3203240

R. PAUL VAN DAM
Salt Lake County Attorney
By: Craig W. Anderson
Deputy County Attorney
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Salt Lake City, Utah 84115
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Recorded NOV 28 1978 at 12:40 p m
Request of County Attorney R Paul Van Dam
KATIE L. DIXON, Recorder
Salt Lake County, Utah
$ No Fee By Evelyn Thompson Deputy
Evelyn Thompson
REF.

NOTICE

TO WHOM IT MAY CONCERN:

You will please take notice that pursuant to Section 7006(f) of the Uniform Building Code, the Salt Lake County Department of Building Inspection has adopted the seismic and grading recommendations contained in the Dames and Moore Geologic and Engineering Reports of June 23, 1977, and October 8, 1978, (attached) on the Canyon Cove Subdivision, Phases One and Two as part of the grading permit requirements for said subdivision and described as follows, to-wit:

Lots 1 through 47, Canyon Cove #1
Lots 201 through 281, Canyon Cove #2

DATED this 28 day of November, 1978.

Craig W. Anderson

On this 28 day of November, 1978, personally appeared before me Craig W. Anderson, the signer of the foregoing instrument, who duly acknowledged to me that he executed the same.

Mindy Nelson
NOTARY PUBLIC, Residing in
Salt Lake County, Utah

My Commission Expires:

2-7-81

NOTARY PUBLIC STATE OF UTAH

4777 PAGE 1257

DAMES & MOORE
CONSULTANTS IN THE ENVIRONMENTAL AND APPLIED EARTH SCIENCES

SUITE 200, 250 EAST BROADWAY · SALT LAKE CITY, UTAH 84111 · (801) 359-8764
CABLE: DAMEMORE TWX: 910-925-5692

June 23, 1977

Envirowest
450 South 900 East
Salt Lake City, Utah 84102

Attention: Mr. Bill Miller

Gentlemen:

Soils and Engineering Geology Study
Proposed Canyon Cove Development
6500 South and Wasatch Boulevard
Salt Lake City, Utah
For Envirowest

INTRODUCTION

This letter presents the results of our soils and engineering geology study of the Proposed Canyon Cove Development located at 6500 South and Wasatch Boulevard as shown on Plate 1, Vicinity Map. Our study was requested by Mr. Bill Miller of Envirowest.

PURPOSE AND SCOPE

The purposes of this study were to define and evaluate the soils, ground water, bedrock and geologic setting of the site, and to provide foundation, earthwork, and geotechnically related site development recommendations. In accomplishing these purposes, the following scope of work was performed:

1. An initial office program consisting of a detailed literature search, air photo interpretation, and outside professional contacts.

2. A general site reconnaissance.

3. The excavation, logging, and sampling of nine test pits on the site.

4. Preparation of this written report.

PROPOSED CONSTRUCTION

We understand that a residential development consisting of single-family and multi-family units will be constructed. Structures will be one to three stories in height and will incorporate full basements. Detailed information on building types and foundation loading is not available at present. However, it is projected that the loads imposed by the proposed structures will be light.

Moderate amounts of earthwork will be required at the site. However, we understand that there will be no major cuts made into the steep ridge sideslopes near the east property boundary and that no structure will be placed entirely upon the steep sideslopes. Exact data pertaining to maximum fill and cut depths and locations are not available since development plans have not been finalized.

SITE CONDITIONS

SURFACE

The site is comprised of a dissected west-facing slope at the foot of the steep mountain front. Slopes over most of the site range from 20 to 30 percent (5.0 horizontal to 1.0

vertical to 3.3 horizontal to 1.0 vertical). However, a small steep area, with slopes ranging up to approximately 67 percent (1.5 horizontal to 1.0 vertical), lies along the east-central property boundary. A gravel pit has been excavated in the southwestern corner of the property.

An intermittent stream that drains Hughes Canyon crosses the northern part of the site. There are few other well-defined drainage channels on the property.

Vegetation consists of low grasses and weeds, scattered stands of scrub oak, and sagebrush.

Surface features are shown on Plate 2, Plot Plan.

GEOLOGY

SOIL AND BEDROCK

The site is underlain principally by granular materials deposited within ancient Lake Bonneville in the southern two-thirds of the property and by granular alluvial fan deposits in the northern third of the property. The steep slopes along the east property boundary are underlain by shale and quartzite bedrock and a thin soil developed from the parent rock. Detailed descriptions of the soils encountered in the test pits excavated at the site are presented on Plates 3A and 3B, Log of Test Pits. The soils are described in accordance with the nomenclature presented on Plate 4, Unified Soil Classification System. Locations of the test pits and site geologic features are shown on Plate 2.

The steep ridge along the eastern property boundary is underlain principally by light brown quartzite of the Big Cottonwood Formation of Precambrian age. The quartzite strikes east-northeasterly and dips steeply (about 70 degrees) to the northwest.

It is moderately to highly fractured in outcrops on the ridge. Shale, also of the Big Cottonwood Formation, is exposed in the pit south of the ridge and apparently underlies the valley north of the ridge.

A relatively thin layer of surficial, weathered shale south of the ridge has crept or flowed downward on the steep slopes. The undulating topography north of the ridge was also produced by flowage-creep of weathered shale. The ridge itself, being composed of a much more resistant material (bedrock), appears little affected by past earth flow movements.

The bedrock comprising the ridge itself is mostly mantled with a thin soil cover composed of silty and clayey sand and gravel. Near the toe of the steep slope, the surficial soils thicken as a result of slope wash and perhaps soil creep. No indications of present bedrock slope instability on the ridge were noted, even along the edge of a very steep mine excavation on the north flank of the ridge.

The southern two-thirds of the property is underlain by granular soils principally of lacustrine origin. These soils range from silt to boulders and cobbles. The deposits are generally quite uniform and consist of well-rounded particles. The materials occur in distinct layers. Clayey silt deposits and fine to coarse sand deposits predominate.

