Chen & Associates
Consulting Geotechnical Engineers

96 South Zuni
Denver, Colorado 80223
303/744-7105

Casper
Colorado Springs
Glenwood Springs
Salt Lake City

PAVEMENT DESIGN
PROPOSED BRITTANY PLACE DEVELOPMENT
TRILBY ROAD AND LEMAY AVENUE
FORT COLLINS, COLORADO

PREPARED FOR:

DUECK DEVELOPMENT, INC.
791 CHAMBERS ROAD
SUITE 300
AURORA, COLORADO

ATTN: MR. KENNETH P. DUECK

JOB NO. 1 557 84

JULY 2, 1984

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CONCLUSIONS

(1) Conditions encountered are variable and generally consist of natural sandy clays overlying claystone bedrock.

(2) The pavement sections should be as follows:

Street	Asphaltic Concrete (In.)	Base Course (In.)	Full Depth Sec. (In.)
Local Streets	2.5	7	5
Granville Dr.	2.5	9	5.5
Brittany Dr.	2.5	10	6
Bristol Dr. and Province Rd.	3	10	6.5

(3) Soil related design and construction details are presented in the report.

PURPOSE AND SCOPE OF STUDY

This report presents the results of a subsurface investigation and pavement design for the proposed roads to be located in the Brittany Place Development, Fort Collins, Colorado. The report presents the subsurface conditions encountered, recommended pavement sections and other soil related design and construction details.

PROPOSED CONSTRUCTION

We understand the proposed roadways will be built in accordance with the City of Fort Collins Design Criteria. Only minimal amounts of cut and fill are anticipated for grading purposes. The roadways evaluated are shown on Fig. 1 and were classified by City of Fort Collins officials as follows:

Street	Classification
Interior Streets	Local
Granville Drive	Through Local
Brittany Drive	Through Local
Bristol Drive	Collector
Province Road	Collector

SITE CONDITIONS

The proposed construction site is currently cultivated in corn, wheat and hay. These fields are watered by means of irrigation ditches. These ditches were dry at the time of our investigation. The general site topography is gently rolling with the slopes ranging from 2% to 8%. Areas of subsidence were observed near the intersection of Windsor Road and Lemay Avenue. These streets are currently covered with gravel.

SUBSURFACE CONDITIONS

The subsurface conditions along the proposed roadway alignments were investigated by drilling 26 test holes at the approximate locations shown on Fig. 1. The logs of test holes are shown on Figs. 2 and 3 with the legend and notes on Fig. 4. Subsurface conditions exposed in the test holes consist of a thin veneer of topsoil overlying 0 to 11 feet of stiff to very stiff sandy clay which in turn overlie firm to very hard weathered and unweathered claystone bedrock. One to 5 feet of sandy clay fill materials were also encountered in four of the test holes. The exact horizontal and vertical extent of fill was not determined during our investigation.

Swell-consolidation tests performed on the overburden clays and claystone bedrock indicate they possess a low to moderate swell potential upon saturation and loading. The results of swell-consolidation tests are shown on Figs. 5 through 7. For pavement design, laboratory tests consisting of index properties and Hveem stabilometer tests were performed to evaluate the soil support characteristics of the subsurface soils. The test results indicate "R" values range from 8 to 13 for both the clay and claystone. Moisture-density relationships and Hveem stabilometer test results are shown on Figs. 8 through 15. The laboratory test results are summarized on Table I.

Groundwater was not encountered in the test holes during our investigation. All holes were backfilled after drilling.

PAVEMENT DESIGN

A pavement section is a layered system designed to distribute concentrated traffic loads to the subgrade. Performance of pavement structures is directly related to the physical properties of the subgrade and traffic loading.

Subgrade Materials: The laboratory test results indicate the sandy clay and claystone bedrock are classified as A-6 to A-7-6 with group indices between 9 and 34 in accordance with the American Association of State Highway Transportation Officials classification (AASHTO). These soils are classified as fair to poor subgrade materials for pavement support. For design purposes, we selected an average "R" value of 10.

Design Traffic: The design traffic was obtained from the City of Fort Collins officials. Following is the DTN numbers used in the design.

Street	Design Traffic Number (DTN)
Local	5
Granville Road	10
Brittany Drive	15
Bristol Drive and Province Road	20

Pavement Section: Using City of Fort Collins, Design Criteria and Standards for Streets and the recommended AASHTO Interim Guide for Design of Pavement Structures and the above traffic information, we recommend the following pavement sections:

Street	Combination Section Asphalt/Base Course (In)	Full Depth Asphalt Section (In)
Local	2.5/7	5
Granville Road	2.5/9	5.5
Brittany Drive	2.5/10	6
Bristol Drive	3/10	6.5
Province Road	3/10	6.5

It has been our recent experience that full-depth pavement sections perform better than the composite section. We have experienced water entering the base course due to adjacent irrigation and wetting the subgrade. This can reduce the effective life of the pavement.

