Table of Contents

File 1976-0065

Date 5/8/00 Project Name: GSA Building - TechDol Sol

Present	Scanned	
		A few items are denoted with an asterisk (*), which means they are to be scanned for permanent record on the ISYS retrieval system. In some instances, not all entries designated to be scanned are present in the file. There are also documents specific to certain files, not found on the standard list. For this reason, a checklist has been included. **Remaining items, (not selected for scanning), will be marked present on the checklist. This index can serve as a quick guide for the contents of each file.** **Files denoted with (**) are to be located using the ISYS Query System. Planning Clearance will need to be typed in full, as well as other entries such as Ordinances, Resolutions, Board of Appeals, and etc.**
X	X	***Summary Sheet – Table of Contents**
		Application form
		Receipts for fees paid for anything
		***Submittal checklist**
		***General project report**
		Reduced copy of final plans or drawings
		Reduction of assessor's map
		Evidence of title, deeds
		***Mailing list**
		Public notice cards
		Record of certified mail
		Legal description
		Appraisal of raw land
		Reduction of any maps – final copy
		***Final reports for drainage and soils (geotechnical reports)**
		Other bound or nonbound reports
		Traffic studies
		Individual review comments from agencies
		***Consolidated review comments list**
		***Petitioner's response to comments**
		***Staff Reports**
		***Planning Commission staff report and exhibits**
		***City Council staff report and exhibits**
		***Summary sheet of final conditions**
		***Letters and correspondence dated after the date of final approval (pertaining to change in conditions or expiration date)**

DOCUMENTS SPECIFIC TO THIS DEVELOPMENT FILE:

X	X	Follow-Up Form			
X		Review Sheets			
X	X	Drainage Report			
X	X	Soil and Foundation Investigation			
X	x	Site Plan			
X		Floor Plan			
X		North Elevation, South Elevation, Cross Section			
X		Foundation Plan			
X		Landscape Plan			

Subdivision Development in H.O. – G.S.A. Bldg

Date 9-10-76 Item # 65-76

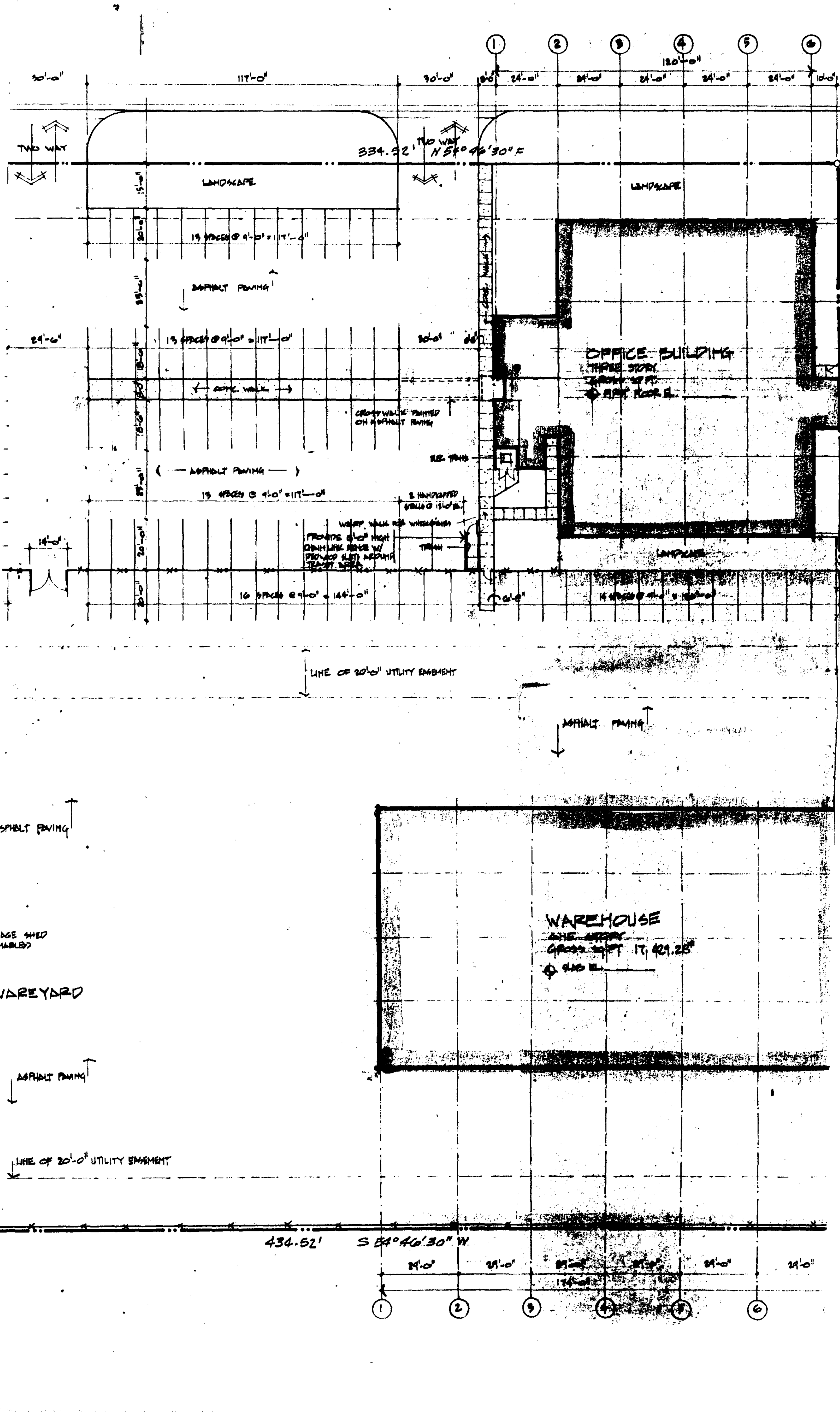
Petitioner LEA Company

Preliminary Review Agencies Comments	Final Review Agencies Comments
PARKS & REC – RECOMMEND the elimination of cottonwoods & chgs in planting distances	
ENG – DRAINAGE should be TOWARDS HORIZON DR. Get Power of Atty for improvements on Horizon Dr.	
FIRE Dept. – recommends 1 hydrant at each parking lot entrance (NOT less than 6" pipe.)	

Action Taken	Action Taken
P.C. Approved 29 Sept. 1976	P.C.
C.C. APPROVED 6 Oct 1976	C.C.
Comments	Comments
Subject To 15' building setback on EAST w. LANDSCAPING + Eng. & Parks requirements.	
Power of Atty for imp. along Horizon	

ITEMS REQUIRED FROM DEVELOPER

___ Check	___ Utility Agreement	___ Title Investigation	
___ Drainage	___ Landscaping	___ Covenants	
___ Improvements	Guarantee	___ Annexation	___ Other (Specify)



TWO WAY
334.52' N 54° 46' 30" E
LANDSCAPE
13 SPACES @ 9'-0" = 117'-0"
ASPHALT PAVING
OFFICE BUILDING
THREE STORY
CROSSWALK PAINTED ON ASPHALT PAVING
2 HANDICAPPED STALLS @ 13'-0"
TRASH
16 SPACES @ 9'-0" = 144'-0"
LINE OF 20'-0" UTILITY EASEMENT
WAREHOUSE
ONE STORY
GROSS SQ FT 17,424.28
SLAB EL.
WAREYARD
434.52' S 54° 46' 30" W

DRAINAGE REPORT

TECH - DEL - SOL

REPLAT OF THE GRAND JUNCTION

TECHNOLOGICAL CENTER SUBDIVISION

JAMES F. SQUIRRELL & ASSOCIATES

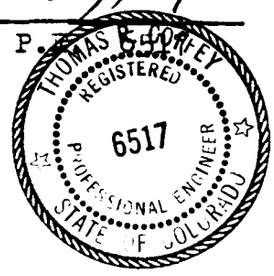
January 16, 1975

PREPARED BY:

THOMAS R. COFFEY P.E.
2784 CHEYENNE DRIVE
GRAND JUNCTION, COLORADO 81501

Thomas R. Coffey

Thomas R. Coffey P.E. 6517



STORM DRAINAGE STUDY

TECH DEL SOL

OF

GRAND JUNCTION TECHNOLOGICAL CENTER SUBDIVISION

PURPOSE

To Determine:

(1) The drainage basin acreage area that will bypass outside and along the boundaries of the Tech Del Sol Subdivision.

(2) The drainage area within the internal boundary of the Tech Del Sol Subdivision.

(3) The Hydraulic load to be handled by (1) and (2). This load generated by storm rainfall.

(4) The snow melt load to be handled by (1) and (2).