The northern third of the site is underlain principally by alluvial deposits. These soils are poorly sorted and consist of angular sand, gravel, cobbles, and boulders with some silt and clay.

The natural soils exhibit high strength and low compressibility characteristics and should not be moisture sensitive with the exception of some near surface silt and fine sand strata. A moisture sensitive layer was encountered in the upper four and one-half feet of soil in Test Pit 2. Although no other apparently moisture sensitive soils were encountered in the widely spaced test pits, other such deposits probably exist. Expansive soils or bedrock were not observed.

GROUND WATER

The ground water table was not encountered in any test pits excavated at the site and probably lies at considerable depth.

ACTIVE FAULTS

The site lies along the Wasatch Fault Zone, an active fault system which extends from south of Nephi, Utah, to north of Brigham City. The fault zone often consists of several individual fault traces which are sometimes braided, or in a series of parallel faults.

Faulting in the site vicinity is complex. The faults trend northerly to northwesterly and are braided and often curvilinear. The most prominent fault scarp in the vicinity crosses the extreme southwestern corner of the property and lies a few hundred feet west of Wasatch Boulevard further northward. Several fault traces are inferred to cross the site based upon topographic expression and subtle tonal patterns observed on aerial photographs. The faults are all downthrown on the west side.

The existence of one of the faults has been verified by its exposure in a deep gravel pit a short distance south of the property. The exposed fault trends north 5 degrees east, dips 45 degrees west, and has an overall displacement of about ten feet. Near the surface, the fault splits into three individual faults all located within ten feet of each other. The fault cuts gravels believed to be of Alpine age (30,000 to 70,000 years old). It is

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believed that the fault is younger than the Bonneville Lake stage (12,000 to 25,000 years old) since the fault scarp is so well preserved. In the geologic sense, this faulting is a very recent occurrence.

Projected and defined fault locations are shown on Plates 1 and 2.

SEISMICITY

The site is located within the Intermountain Seismic Belt in an area designated as a Zone 3 seismic area. A Zone 3 area is defined* as an area where "major damage" may occur due to an earthquake.

The highly seismic character of the areas is indicated by the abundance of earthquake epicenters near the Wasatch Fault Zone in the site region. Most of these events have been detectable only with recording instruments, although several have been felt by occupants of the region. The Salt Lake City area has experienced two damaging earthquake shocks within the 120 years of record. Although no ground ruptures have been noted after any of the reported earthquakes near Salt Lake City, local faulting is geologically recent and earthquake activity is present in the faulted area. In addition, some of the present theories of earthquake tectonics would indicate that the Salt Lake City area must be considered seismically active.

The Salt Lake City area experienced three shocks of Intensity VII (Magnitude 5.5) on May 22, 1910. Another earthquake of Magnitude 5.2 occurred in 1962, centered near Magna. Solely on a historical basis, therefore, one must postulate the occurrence of another Intensity VII shock in the Salt Lake City area in the next

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*Uniform Building Code, 1976.

50 to 100 years. Table 1, Modified Mercalli Intensity Scale, relates intensity designations and earthquake effects. As a result of the limited length of recorded seismic information for the area, the geologic history of the region must also be used in any postulation of future earthquake occurrence.

As previously noted, the seismic history is short but intense and our knowledge of the geologic history of the area must be used to extend the seismic history. A shock of Magnitude 7.1 or greater probably would have been required to produce fault scarps of the magnitude exposed in the vicinity. Such an event may have occurred prior to the earliest historic record but perhaps within the last 300 years. As a general statement, an earthquake of approximate Magnitude 6 or greater is required for ground rupture.

Intensities VIII and IX have been recorded elsewhere on the Wasatch Fault Zone and in contiguous fault zones formed in the same tectonic setting. Thus, Intensity VIII earthquakes cannot be dismissed as a potential threat to the Salt Lake City area in the next 100 years.

DISCUSSIONS AND RECOMMENDATIONS

GENERAL

Supporting data upon which many of the recommendations presented herein are based have been presented in the previous sections of this report. It should be noted that extensive deep drilling and sophisticated laboratory testing were beyond the scope of this study and were not performed. Therefore, many of the analyses and projections are based upon our experience with similar soils upon which detailed testing has been performed. The discussions and recommendations related to dynamic stability and settlements resulting from dynamic loading should therefore be considered as guidelines and approximate.

FAULT AND EARTHQUAKE HAZARDS

The property is located within a seismically active area as does all of the Wasatch Front and, therefore, is subject to seismic hazards such as earth shaking and possible induced soil liquefaction, landsliding, and soil settlement. In addition, the site is crossed by fault traces of the Wasatch Fault Zone with the attendant hazard of ground rupture or shearing.

Utilizing the geologic setting of the site, the tectonic history of the region and the available seismic history, it is projected that the site could be subjected to earthquake vibrations during the projected lifetime of the proposed development structure, which would be considerably greater than that which have occurred during past historic shocks. If a large earthquake were to occur on the Wasatch Fault system, the proposed structures would be subjected to severe high frequency motion. For example, in the 1966 Parkfield, California earthquake, a Magnitude 5.5 shock generated peak acceleration levels of 50 percent of gravity for distances up to one or two miles from the fault on which the epicenter was located. A large portion of the "strong motion" acceleration levels expected from a nearby earthquake on the Wasatch Fault would be in the natural period range characteristic of low, relatively rigid type construction, such as brick and masonry. It is generally accepted that the sharp peak of acceleration which occurs close to a fault zone is not particularly critical in well-designed structures because of its short time interval of application.

For the site, we recommend that only properly seismically designed wood frame structures be considered. Brick veneer should be held to a minimum. As a minimum, the design requirements for Seismic Zone 3 as outlined in the 1976 UBC should be followed. We also recommend that no structure for human occupancy be constructed within 50 feet of an active fault. The approximate locations of the inferred active faults which pass through the site are shown on Plate 2.

