

FOR: PETE PARKINSON
Environmental Coordinator/
Principal Planner
Environmental Planning

cc: Correspondence File
GHA File
Ruth Owen, Code Compliance
Sheryl Mitchell, Agricultural Planner

PP/PL/cu/arriaga/027

POR. SECS. 4 & 9, T. 11 S., R. 2 E., M. D. B. & M. PROJECTED

11-15-
16-P.M

48-P.M.-39
12-3-87
NOTE - See 109-07
for Northerly Por

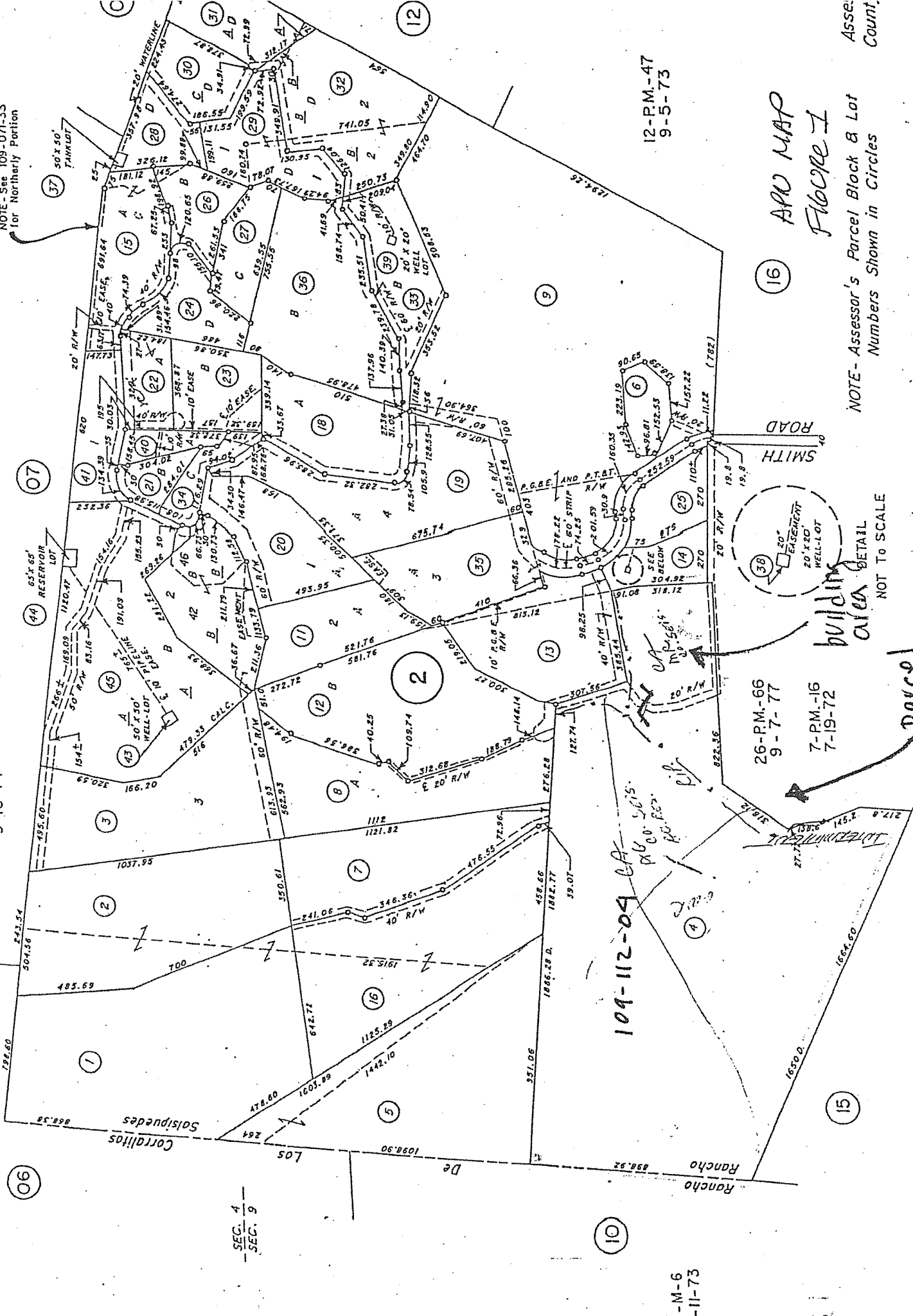
13-P.M.-24
10-23-73

13-P.M.-23
10-24-73

31-P.M.-45
2-13-79

6-P.M.-30
9-10-74

4



⑤

NOTE- Assessor's Parcel Block & Lot