DESCRIPTION

The Tech Del Sol Subdivision lies within the lower 1/3 area of the drainage basin. The basin begins at the entrance to Walker Field Airport and extends south to the U. S. Government Highline Irrigation canal. The number of surface acres within the drainage basin is approximately 31.7 acres. (i.e. this is the area affecting Tech Del Sol) The effective drainage length to the north boundary property line of Tech Del Sol is 2200 feet. The average slope is 0.02 ft/ft. (See Fig 1 Drainage Basin Boundary).

The 12" CMP culvert located at the Walker Field Airport entrance drains the passenger loading zone and the parking lot areas. Although this size of culvert (12") could carry as much as 4.0 CFS of runoff, the actual hydraulic load generated by the parking area during the record rainfall of 82 years which occured on Thursday, July 18, 1974 during this period 1.38" fell in 55 minutes, the flow was estimated to be 1.2 CFS. (Actual observed flow).

The 12" CMP culvert crossing Horizon Drive highway near the Tech Del Sol driveway entrance is non-operational at this time. The drainage embankment has been altered to force the flow in a south westerly direction following approximently the fence line on the north side of Horizon Drive. The drainage acreage area is approximently 5 acres. The estimated flow the 12" culvert would have carried, based on July 18, 1974 storm, was 0.8 CFS.

SOIL SCIENCE

The ground soil crossection classification and subsoil consists of 3 to 25 feet of silky clay overlying claystone-siltstone bedrock. The upper silty clays are calcareous with low plasticity with an average moisture content of 4.8 to 5.6%.

The natural upper soils are sensitive to moisture change. These soils are highly water absorbant.

In observing storm run off over a period of 3 years (1971 thru 1974), storm duration and magnitude has never caused the storm run off to traverse further than the section marked "X"---"X" on Fig 1. All run off had been absorbed by the soil.

The only way flow can reach the north boundary of Tech Del Sol is to have a series of storms occuring within an 18 hour period. This type of storm frequency would saturate the drainage basin to an extent that flow would eventually reach the south property line of the subdivision.

STORMS

The type of storm generated along the Bookcliff area is one of two forms:

(a) Thermal convection i.e., moisture laden rising air currents condense at dew point temperature. Heat is required for this thermal engine to function. Early to late afternoon thunder storms are generated. These storms are usually high rain fall intensity, short duration.

(b) Frontal/cycloric i.e., contact interfacing with two different air masses. This type of storm usually results in low to moderate rainfall intensity and a duration of 4 to 6 hours.

ANALYSIS

The storm which caused the greatest concern is type (a). (Thermal convection).

Type (b) rarely occurs within the valley, therefore contributes little to the analysis.

In the normal analysis of a drainage problem, investigation usually covers:

(a) 25 year 24 Hour Precipitation

(b) 50 year 24 Hour Precipitation

(c) 100 year 24 Hour Precipitation

HISTOGRAM of the 82 year record storm

On Thursday, July 18, 1974 at 5:18 P.M., 1.38 inches of rain fell in 55 minutes, establishing a new record for 82 years.

The design configuration for drainage structures will be examined on this record breaking rainfall.

There had been two previous storms within the past 18 hours. The last storm the weather bureau considered as "monderate" with a duration of 30 - 40 minutes. This storm ended 1:00 A.M. in the early morning of July 18, 1974.

CRONOLOGICAL STORM EVENT (Late afternoon of July 18)

Storm begans	5:12 P.M.	
		"Moderate"
	5:18 P.M.	
	5:18 P.M.	
		"Heavy"
	5:45 P.M.	
	5:45 P.M.	
		"Moderate"
	5:52 P.M.	
	5:52 P.M.	
		Generally "less than moderate"
Storm ended	8:07 P.M.	

All of the ingrediants were present to fulfill the requirements of page 3, i.e. 18 hours storm (s) and saturation of soil plus a "Heavy" storm.

Comparison of a unit Hydrograph, Isopluvial, and Rational Analysis Method will be analyzed in the "conclusion" section of this report.

The isopluvial data compiled by the Special Studies Branch of Hydrology, Weather Bureau Environmental Science Services Administration, U. S. Department of Commerce. A synopsis of the isopluvial data plots will be used in this report.

HYDROGRAPH PLOT

Unit Hydrographs were constructed based on this storm data. (See enclosure)

For the 31.7 acre drainage:

(1) Maximum Probable Flood From Thunderstorm Rainfall (31.7 AC)

(2) Maximum Porbable Flood From General Rainfall (31.7 AC)

For 10.7 acre (Subdivision drainage)

(3) Maximum Probable Flood From Thunderstorm Rainfall (10.7 AC)

(4) Maximum Probable Flood From General Rainfall (10.7 AC)

The CN factor used for the 31.7 acre = 85 (highly saturated), and for the 10.7 acres = 95 (based on the parking area paved and the entire building area roof covered).

SNOW MELT DRAINAGE LOAD

Winter generated snow depth within the drainage basin and subdivision will vary from 8" to 12", seldom exceeds 14". The average water content of the snow is approximently 4%.

The hydraulic load depends upon the rate of melting during the spring thaw. The maximum thaw rate occurred during the month of February 28, 1974 with an average of 4" of snow, the temperature 51° F the snow melted generated 2 CFS of runoff from the 31.7 acres, 0.5 CFS from the subdivision. This melting occurred within 3 hours.

CONCLUSIONS

The unit hydrograph record establishes the maximum probable flood drainage load. This procedure is the most reliable method know to date.

The Isopluvial Data Plot establishes rate of runoff from equal rate parameters.

The Rational Analysis Method establishes probable flood loads based on distribution of exceptional rainfall throughout the United States, published by the U. S. Weather Bureau.

SUMMARY

FLOW CUBIC FT. PER SECOND (CFS)

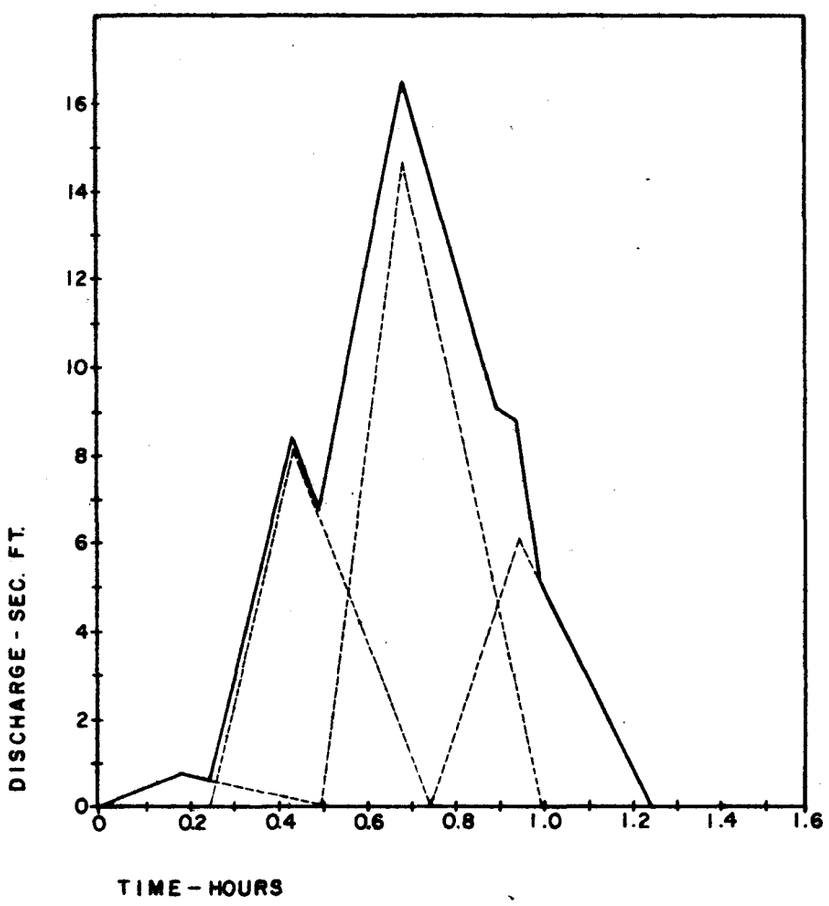
	HYDROGRAPH July 18, 1974	ISOPLUVIAL 100 yr freq.	RATIONAL 100 yr freq.
Thunder Storm (31.7 AC)	22	7.5	6.
General Storm (31.7 AC)	14	6.1	5.
Thunder Storm (10.7 AC) Subdiv.	16	3.1	2.
General Storm (10.7 AC) Subdiv.	7	2.0	1.

The selection of the actual hydraulic structure, (A) Fig 2 will be governed by consent of the County Commissioners and the County Road Dept.

The selection of the structure (B) Fig 2 will depend on the building placement and the terracing of the area where the structure rests. The structure could be CMP or of a concrete cast form.

MAXIMUM PROBABLE FLOOD FROM THUNDERSTORM RAINFALL (10.7 AC.)