CONSTRUCTION RECOMMENDATIONS

Roadway Materials: The asphalt pavement should consist of a bituminous plant mix composed of a mixture of aggregate and bituminous material which meets the requirements of a job-mix formula established by a qualified engineer. Bituminous material should be AC-10 grade and should perform to the requirements of AASHTO M226. Aggregate should meet Grading C or E specifications according to Sections 401 and 703 of the Colorado Standard Specifications for Road and Bridge Construction. The base course material should be high quality Class 6 aggregate in accordance with Sections 304 and 703 of the standard specification.

Subgrade Preparation: Particular care should be taken to insure the physical characteristics are uniform. All fill for grading purposes should be placed in 8 inch lifts at near optimum moisture content and compacted to a minimum of 95% standard Proctor density as determined by AASHTO T99 method. In cut areas, the subgrade materials should be scarified to a depth of 8 inches and recompacted to 95% standard Proctor density near optimum moisture. We recommend the pavement subgrade be proofrolled with heavy loaded pneumatic tired construction equipment prior to paving. Areas which deform excessively or pump under the wheel loads should be removed and replaced prior to paving.

Drainage: The collection and diversion of surface drainage away from paved areas is extremely important to satisfactory performance of the pavement. The design of surface drainage should be carefully considered to remove all water from paved areas. To reduce surface water infiltration to the subgrade, routine maintenance provisions should be established to seal joints within pavements and curbs and gutters and also cracks which occur within the pavement surface.

LIMITATIONS

This report has been prepared in accordance with generally accepted soil and foundation engineering practices in this area for use by the client for design purposes. The conclusions and recommendations submitted in this report are based upon the data obtained from the exploratory holes drilled at the locations indicated on the exploratory hole plan. The nature and extent of variations between the exploratory holes may not become evident until excavation is perfomed. If during ocnstruction, fill, soil, rock and water conditions appear to be different from those described herein, this office should be advised at once so reevaluation of the recommendations may be made.

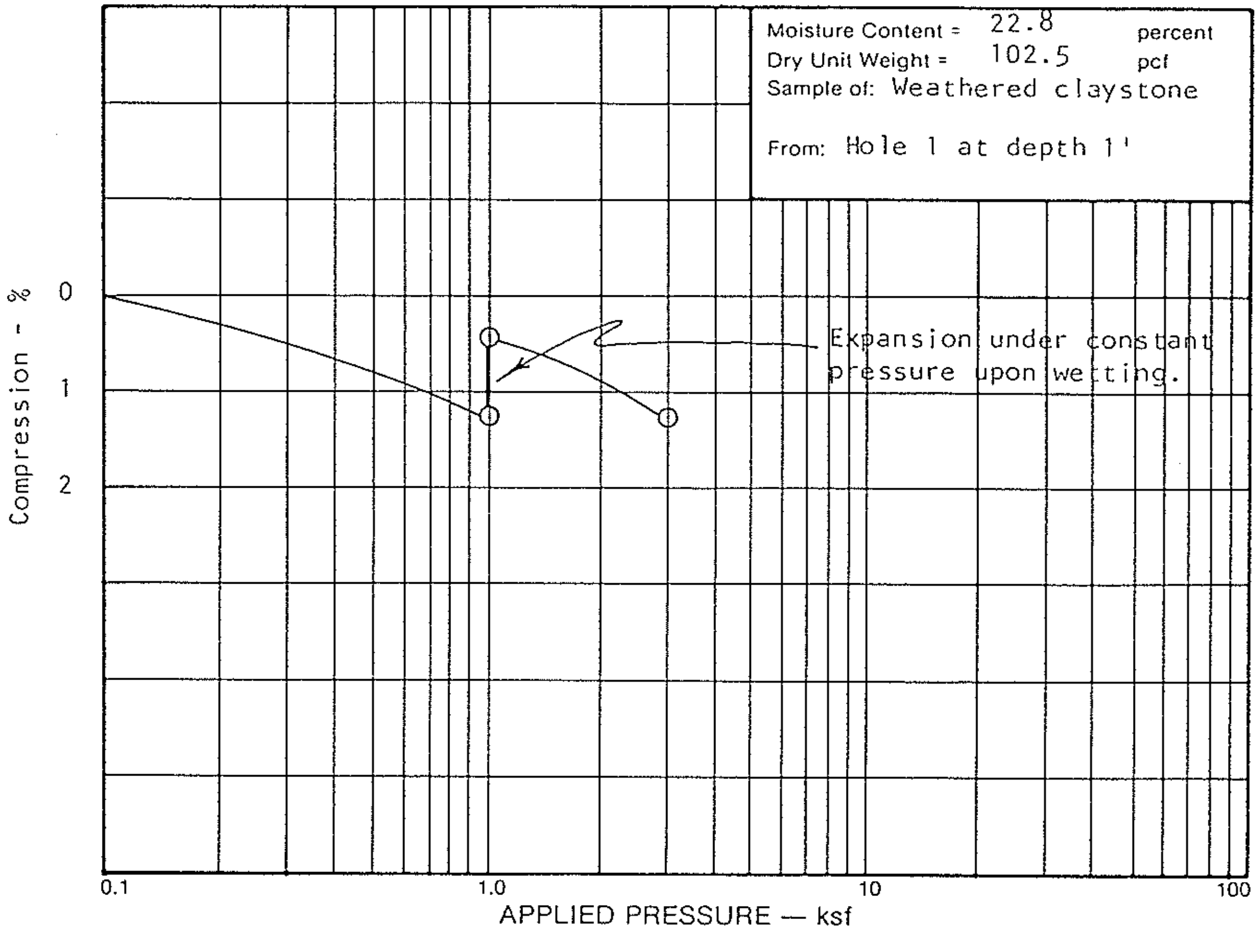
Recommended pavement sections are based on subsurface conditions encountered and the traffic data provided. If traffic conditions are substantially different or excessive construction traffic is anticipated, the sections outlined should be revised accordingly. We recommend on-site observation of roadway construction and paving by a soil engineer.