Numbers Shown in Circles

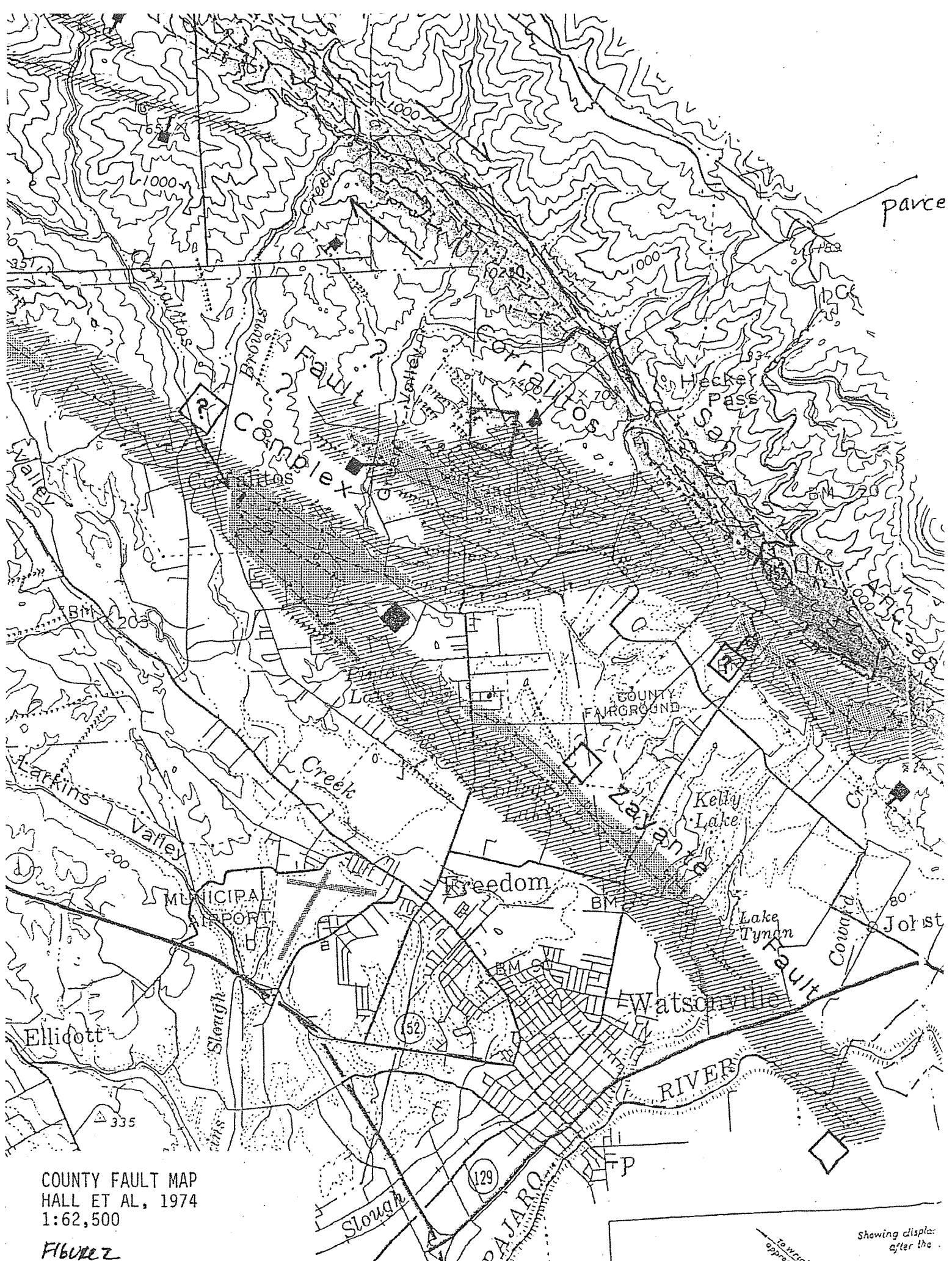
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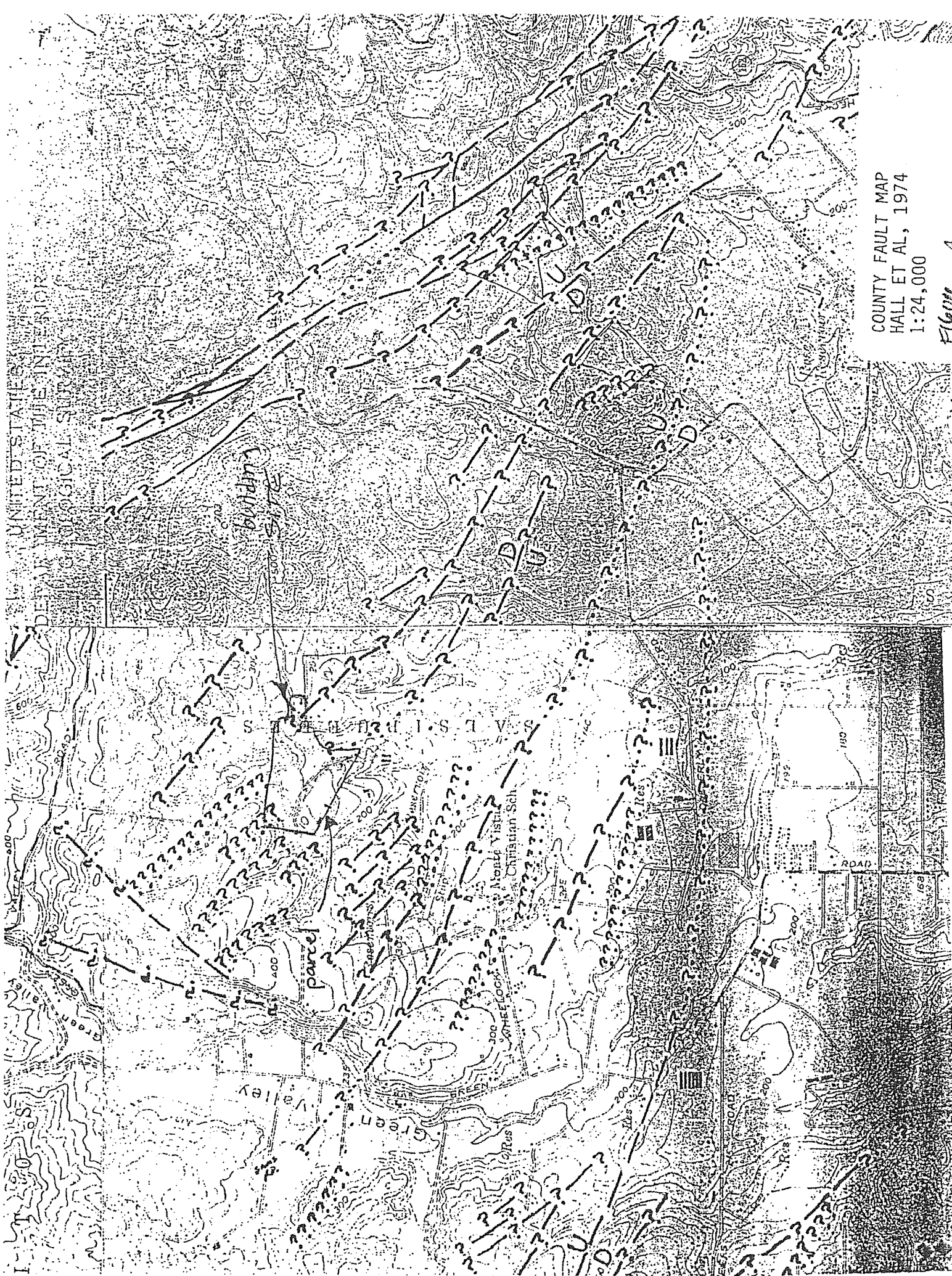
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COUNTY FAULT MAP
HALL ET AL, 1974
1:62,500