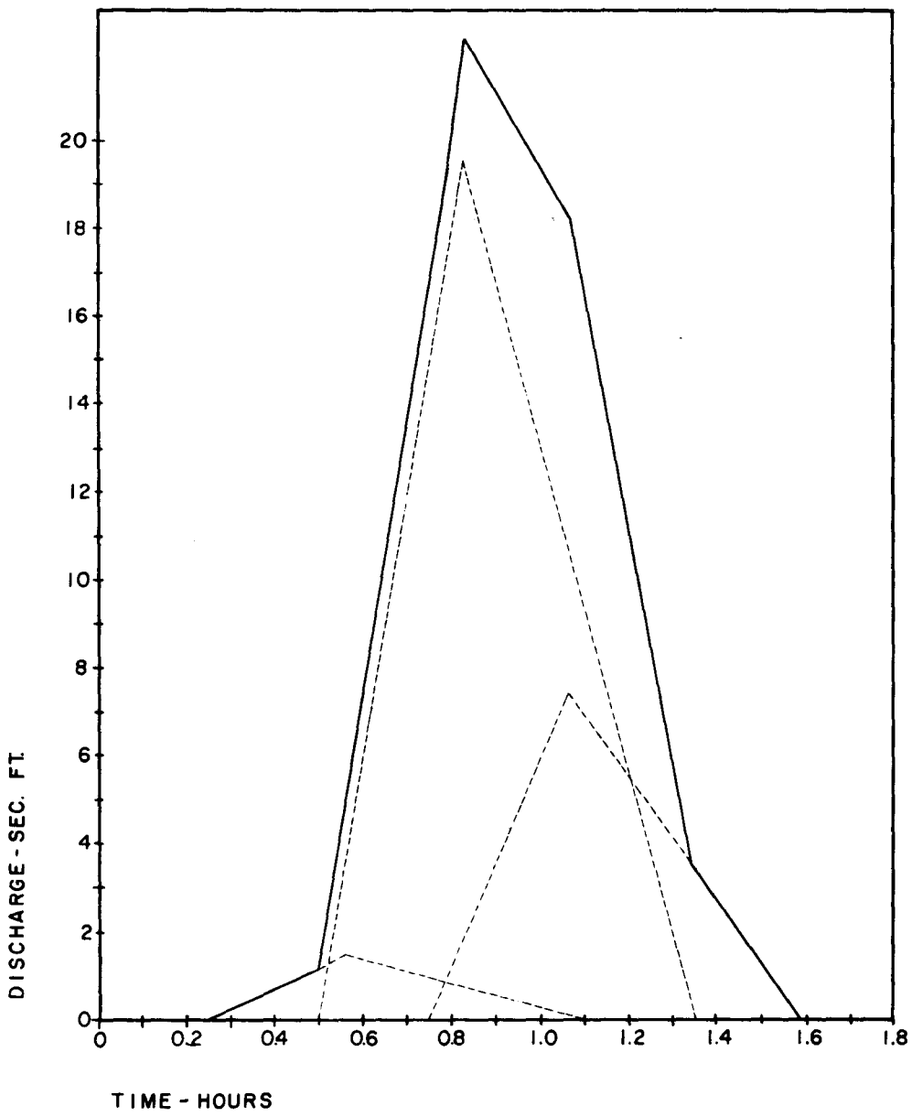
CN 95
Tc = 0.11 HR.



HYDROGRAPHS COMPUTED BY HYDROMETEOROLOGICAL METHOD.

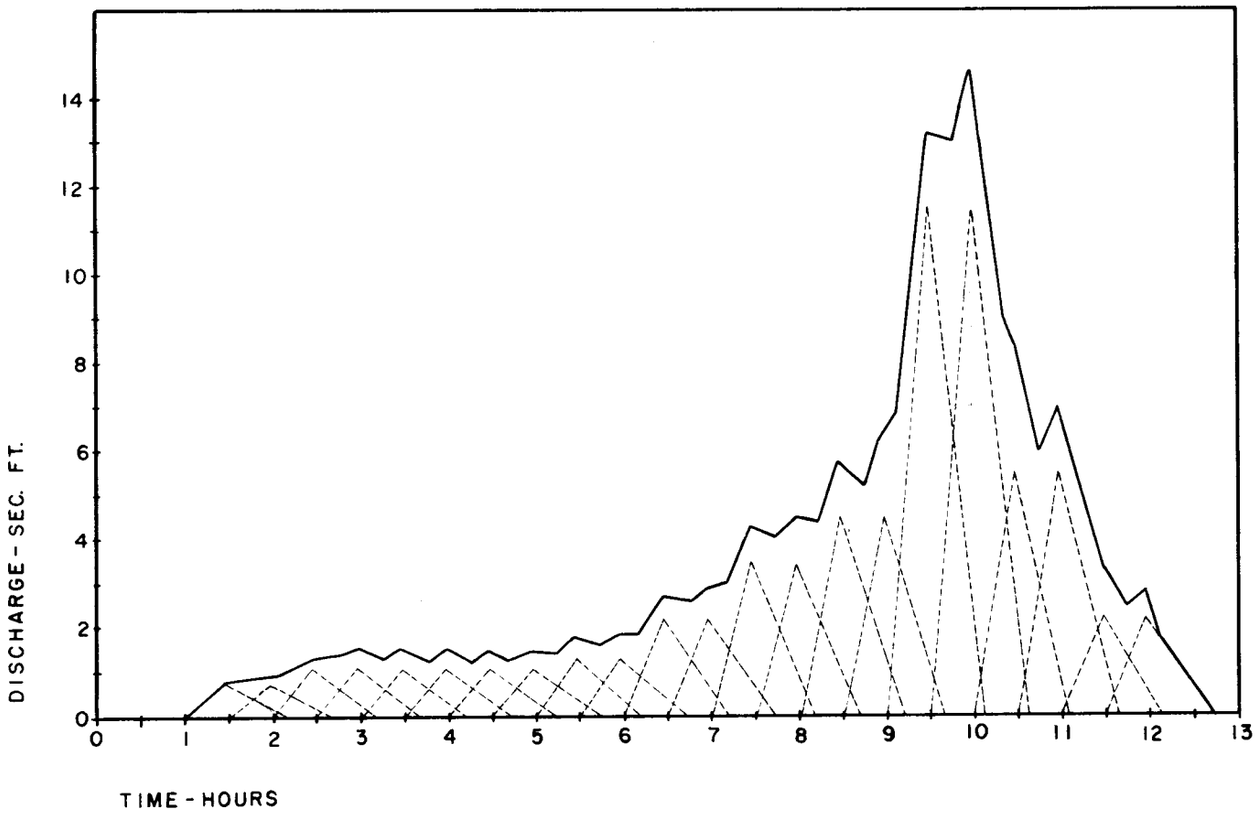
MAXIMUM PROBABLE FLOOD FROM THUNDERSTORM RAINFALL (31.7 AC.)

CN 85
Tc = 0.32 HR.



MAXIMUM PROBABLE FLOOD FROM GENERAL RAINFALL (31.7 AC.)

CN 85 (CONVERTED TO 94)
Tc = 0.32 HR.



chen and associates, inc.
CONSULTING ENGINEERS

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1924 EAST FIRST • CASPER, WYOMING 82601 • 307/234-2126

SOIL AND FOUNDATION INVESTIGATION
PROPOSED DESIGN CENTRE, LTD. OFFICE COMPLEX
TECHNOLOGY OF THE SUN SUBDIVISION
GRAND JUNCTION, COLORADO

Prepared for:
JAMES F. SQUIRRELL & ASSOCIATES
Post Office Box 2112
Grand Junction, Colorado

Job No. 8913

November 24, 1972

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CONCLUSIONS

The proposed buildings should be founded with piers drilled into bedrock with design pressures and foundation alternative given as discussed.

SCOPE

This report covers a soil and foundation investigation for the proposed Design Centre, Ltd. office complex to be located in the Technology of the Sun Subdivision on Horizon Drive, Grand Junction, Colorado. The report presents the most desirable and safe type foundations, allowable soil pressures, water table conditions, and design and construction details.

SITE CONDITIONS

The site is at present vacant. An existing brick building and a pond are located to the west of the proposed building. The ground surface is high at the northeast side sloping toward the southeast with a maximum difference in elevation across the site of about 20 feet. A considerable amount of fill was found at various places at the site. The thickness of the fill varies from 1 to 5 feet. The site has been graded. The fill was placed during the grading of the site.

SUBSOIL CONDITIONS

Subsoil conditions at the site are erratic. Generally, they consist of 3 to about 25 feet of silty clays overlying claystone-siltstone bedrock. The upper silty clays are calcareous with low plasticity. Such material in its natural state has high unconfined compressive strength and high resistance to penetration. However, upon wetting the material will collapse and settle

excessively. The swell-consolidation characteristics of the upper soils are shown on the attached figures. The lower bedrock consists mainly of claystone and siltstone. Some of the material possesses a low swell potential.