LIQUEFACTION

Liquefaction of site soils would be remote due to the lack of a water table.

Because of the relatively high permeability of the site soils, we project that the chances of saturating the site soils due to normal development activities will be low. The failure of a large drain or water line or excessive leakage from ponds, could however result in saturation. If a large water line failure were to occur, immediate repairs would be essential. Ponds, if contemplated, should be lined with materials of low permeability to control leakage.

LANDSLIDES

STEEP RIDGE SLOPES

The steep ridge slopes along the east property boundary which are underlain by bedrock and mantled by a relatively thin soil cover were carefully inspected for indications of instability. We believe that the bedrock controlled ridge sideslopes are stable with respect to major mass movements under both static and seismic loading in their present condition and that the proposed structures can be feasibly constructed below the toe of the steep slope.

As previously discussed, the thin soil and weathered shale mantle over the bedrock in this area is or has creeped downward on the steep slopes. This is a normal occurrence and should not pose any danger to structures constructed below the toe of the slope. Under earthquake loading, the creep will most likely be accelerated. If major slope cuts are made into the steep ridge, or if the environment of the slope is altered, localized areas of potentially damaging instability due to soil movement and erosion may result. Additional measures such as installation of retaining walls or other support systems will be required for major cuts into the hill slope.

OFF-RIDGE DEVELOPMENT AREA

The off-ridge area of development is underlain by granular soils and has moderate slopes. In our analysis of the stability of the natural slopes and future man-made slopes, we have assumed that the slopes will consist of granular soils which are not saturated or contain extensive zones of perched saturation. The assumption of cohesionless soil is somewhat conservative for the natural soils, since the soils exhibit some cohesion and slight cementation.

Based on the above assumptions, we have calculated that the factors of safety of a one and one-half horizontal to one vertical slope under static conditions would be approximately one.

Failure, if it was to occur, would be in the form of a surface slump parallel to the exposed sideslope. This is known as an "infinite slope" type failure. Generally, the thickness of the unstable moving mass is small compared to the height of the slope. A deep seated circular failure is not likely.

The stability of a one and one-half horizontal to one vertical slope under dynamic loading associated with a moderately large earthquake, approximate Magnitude 5.5 to 6.0, would be less than one. For a two horizontal to one vertical slope, the factor of safety would be slightly in excess of one.

Based upon the above analyses we recommend that structures for human occupancy be constructed far enough back from the crest of a granular soil slope such that the foundations will lie below a line extending up from the toe of the slope at an angle of two horizontal to one vertical.

DYNAMICALLY INDUCED SETTLEMENTS

The natural granular site soils under unsaturated conditions are relatively nonsusceptible to damaging differential settlement due to earth shaking such as would occur during a seismic event. Loose soils could be susceptible to dynamically induced settlement and, therefore, all structural fill placed at the site should be adequately compacted as discussed in subsequent sections of this report.

EARTHWORK

SITE PREPARATION

All areas to be occupied by buildings, roadways, walkways, and parking areas should be stripped of all vegetation and topsoil prior to further construction. Major root systems generally extend to depths of three inches. The stripped soils will be unsuitable as structural fill but may be stockpiled for later use as general landscaping fill.

EXCAVATIONS

Ground water should not be encountered to the depths penetrated by construction at the site. Shallow temporary excavations not exceeding four feet in depth may be constructed with near vertical sideslopes. Deeper excavations not exceeding 10 feet in depth should be constructed with sideslopes no steeper than one horizontal to one vertical. Deeper excavations would require somewhat flatter slopes, or may be braced.

All excavations should be inspected on a daily basis by competent personnel. If signs of instability or excessive sloughing are noted, immediate remedial action should be initiated.

PERMANENT SLOPES

All permanent slopes, whether constructed in natural soils or compacted fill, should be no steeper than one and one-half horizontal to one vertical. It should, however, be noted that the fine textured soils at the site are readily erodible if not properly protected. It is recommended that all slopes constructed at one and one-half horizontal to one vertical be properly planted or protected with other physical means to reduce the possibility of erosion. Previously discussed setback requirements for houses near the crest of slopes should also be followed. If more rapid slope changes are required, retaining wall systems may be utilized. All retaining systems should be designed for dynamic loading.

FILL MATERIALS AND INSTALLATION

All fill materials which will be subjected to structural loads should be of a granular nature (sand and gravels). On site granular soils are suitable for this purpose. All structural fill should be placed in lifts not exceeding eight inches in loose thickness and compacted with suitable equipment to a minimum dry density of 90 percent of the maximum dry density as determined by the ASTM* D-1557 compaction criteria. The moisture content of the fill should be such that the proper and described compaction criteria can be readily achieved. Structural fill may be placed upon properly prepared natural soils or previously placed structural fill. Structural fill should not be placed upon loose non-engineered fill, moisture sensitive soil, or other unsuitable soils.

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*American Society for Testing and Materials.

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All fill which will not be subjected to structural loadings should be placed in loose lifts of 12 inches and proof rolled with a minimum of two passes with hauling and spreading equipment.

SPREAD AND CONTINUOUS WALL FOUNDATIONS

GENERAL

Proposed residential structures may be supported upon conventional spread and continuous wall foundations established upon suitable natural granular soils or structural fill. Foundations should not be placed upon loose fill, moisture sensitive soil, topsoil, or other unsuitable soils. If unsuitable soils are encountered, they should be removed and the footings placed on underlying suitable soils or replacement granular fill extending to suitable soils. Because of the variability of the limited moisture sensitive soils encountered, inspection for this condition on a lot by lot basis may be required.

DESIGN DATA

All footings which will be exposed to the full effects of frost should be established at a minimum depth of two and one-half feet below lowest adjacent grade. Protected foundations such as those within continuously heated buildings may be founded at higher elevations, although a minimum depth of embedment of one and one-half feet is recommended for confinement purposes. The floor slab thickness may be included in determining embedment depth.