Figure 2



COUNTY FAULT MAP
HALL ET AL, 1974
1:24,000
File 4

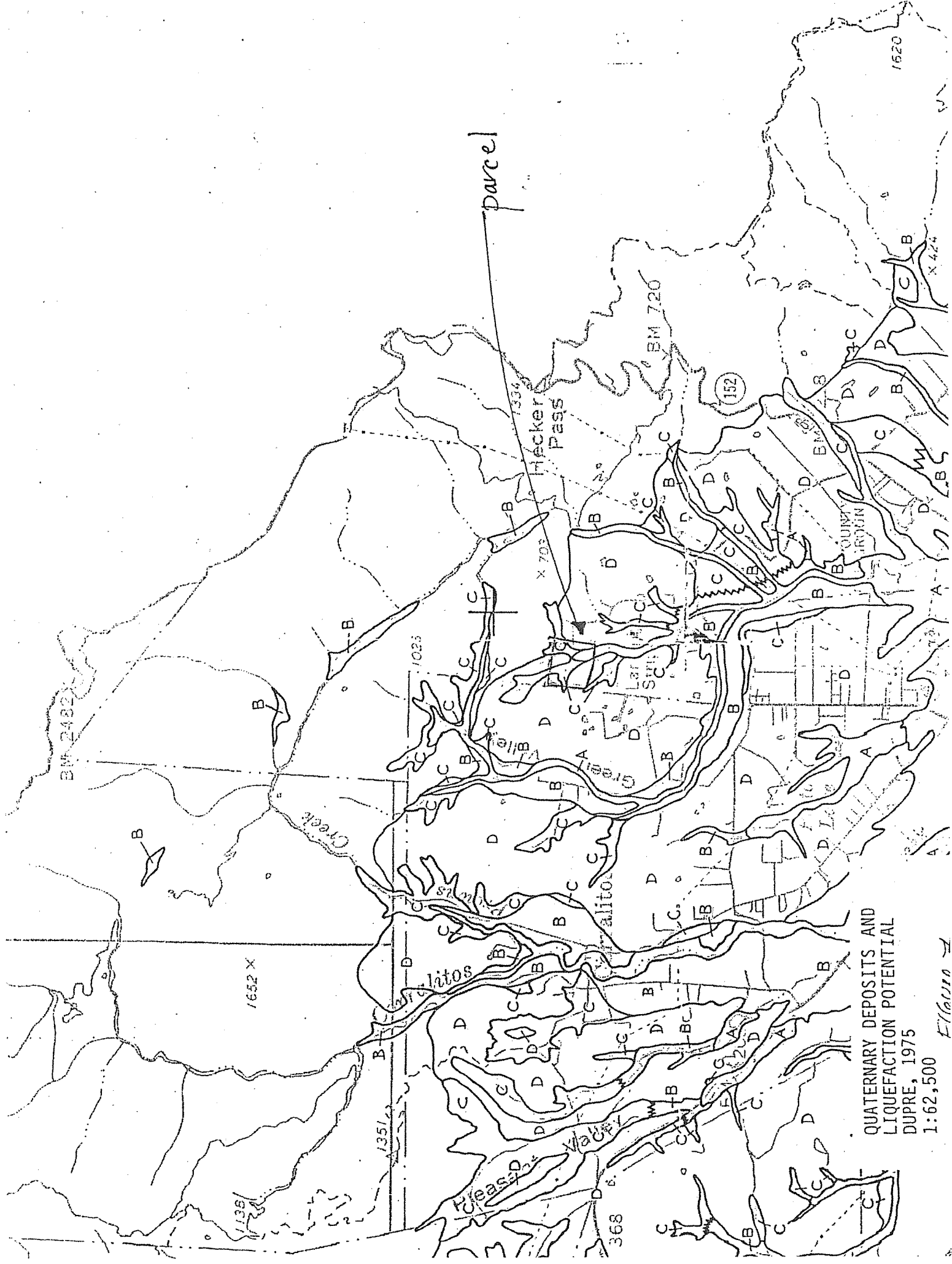
Geologic Map
1:25,000

San Juan River
Hecker Pass
Perry Lake
Municipal Airport
Therapy
County Ground
Agricultural Zone