No free water was found in the test holes at the time of our investigation.

BUILDING FOUNDATIONS

We understand that the proposed office building will be two stories high with no basement. It is planned to construct 5 to 6 buildings at the site.

Since the upper soils are erratic in characteristics, we believe the most desirable and safe type foundation for the proposed buildings is straight-shaft piers drilled into bedrock. The following design and construction details should be observed:

(1) Piers should be designed for a maximum end pressure of 40,000 psf and a skin friction of 4,000 psf for the portion of pier in bedrock.

(2) Piers should also be designed for a minimum dead load pressure of 10,000 psf based on pier end area only.

(3) All piers should penetrate at least 4 feet into the hard bedrock (darkened portion of Logs of Exploratory Holes).

(4) A minimum 4 inch air space should be provided beneath all grade beams to concentrate the pier load.

(5) All piers should be reinforced for their full length with at least two #5 bars.

(6) All piers should be properly cleaned and dewatered, if necessary, before pouring concrete.

SPREAD FOOTING FOUNDATION ALTERNATIVE

A satisfactory foundation alternative is spread footings placed on the upper natural soils. The following design and construction details should be observed:

(1) All footings should be placed on the natural soils below the existing fill material. The depth of the existing fill material reached as much as 5 feet. In order to reach the lower natural soils, deep foundation walls will be required.

(2) Footings placed on the upper natural soils should be designed for a maximum soil pressure of 2,000 psf. Under this pressure, even under excessive wetting conditions, the amount of settlement will be within tolerable limits for this type of construction.

(3) Continuous foundation walls must be heavily reinforced top and bottom to span an unsupported length of at least 12 feet. We recommend that at least two #6 bars top and bottom will be required.

(4) Local soft pockets or undesirable soils found immediately beneath the footings should be removed and the footings extended to the lower firm soils. It is advisable that a soil engineer inspect the open excavation before pouring the foundation concrete.

(5) All exterior footings should be placed below frost depth.

INTERIOR FLOOR SLABS

Part of the interior floor slab will be placed on existing fill material and part will be placed on the natural soils. Both the existing fill material and the natural soils do not possess swell potential and should be adequate to support the floor load. To prevent slight differential slab movement,

all slabs should be separated from bearing walls and reinforced. A minimum 4 inch gravel layer should be placed beneath the slab to distribute the floor load.

SURFACE DRAINAGE

The natural upper soils are very sensitive to moisture change. The material will collapse upon wetting. Consequently, every effort should be made to prevent the foundation soils from becoming excessively wetted. The following precautions should be observed:

(1) Backfill around the buildings must be well compacted to prevent surface water from seeping through the backfill into the foundation soils. We recommend that the backfill material be compacted to at least 90% Proctor density at optimum moisture content.

(2) The ground surface around the exterior of the buildings must be well sloped so that surface water will drain away from the buildings.

(3) All roof downspouts and drains should discharge well beyond the limits of all backfill.

(4) Excessive wetting of the foundation soils must be avoided. Excavations should not be left open for a long period of time. If the foundation excavation is saturated by heavy rainfall, foundation concrete should not be poured until the material is sufficiently dried out and approval has been obtained from a soil engineer.

(5) Lawn sprinkling systems should be controlled to avoid excessive irrigation.

MISCELLANEOUS

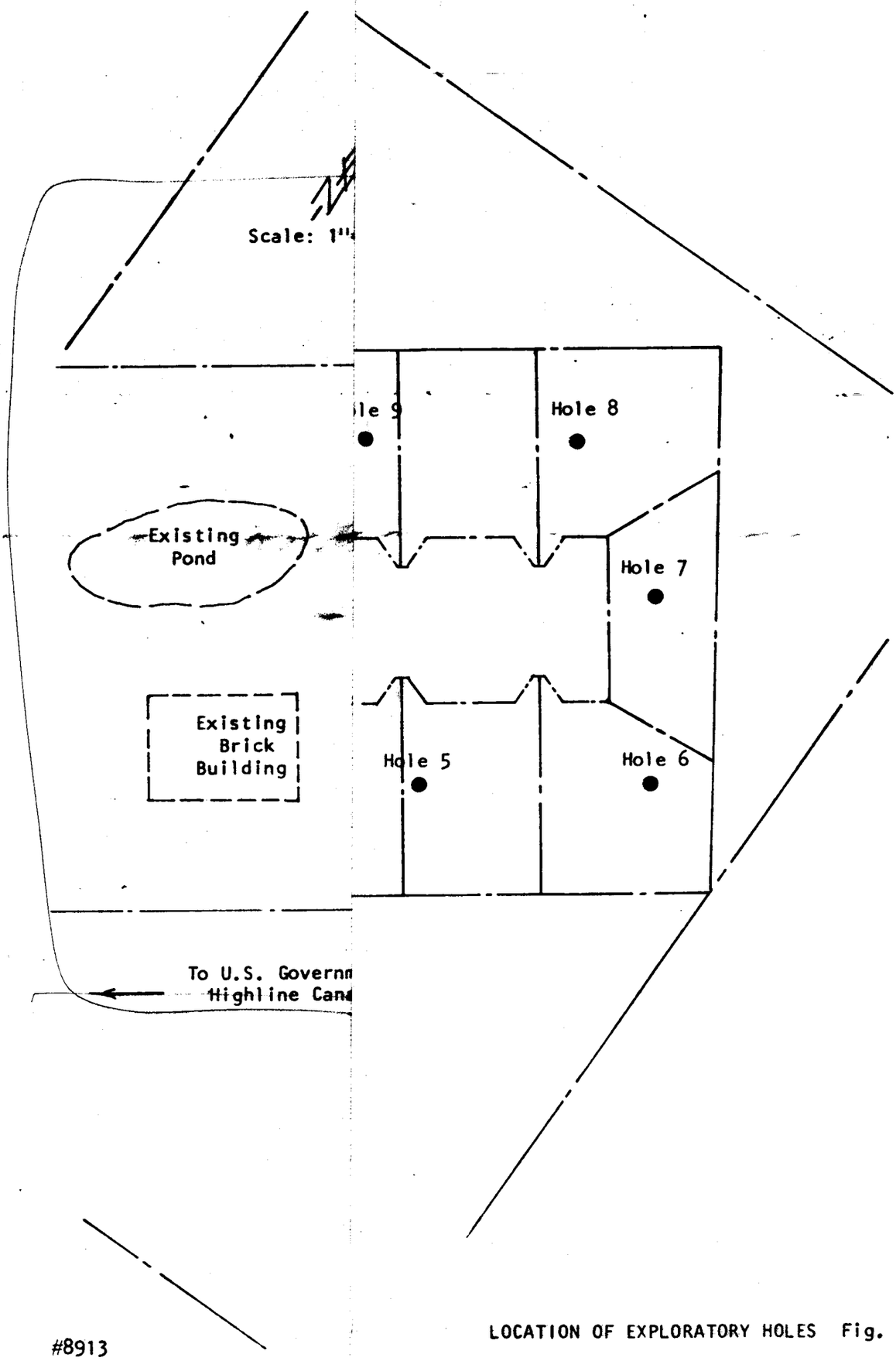
Our exploratory borings were spaced as closely as feasible in order to obtain a comprehensive picture of the subsoil conditions; however,

erratic soil conditions may occur between test holes. If such conditions are found in the exposed excavation, it is advisable that we be notified to inspect the foundation excavation.

CHEN AND ASSOCIATES, INC.

By _____
Fu Hua Chen, P. E.

FHC/dlr



#8913

LOCATION OF EXPLORATORY HOLES Fig. 1

LEGEND:

Topsoil, sandy clays, grass.

Fill, silty clays, yellow brown, erratic.

Clay (CL), silty, stiff, calcareous, brown, slightly moist.

Bedrock, claystone, siltstone, hard, grey, moist.

Undisturbed drive sample. The symbol 18/9 indicates that 18 blows of a 140 pound hammer falling 30 inches were required to drive the sampler 9 inches.