Spread footings established upon natural granular soils and granular fill as recommended above may be proportioned utilizing a net bearing pressure of 2,000 pounds per square foot. The term "net bearing pressure" refers to the foundation pressures resulting from only the above grade portions of the structures. The recommended bearing pressure assumes saturated soil conditions.

We recommend that a minimum spread foundation width of 15 inches be utilized.

INSTALLATION

If the natural or fill soils upon which the footings will be installed become loose they should be recompacted prior to footing installation. No rubbish or other decomposable material should be incorporated into the foundations.

To insure proper distribution of footing loads into supporting structural fill, the minimum width of fill should be equal to the footing plus one foot for each foot of structural fill below the footing.

SETTLEMENT

Foundations designed and installed in accordance with the above recommendations and supporting those static loads typical for residential structures should experience maximum settlements on the order of one-eighth to one-quarter of an inch. These settlements will occur very rapidly with approximately 90 percent of the settlement occurring during construction.

The amount of total settlement which the natural granular and structural fill soils would experience under severe dynamic loadings is a difficult problem to analyze. Settlement in the range of one inch could occur. However, for the limited area occupied by individual structures, differential settlements would be estimated to be on the order of one-half inch.

FLOOR SLABS

Lightly loaded floor slabs may be established upon undisturbed properly prepared natural soils, or structural fill. It is recommended that in all cases the slabs be underlain by four inches of free-draining granular fill in order to facilitate construction and provide a moisture barrier.

Settlements of lightly loaded (static conditions) floor slabs established in this manner will be negligible. However, we recommend that the floor slabs not be structurally tied to the footings.

ADDITIONAL STUDIES

We recommend that additional test pit excavation and trenching be done to verify the existence of and better define the locations of active faults on the property. Because of the steep slopes along the areas to be trenched, it will be necessary to build crude roads for the trenching operations. The work plan should be coordinated with site development plans in order to minimize damage to the natural environment.

We also recommend site inspections of representative foundation excavating and earthwork operations in order to verify subsurface conditions.

oOo

We appreciate the opportunity of performing this service for you. If you have any questions regarding this report or require additional information, please contact us.

Respectfully submitted,

DAMES & MOORE

William J. Gordon
Associate
Professional Engineer No. 3457
State of Utah

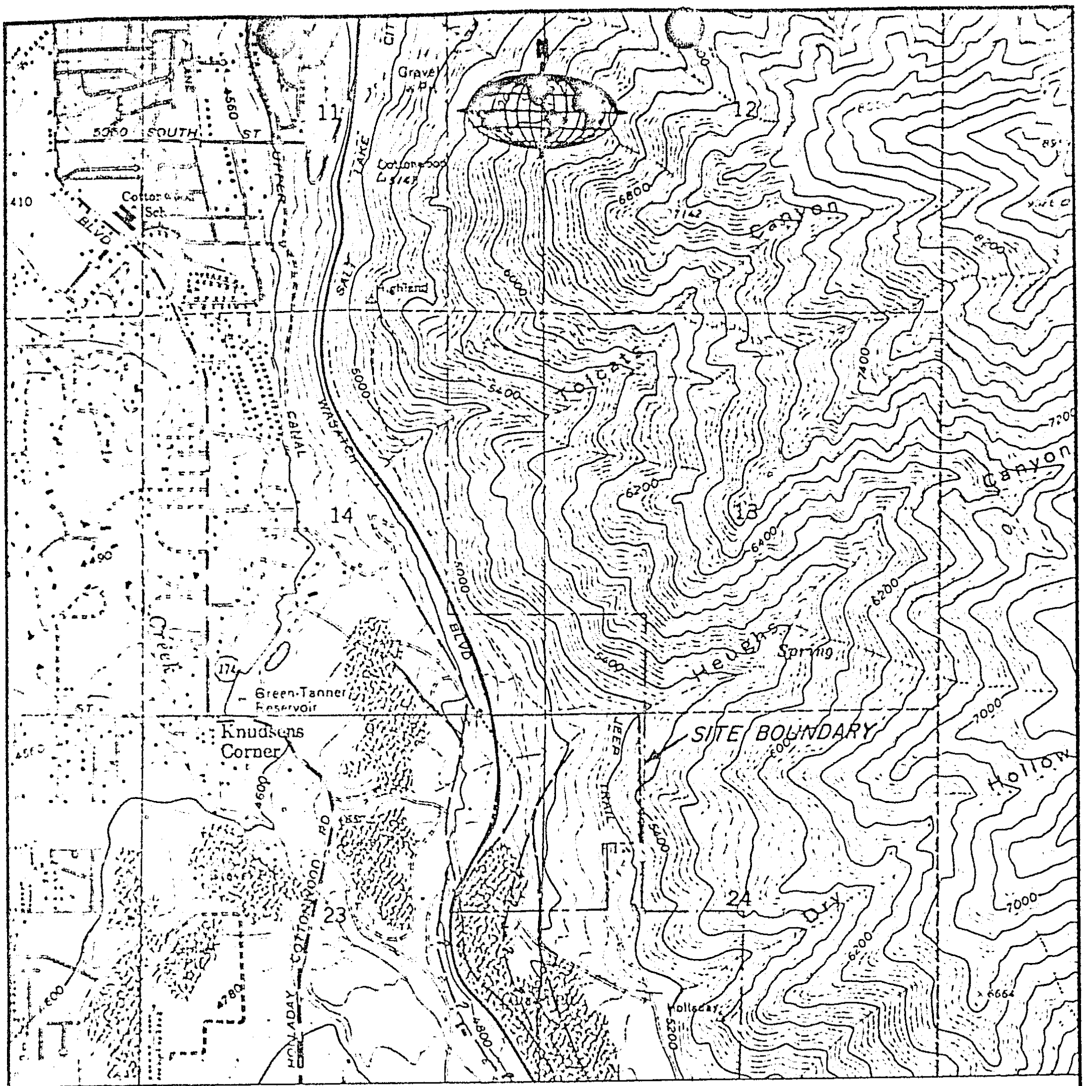
George W. Condrat
Engineering Geologist

WJG/GWC/nb

cc: Mr. Jim Schuchert

Attachments:

Plate 1	- Vicinity Map
Plate 2	- Plot Plan
Plates 3A and 3B	- Log of Test Pits
Plate 4	- Unified Soil Classification System



KEY:

——— ——— ———...... ACTIVE FAULT, DASHED WHERE INFERRED, DOTTED WHERE CONCEALED

REFERENCE:

U.S.G.S. MAP TITLED, "SUGAR HOUSE, UTAH – 1963".

VICINITY MAP

SCALE IN FEET

0 2000 4000

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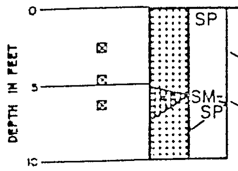
PLATE 1

BY H.B.T. DATE 5-18-77
CHECKED BY GWK
FILE 06658-004 ENVIROWEST
REVISIONS
BY ____ DATE ____

BOOK 4777 PAGE 1274

TEST PIT 1

ELEVATION 4845 FEET



BROWN FINE SAND WITH SOME SILTY FINE AND COARSE GRAVEL – MEDIUM DENSE

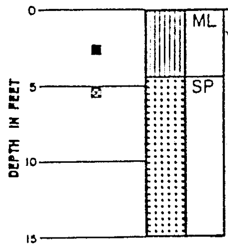
GRADES TO FINE TO MEDIUM SAND WITH SOME FINE AND COARSE GRAVEL WITH OCCASIONAL BOULDER AND COBBLE – DENSE

BROWN SILTY FINE SAND – MEDIUM DENSE (OCCURS IN OCCASIONAL LENSES)

TEST PIT COMPLETED 4-28-77
GROUND WATER WAS NOT ENCOUNTERED

TEST PIT 2

ELEVATION 4920 FEET



DARK BROWN CLAYEY SILT WITH SOME SAND AND OCCASIONAL GRAVEL – MEDIUM DENSE – MAJOR ROOTS TO 3"

GRADES LIGHT BROWN (SLIGHTLY POROUS TEXTURE)

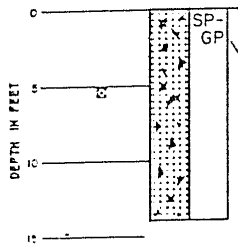
BROWN MEDIUM TO COARSE SAND WITH OCCASIONAL FINE AND COARSE GRAVEL – MEDIUM DENSE

GRADES WITH SOME GRAVEL

TEST PIT COMPLETED 4-28-77
GROUND WATER WAS NOT ENCOUNTERED

TEST PIT 3

ELEVATION 4870 FEET



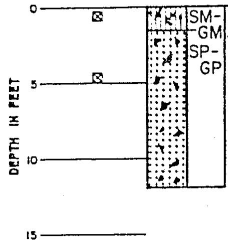
DARK BROWN FINE TO COARSE SAND AND GRAVEL WITH SOME SILT, CLAY, COBBLES AND BOULDERS (TO 3' DIA.) – DENSE – MAJOR ROOTS TO 3"

GRADES BROWN

TEST PIT COMPLETED 4-28-77
GROUND WATER WAS NOT ENCOUNTERED

TEST PIT 4

ELEVATION 5015 FEET



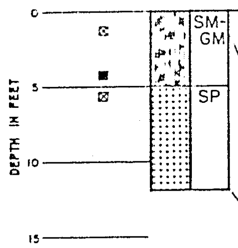
DARK BROWN VERY SILTY AND CLAYEY FINE TO COARSE SAND AND GRAVEL WITH SOME COBBLES AND BOULDERS – MEDIUM DENSE – MAJOR ROOTS TO 3"

BROWN FINE TO COARSE SAND AND GRAVEL WITH NUMEROUS COBBLES AND BOULDERS (TO 3' DIA.) – DENSE

TEST PIT COMPLETED 4-28-77
GROUND WATER WAS NOT ENCOUNTERED

TEST PIT 5

ELEVATION 5100 FEET



DARK BROWN VERY SILTY AND CLAYEY FINE TO COARSE SAND AND GRAVEL WITH OCCASIONAL COBBLES AND BOULDERS – DENSE – MAJOR ROOTS TO 3"

GRADES BROWN

BROWN MEDIUM TO COARSE SAND WITH SOME GRAVEL – MEDIUM DENSE

GRADES TO FINE TO COARSE SAND AND GRAVEL WITH SOME COBBLES AND BOULDERS (TO 2' DIA.) – DENSE

TEST PIT COMPLETED 4-29-77
GROUND WATER WAS NOT ENCOUNTERED

KEY

■ DEPTH AT WHICH UNDISTURBED SAMPLE WAS EXTRACTED

⊠ DEPTH AT WHICH DISTURBED SAMPLE WAS EXTRACTED

NOTES

THE DISCUSSION IN THE TEXT UNDER THE SECTION TITLED, " SITE CONDITIONS", IS NECESSARY TO A PROPER UNDERSTANDING OF THE NATURE OF THE SUBSURFACE MATERIALS.