Figure 5

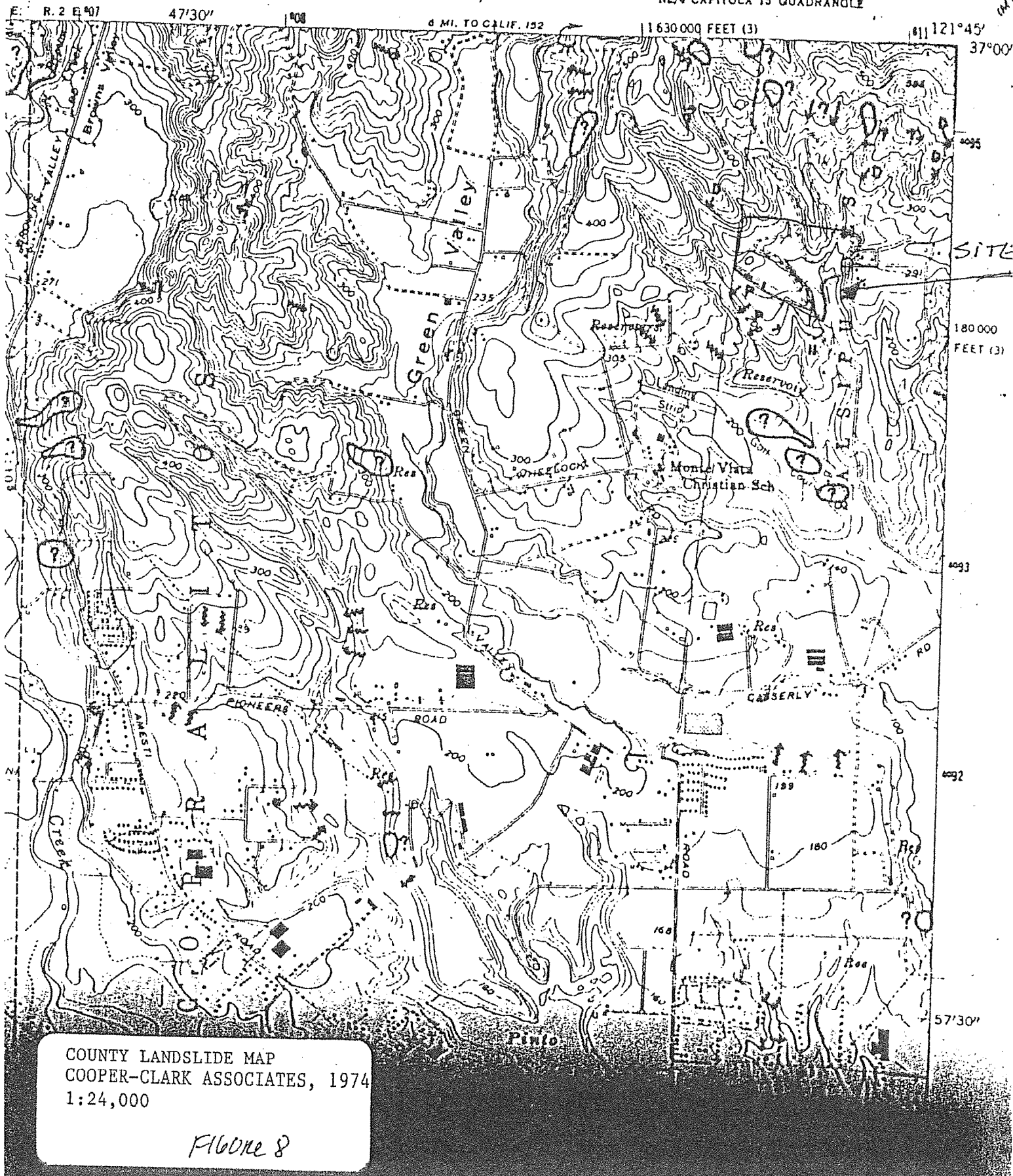
Logic Map
Abb, 1989
12,500





QUATERNARY DEPOSITS AND
LIQUEFACTION POTENTIAL
DUPRE, 1975
1:62,500
E. H. HARRIS

WATSONVILLE WEST QUADRANGLE
CALIFORNIA
7.5 MINUTE SERIES (TOPOGRAPHIC)
NE/4 CAPITOLA 15' QUADRANGLE





RECOMMENDED CONSULTANTS FOR SOIL REPORTS

This list includes consultants who have recently completed reports for projects in Santa Cruz County and who are familiar with County Guidelines for Soil Reports. This is not a complete listing of state registered consultants. Completion of a soil report by a consultant on this list does not guarantee acceptance of the report by the County Planning Department.

Earth Systems Consultants, No. Cal, Inc.
Applied Soil Mechanics, Inc.
835 Blossom Hill Road, Suite 215
San Jose, CA 95123
(408) 365-8100

Cotton & Associates
330 Village Lane
Los Gatos, CA 95030
(408) 354-5542

Haro, Kasunich & Associates
116 East Lake Avenue
Watsonville, CA 95076
(408) 662-3400 or (408) 722-4175

Ted Timmons
P. O. Box 2836
Santa Cruz, CA 95063
(408) 479-4731

Steven Raas & Associates
444 Airport Blvd., Suite 106
Watsonville, CA 95076
(408) 722-9446

Donald Tharp
3014 Baronian Court
Soquel, CA 95073
(408) 479-8165

James C. Reynolds & Associates
805 East Lake Avenue
Watsonville, CA 95076
(408) 722-5377

Pacific Geotechnical Engineers
16120-B Caputo Drive
Morgan Hill, CA 95034
(408) 778-2818

Terratech
1365 Vander Way
San Jose, CA 95112
(408) 297-6969

Mike Van Horn
101 Forest Avenue
Santa Cruz, CA 95062-2622
(408) 429-9364

Sampson Engineering Inc.
6 Hangar Way, Suite C
Watsonville, CA 95076
(408) 761-6219 or 761-6222