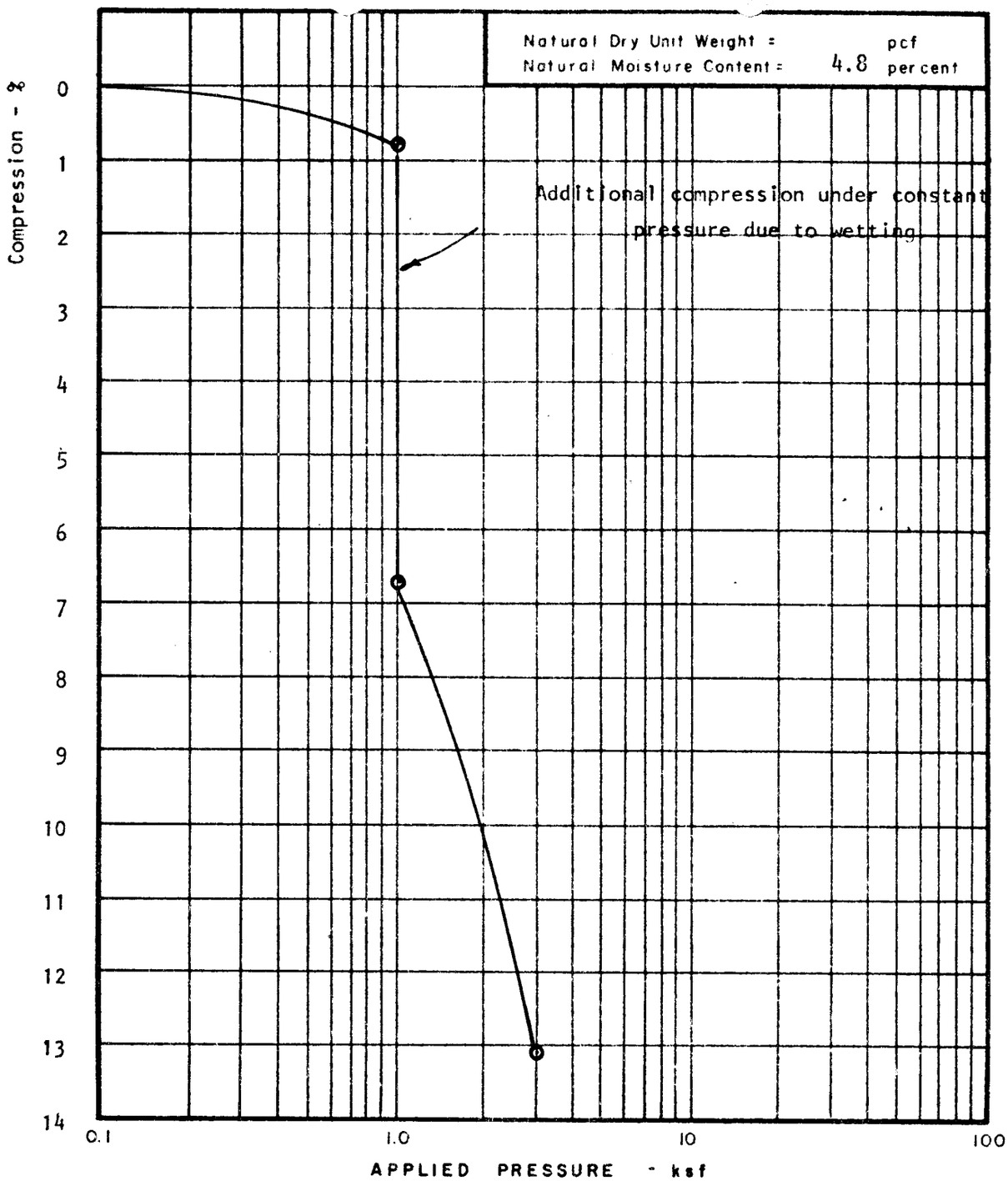
NOTES:

(1) Test holes were drilled November 14, 1972 with a 4 inch diameter continuous flight power auger.

(2) All elevations refer to benchmark on property pin at location shown on Fig. 1. Assumed elevation = 100.0'.

(3) No free water was encountered in the test holes at the time of our investigation.

(4) WC = Water Content (%);
DD = Dry Density (pcf);
UC = Unconfined Compressive Strength (psf);
LL = Liquid Limit (%);
PI = Plasticity Index (%);
-200 = Percent Passing No. 200 Sieve.