LOG OF TEST PITS

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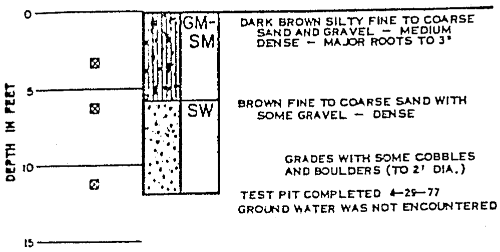
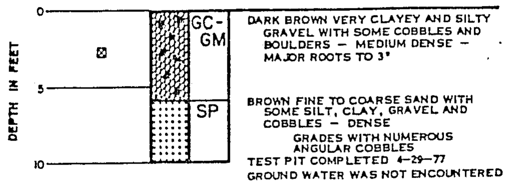
TEST PIT 6

ELEVATION 5190 FEET



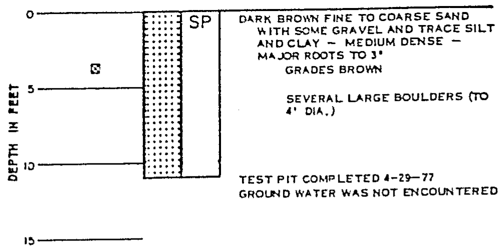
TEST PIT 7

ELEVATION 5180 FEET



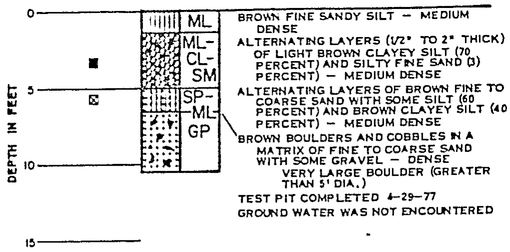
TEST PIT 8

ELEVATION 5145 FEET



TEST PIT 9

ELEVATION 5060 FEET



BOOK 4777 PAGE 1276

LOG OF TEST PITS

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PLATE 3B