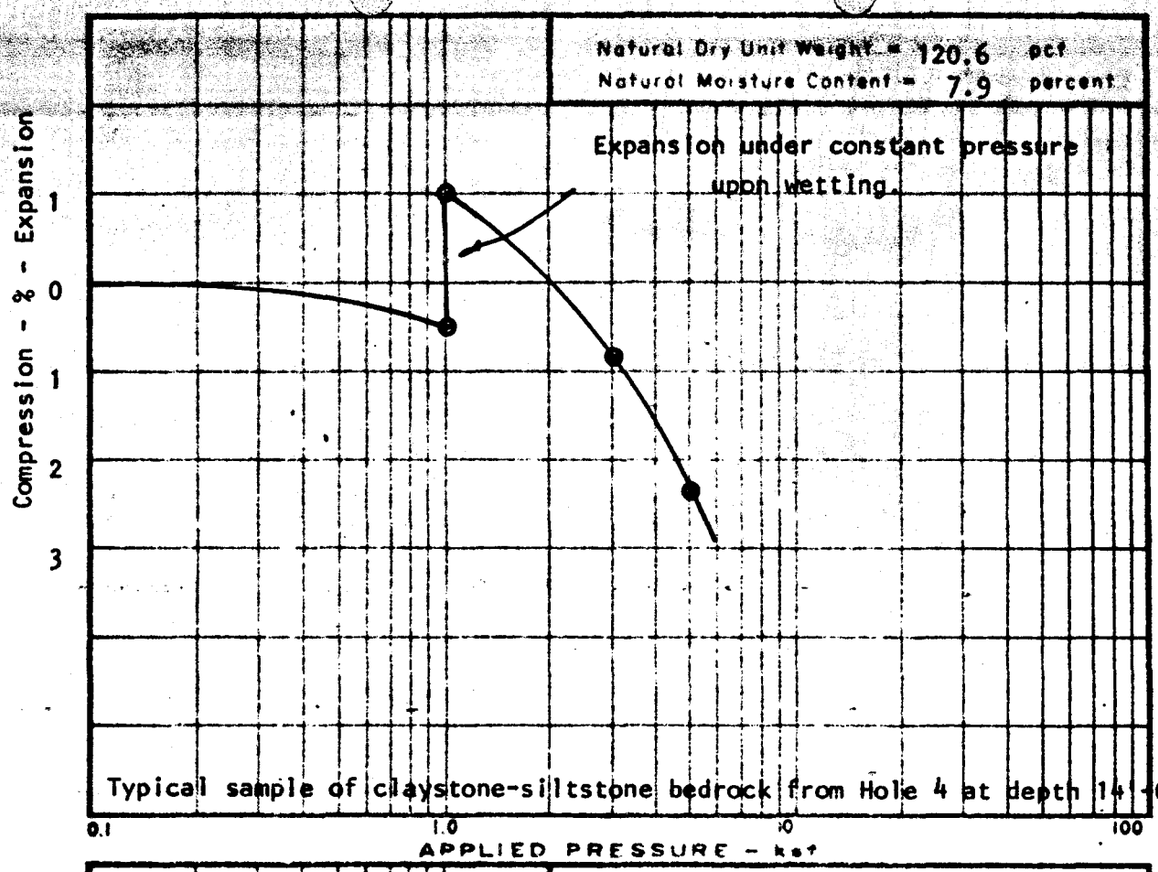


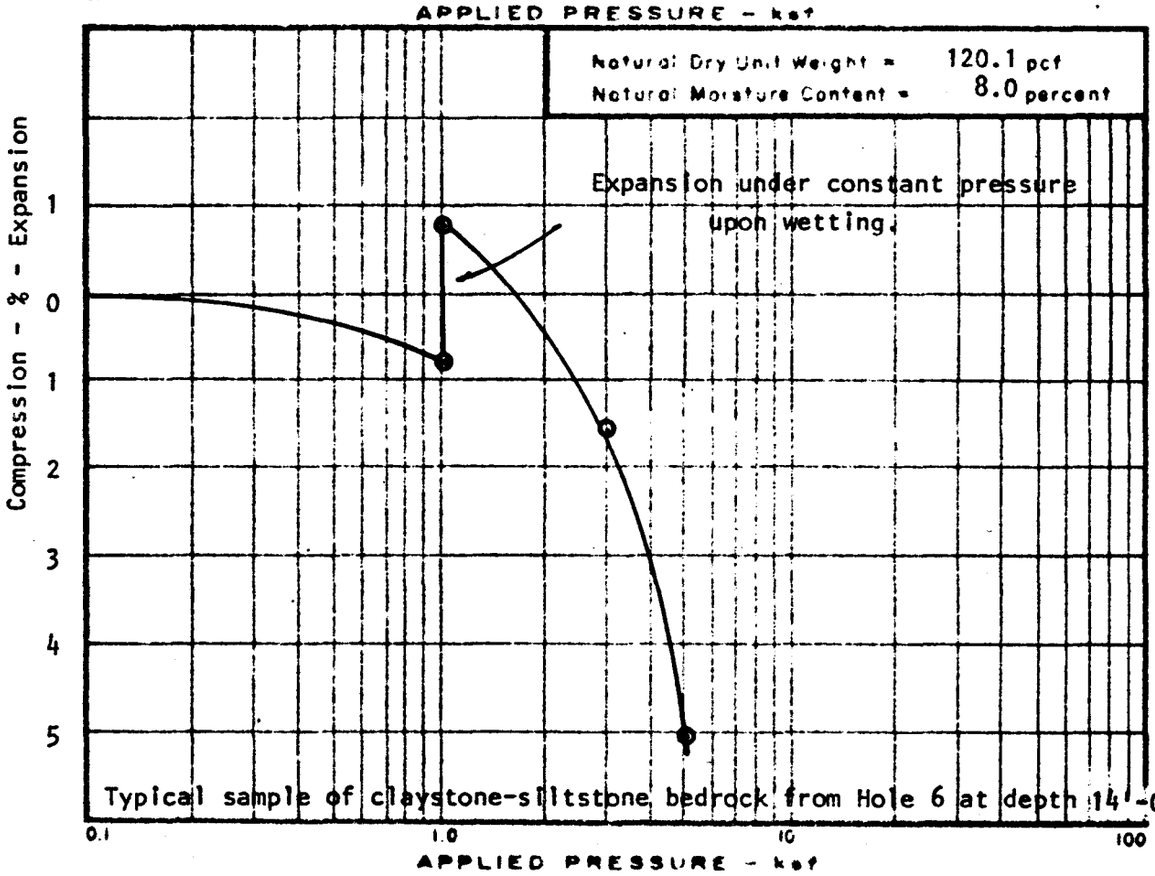
Typical sample of silty clay from Hole 1 at depth 4'-0".

Swell - Consolidation Test
Results

#8913

Fig. 4

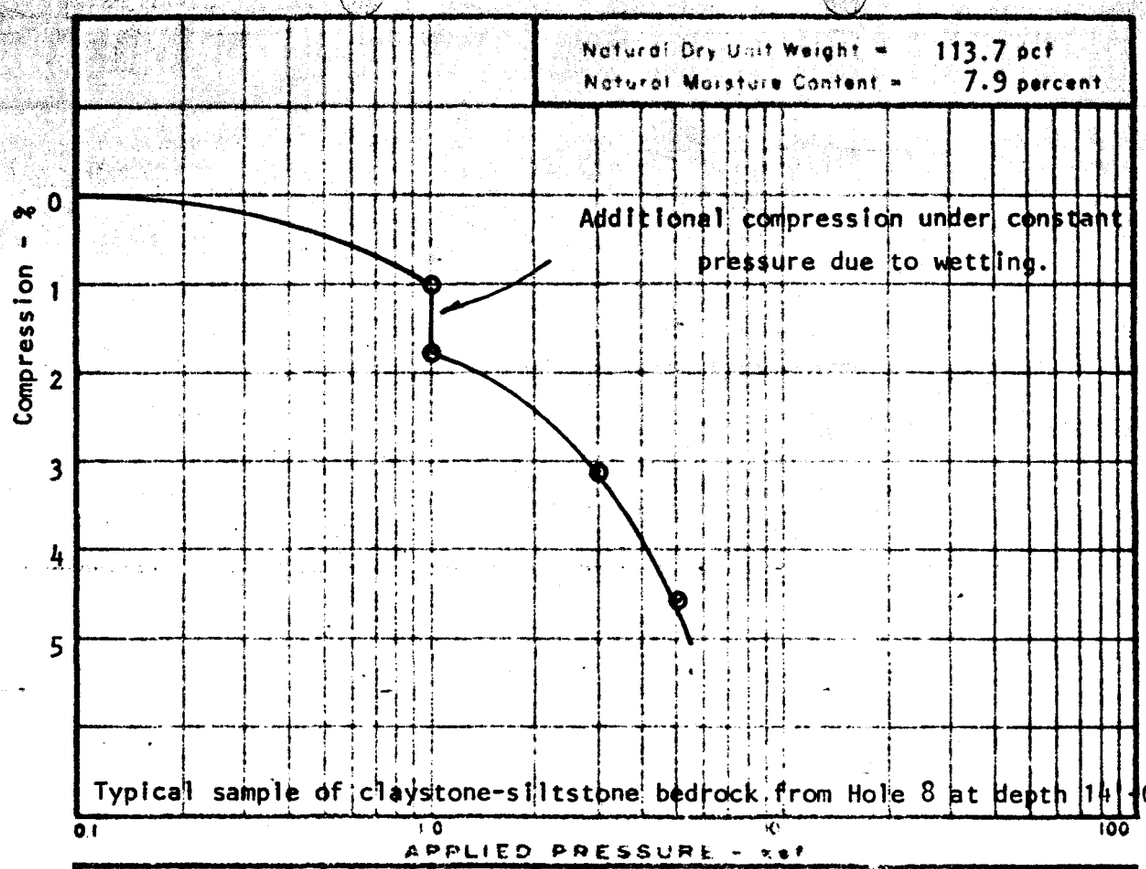


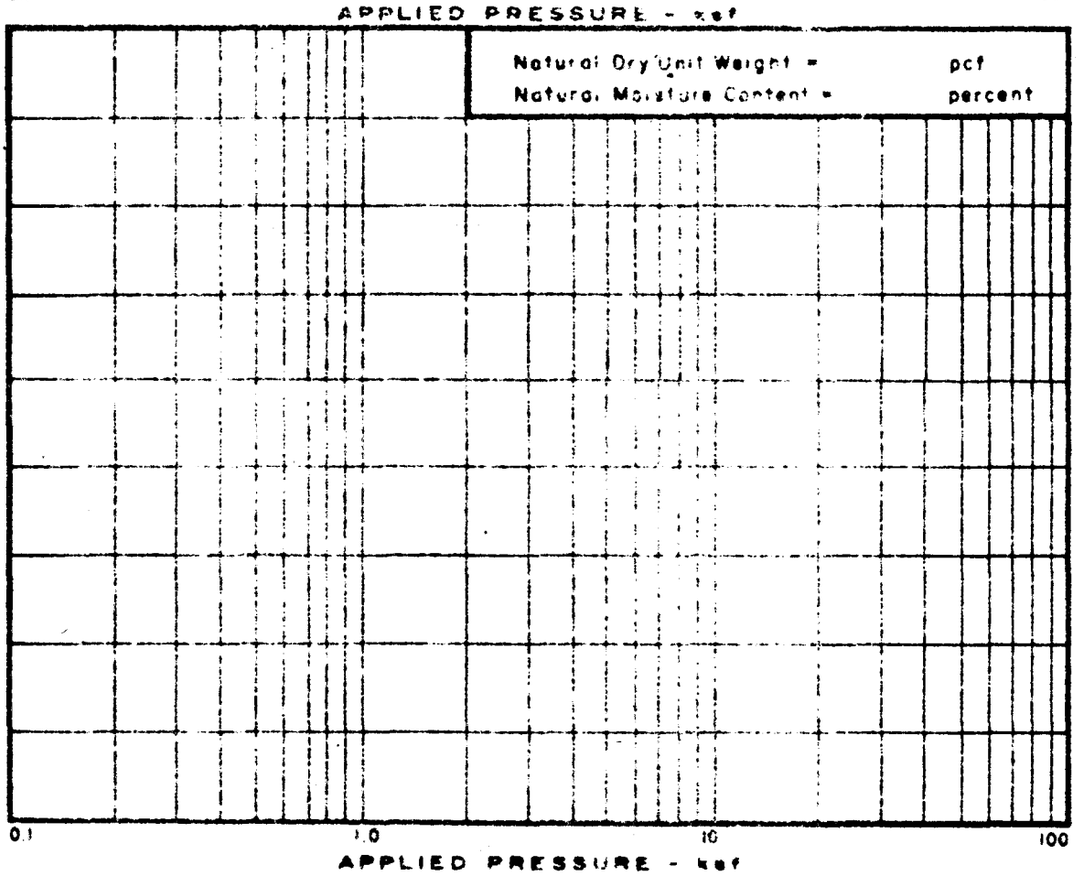


Swell-Consolidation Test Results

#8913

Fig. 5

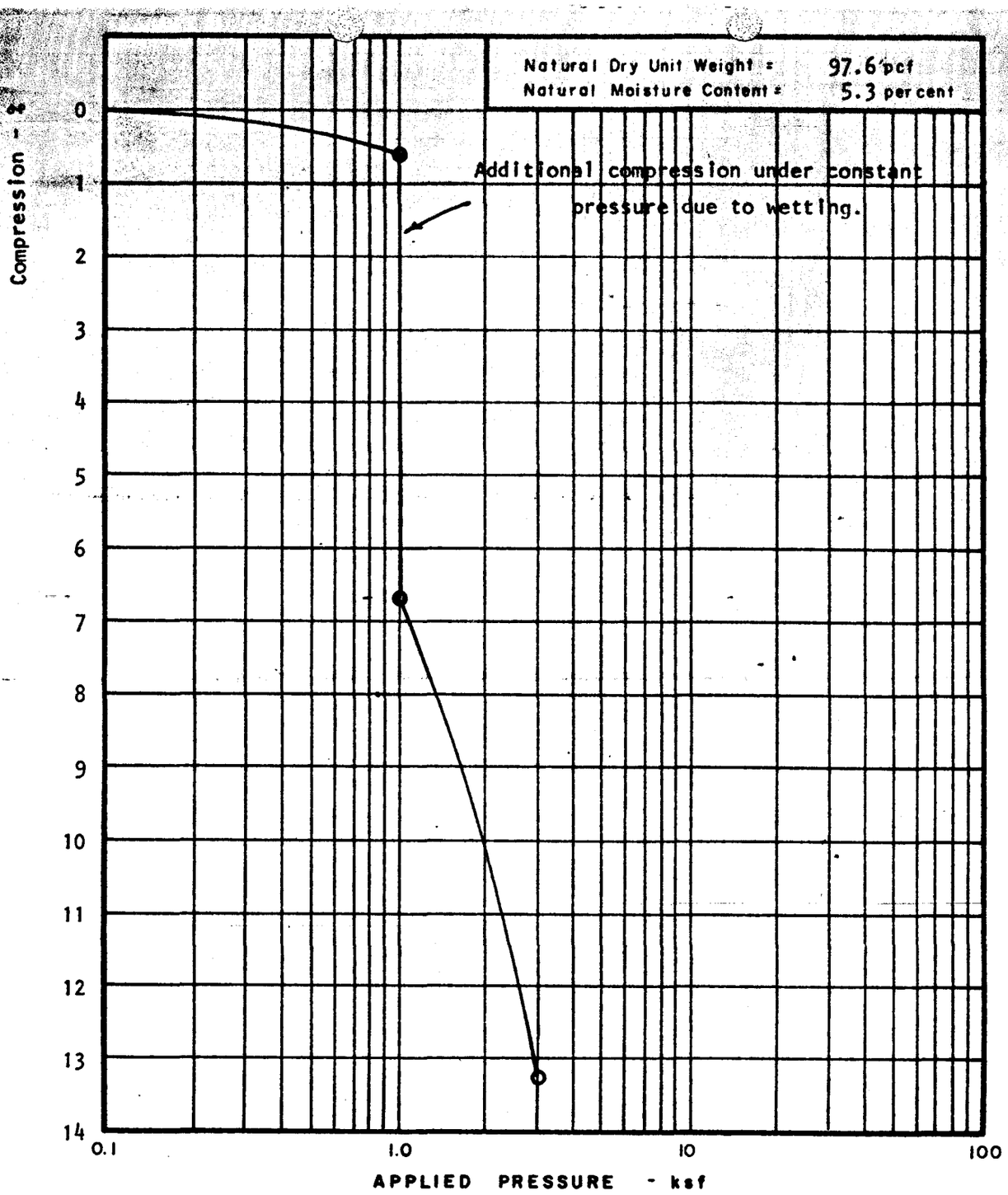




Swell-Consolidation Test Results

#8913

Fig. 6

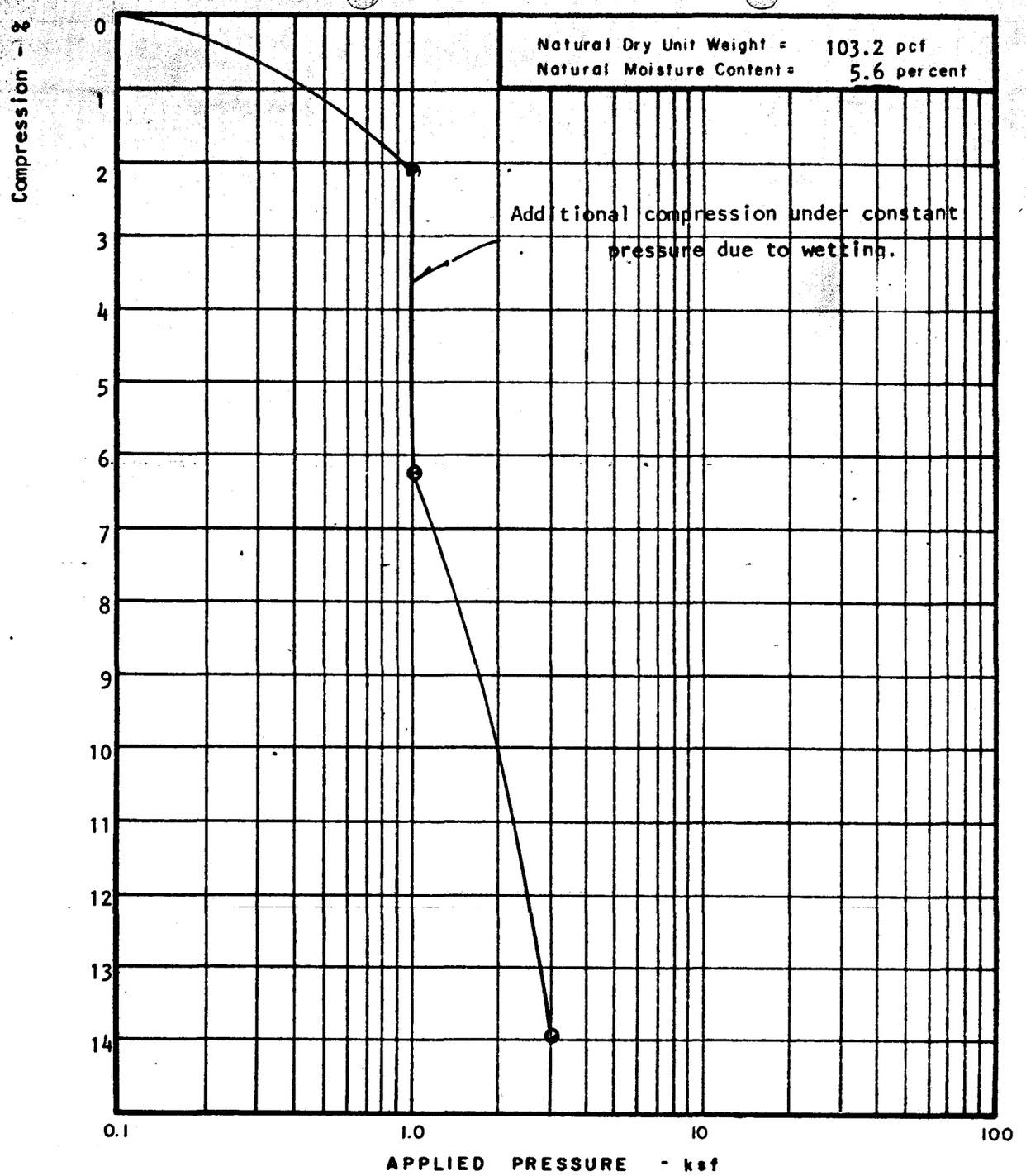


Typical sample of silty clay from Hole 9 at depth 9'-0".

Swell - Consolidation Test
Results

#8913

Fig. 7



Typical sample of silty clay from Hole 11 at depth 9'-0".