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

SOIL CLASSIFICATION CHART

UNIFIED SOIL CLASSIFICATION SYSTEM

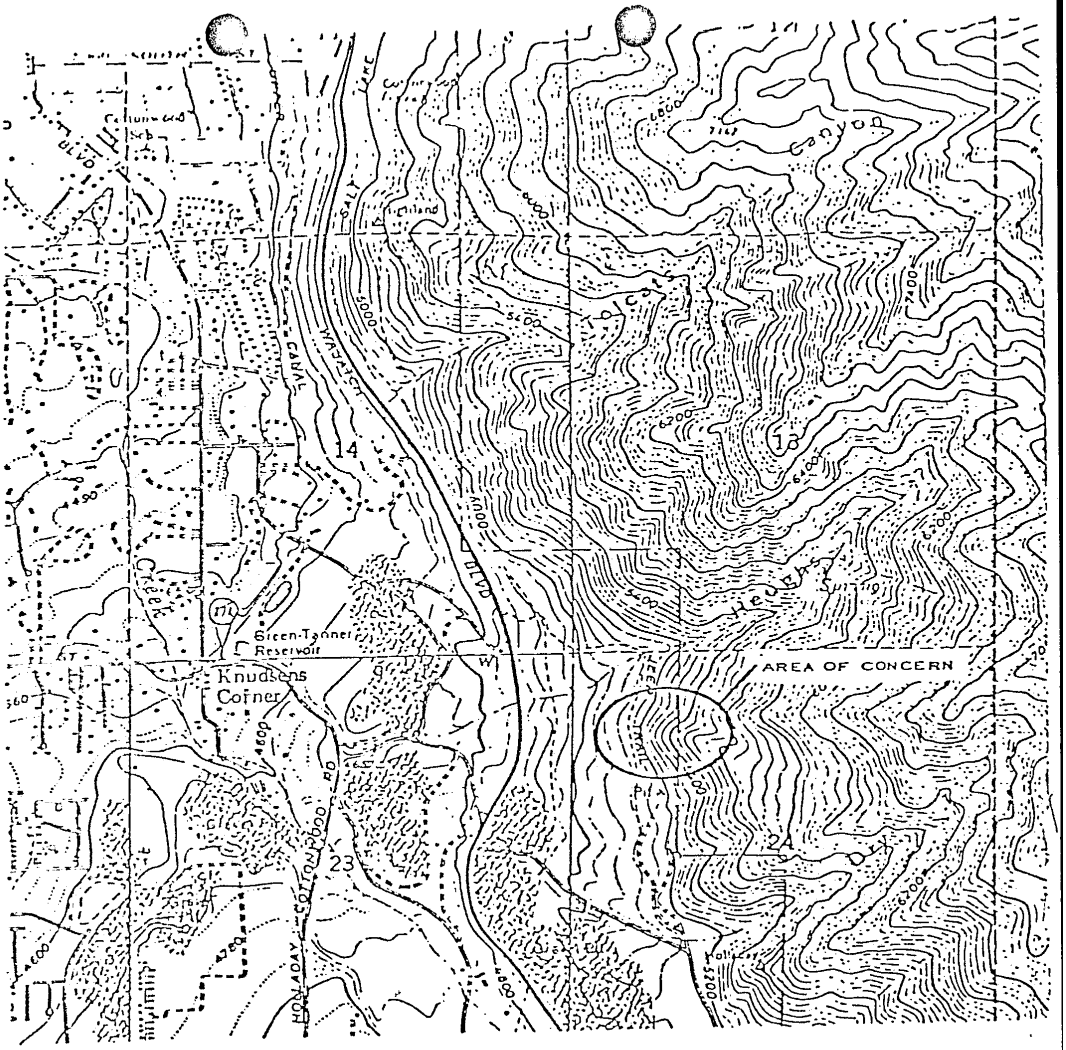
DAMES & MOORE

PLATE 4

REVISIONS BY ______ DATE ______

FILE ______

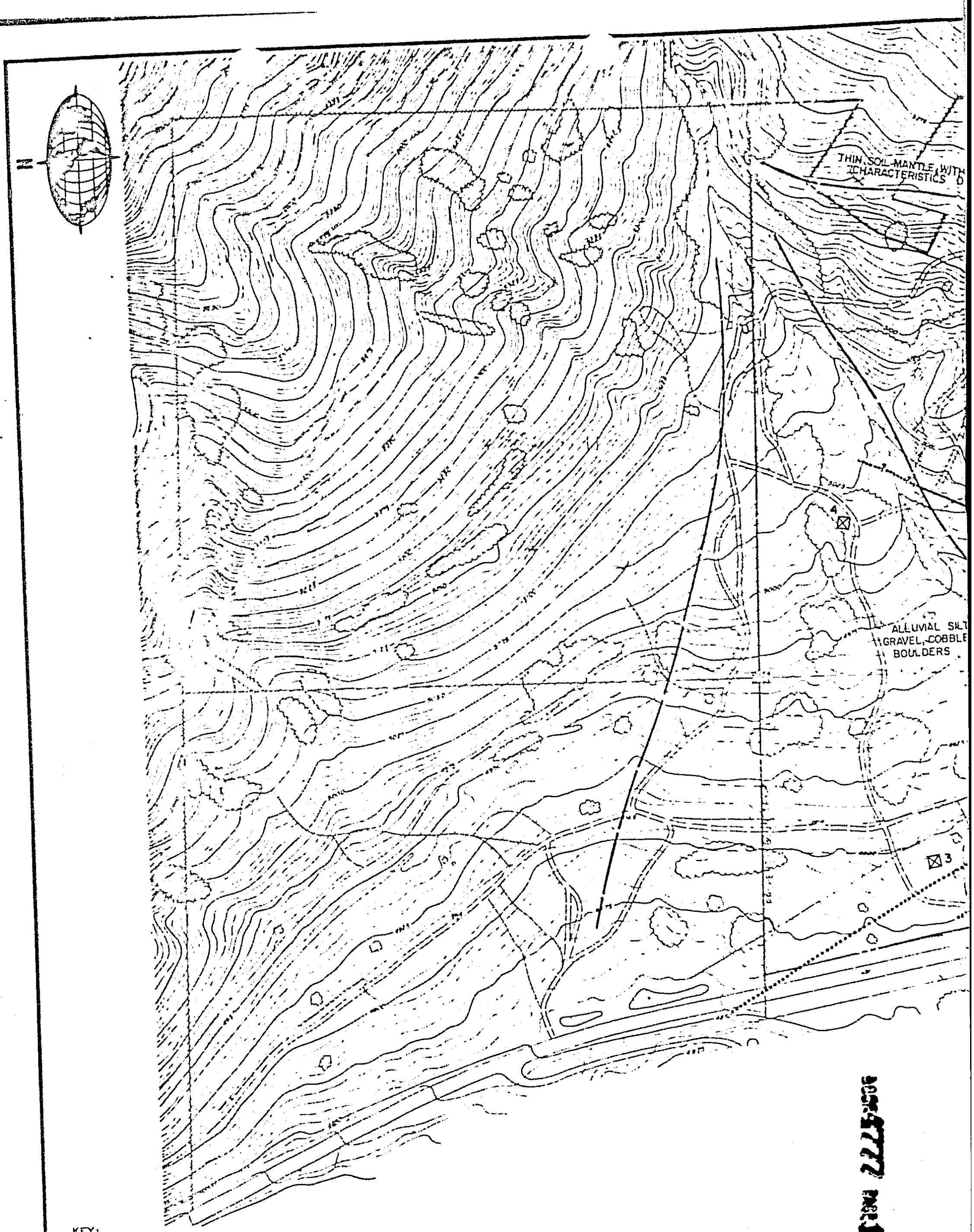
BY ______ DATE ______
CHECKED BY ______



VICINITY MAP

DAMES & MOO

PLATE 1



KEY:

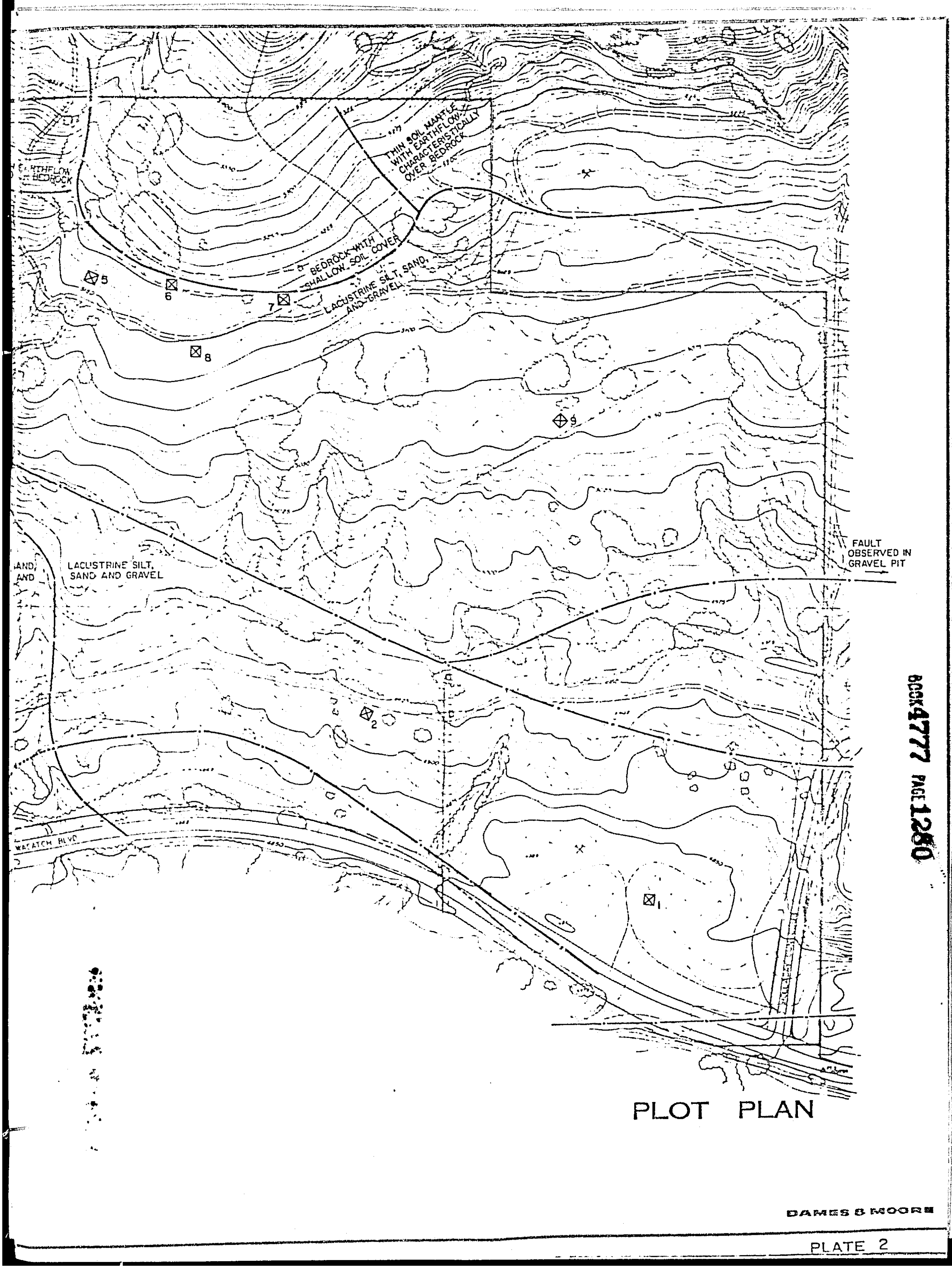
- CONTACT
- FAULT WHERE INFERRED
- FAULT WHERE CONCEALED
- ?.....?.. FAULT WHERE QUERIED
- ⊠ TEST PIT LOCATION