Swell - Consolidation Test
Results

#8913

Fig. 8

JOB NO. 8913

CHEN AND ASSOCIATES

TABLE I

SUMMARY OF LABORATORY TEST RESULTS

HOLE	DEPTH (FEET)	NATURAL MOISTURE (%)	NATURAL DRY DENSITY (PCF)	ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)	TRIAXIAL SHEAR TESTS		PERCENT PASSING NO. 200 SIEVE	SOIL TYPE
				LIQUID LIMIT (%)	PLASTICITY INDEX (%)		DEVIATOR STRESS (PSF)	CONFINING PRESSURE (PSF)		
1	4.0	4.8								Silty Clay
	19.0	10.7	116.4			32,100				Claystone-Siltstone Bedrock
2	4.0	5.7	93.5	27.0	11.3	2,700			88.9	Silty Clay
3	4.0	4.9	94.4	21.2	5.6				81.2	Silty Clay
4	14.0	7.9	120.6							Claystone-Siltstone Bedrock
6	4.0	4.3	102.0							Silty Clay
	14.0	8.0	120.1							Claystone-Siltstone Bedrock
7	9.0	6.0	103.6	27.8	11.7	6,948			93.3	Silty Clay
	19.0	8.3	118.1			18,950				Silty Clay
8	14.0	7.9	113.7							Claystone-Siltstone Bedrock
9	9.0	5.3	97.6							Silty Clay
	19.0	6.3	123.2							Silty Clay
10	14.0	6.7	102.6	28.6	13.3	7,200			94.6	Silty Clay
11	9.0	5.6	103.2							Silty Clay

CA-

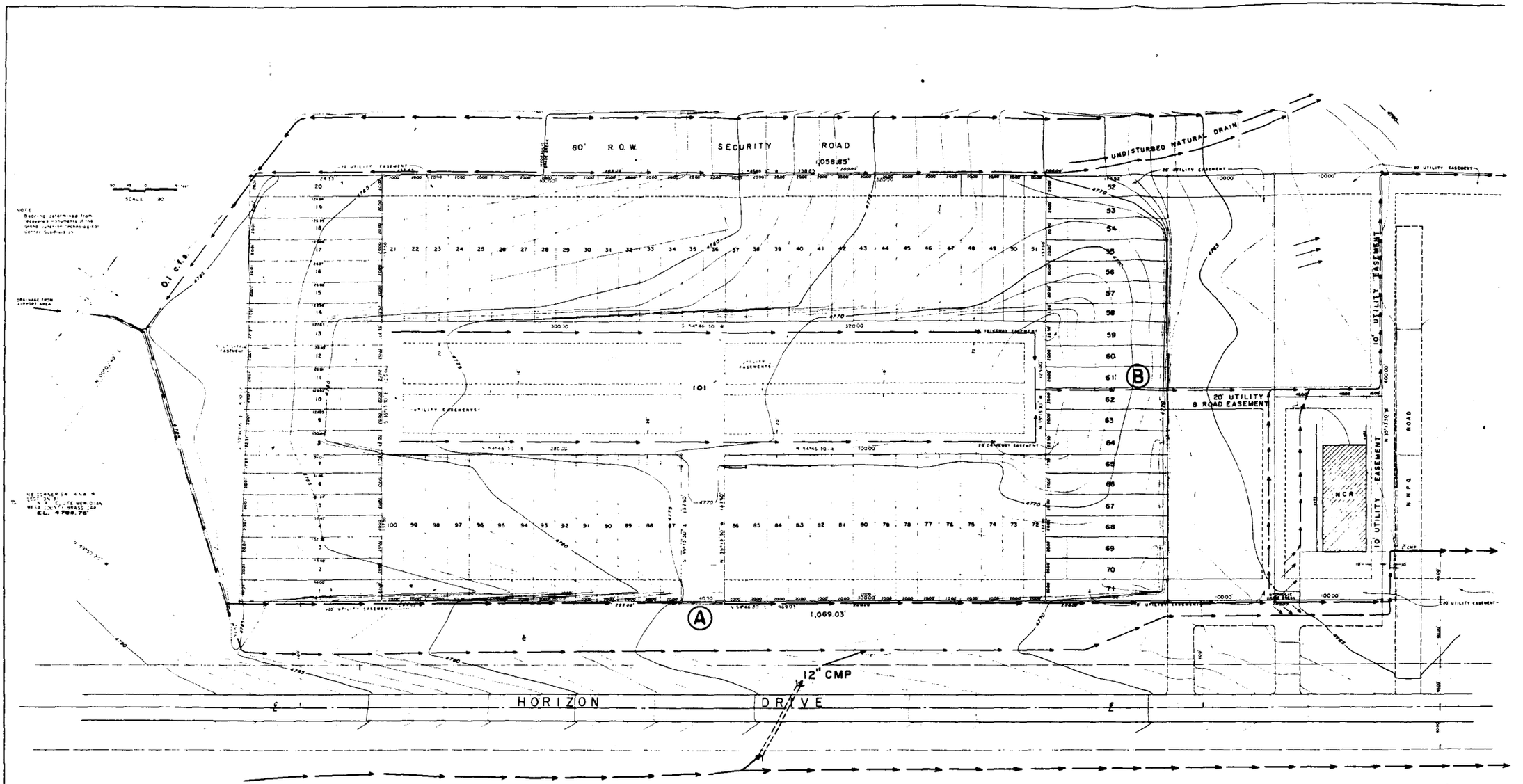
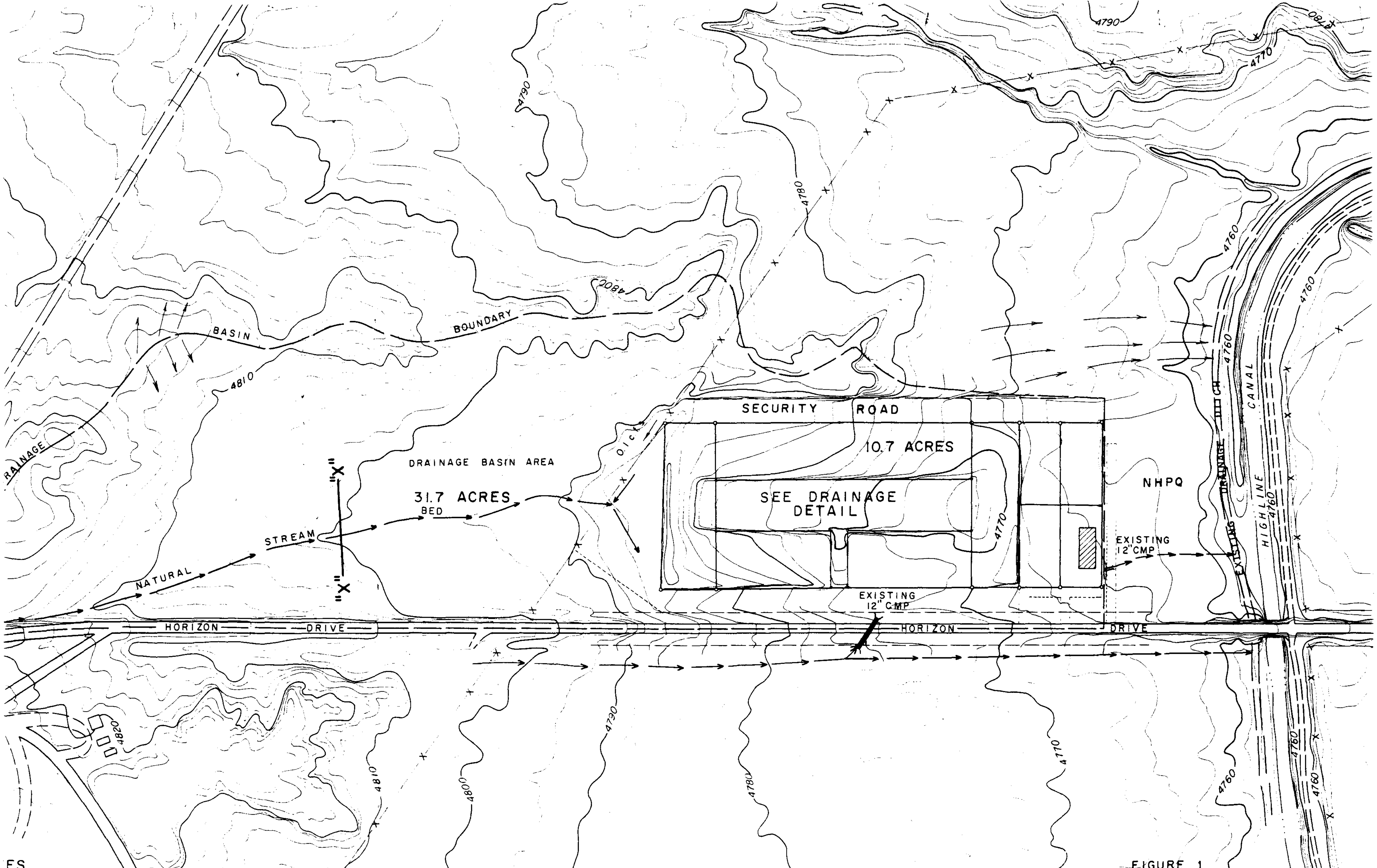


FIGURE 2

JAMES F SQUIRRELL & ASSOCIATES
GRAND JUNCTION, COLORADO

TECH DEL SOL
TOPOGRAPHIC MAP
SHOWING
DRAINAGE DETAIL

DATE: JULY 29, 1974
SCALE: 1" = 30'



BASIN BOUNDARY
DRAINAGE BASIN AREA
31.7 ACRES
NATURAL STREAM BED
"X"
"X"
SECURITY ROAD
10.7 ACRES
SEE DRAINAGE DETAIL
NHPQ
EXISTING 12" CMP
EXISTING 12" CMP
HORIZON DRIVE
HORIZON DRIVE
EXISTING DRAINAGE DITCH
HIGHLINE CANAL
4810
4800
4790
4780
4770
4760
4820
4730

ES

FIGURE 1