REFERENCE:
PRINT ENTITLED, "TOPOGRAPHIC PLAT, PORTIONS OF SECTIONS 13, 14, 23 & 24, T.2S., R.1E., S.L.B.&M.", BY COON, KING & KNOWLTON, DATED 7-26-73.

SCALE IN FEET
100 50 0 100 200 300 400 500

REVISIONS
BY____ DATE____
BY____ DATE____
PLATE____ OF____

FILE CGS-88-004
ENVIROCREST
BY H.J.T. DATE 5-20-88
CHECKED BY GWC DATE 5-25-88



BOOK 4777 PAGE 1280

PLOT PLAN

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PLATE 2

October 9, 1978

Envirowest
450 South 900 East
Salt Lake City, Utah 84102

Attention: Mr. Jim Snaar

Gentlemen:

Supplemental Discussions
Active Faults
Proposed Canyon Cove Development
6500 South and Wasatch Blvd.
Salt Lake City, Utah
For Envirowest

INTRODUCTION

This letter presents supplemental discussions pertaining to the active faults which pass through the referenced site. These supplemental discussions were requested by Mr. Jim Snaar of Envirowest after certain questions were raised by Salt Lake County officials pertaining to the accuracy of the projected fault locations. This letter supplements our report of June 23, 1977* and should be attached thereto.

BACKGROUND

On Plates 1 and 2 of our June 23, 1977 report the locations of a number of active faults passing through the subject site have been inferred. The inferred fault locations are based

*Soils and Engineering Geology Study, Proposed Canyon Cove Development, 6500 South and Wasatch Blvd., Salt Lake City, Utah, For Envirowest.

upon 1) our previous detailed examination of all available printed geologic literature pertaining to the area, 2) a detailed review of two sets of aerial photographs of the site, 3) verbal discussions with scientists familiar with the faulting in the site area, 4) a detailed site reconnaissance, plus 5) two positively identified active faults in the gravel pits to the immediate south. (The identified faults are continuations of the inferred faults through the site.) In all cases it is our opinion that the locations as presented on Plates 1 and 2 are within 50 feet of the actual fault traces.

DISCUSSIONS AND RECOMMENDATIONS

ACTIVE FAULTS

Based upon the available data, it is our opinion that the faults as referenced on Plates 1 and 2 of our June 23, 1977 report are "active". It is our recommendation that, with the present disclosure laws pertaining to residential property, proposed human occupancy residential structures not be constructed over known active faults. Since the locations of the fault, as presented in our June 23, 1977 report, are based upon parameters such as lineations on aerial photos, subtle topographic expressions, etc., and not upon actual trenching identification, we recommend that the residential structures be constructed no closer than 50 feet to the present fault traces. When and if the actual site specific locations of the active fault traces can be identified, then our original recommendations for a 50-foot offset would be dropped provided that the proposed human occupancy structures not be constructed over the field verified active fault locations.

BOOK 4777 PAGE 1282

ADDITIONAL STUDIES

The most positive means of defining the actual locations of the fault traces is through the excavation of a number of exploratory trenches. These trenches may either be excavated prior to final site development, or may be incorporated as part of development, such as detailed observations of sewer and waterline excavations. We have utilized this procedure very successfully for a subdivision located just east of Wasatch Blvd. at approximately 8500 South. At the 8500 South site the actual fault traces were easily identified in the trenches and were subsequently accurately surveyed and presented on the legal Plat for the subdivision. Once the fault was identified, the 50-foot offset requirement for human occupancy structures was waived with the stipulation that the structures will not be constructed over the active faults.

oOo

We hope that this supplemental letter clarifies the initial intent of the recommendations and data presented in our June 23, 1977 report. If you have any questions regarding the discussions or recommendations presented herein, or have any additional questions pertaining to additional studies, please contact us.

Yours very truly,

DAMES & MOORE

William J. Gordon
Associate
Professional Engineer No. 3457
State of Utah

WJG/ph

cc: Mr. Ralph McClure