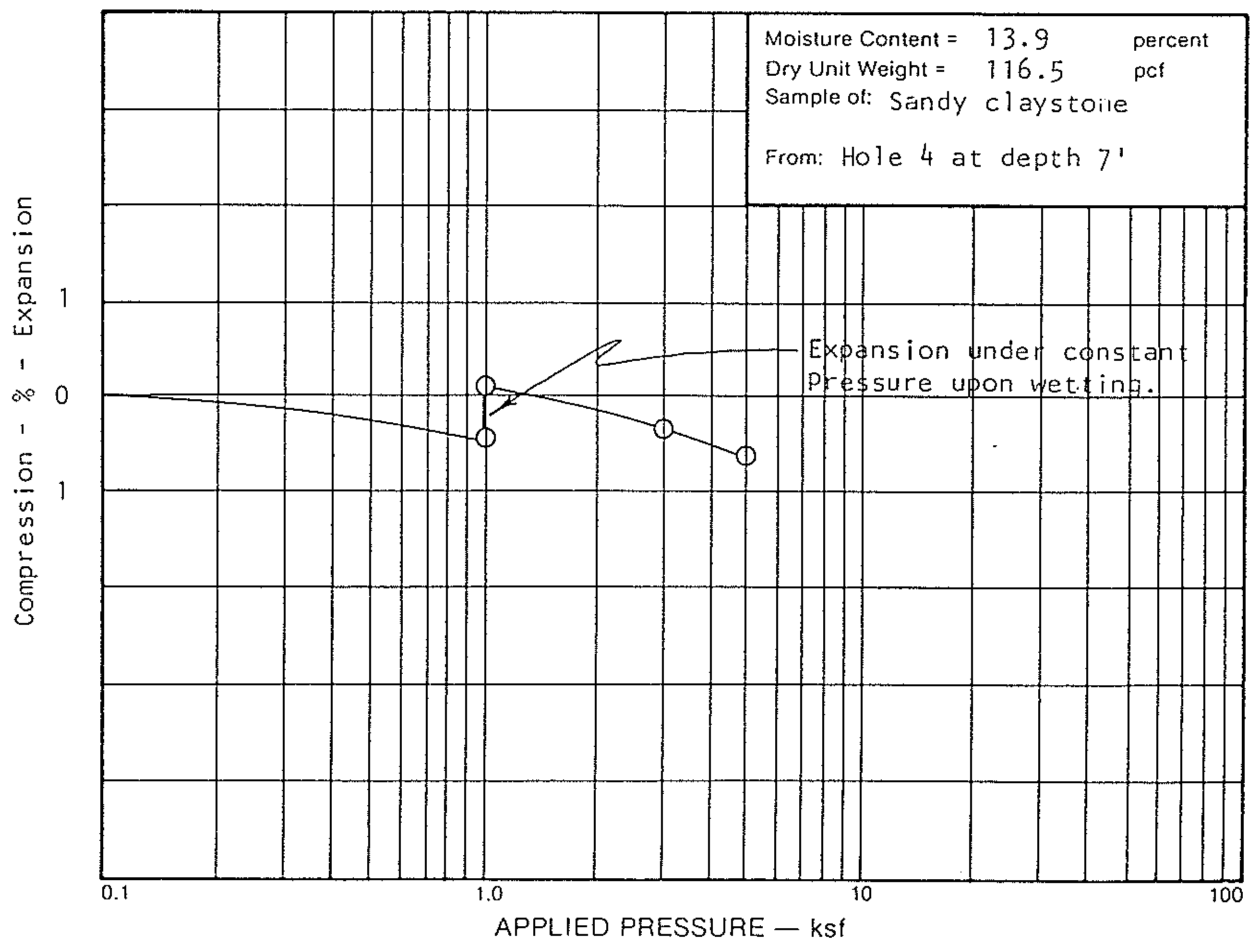
CHEN & ASSOICATES, INC.

By ______________________
Narender Kumar, P.E.

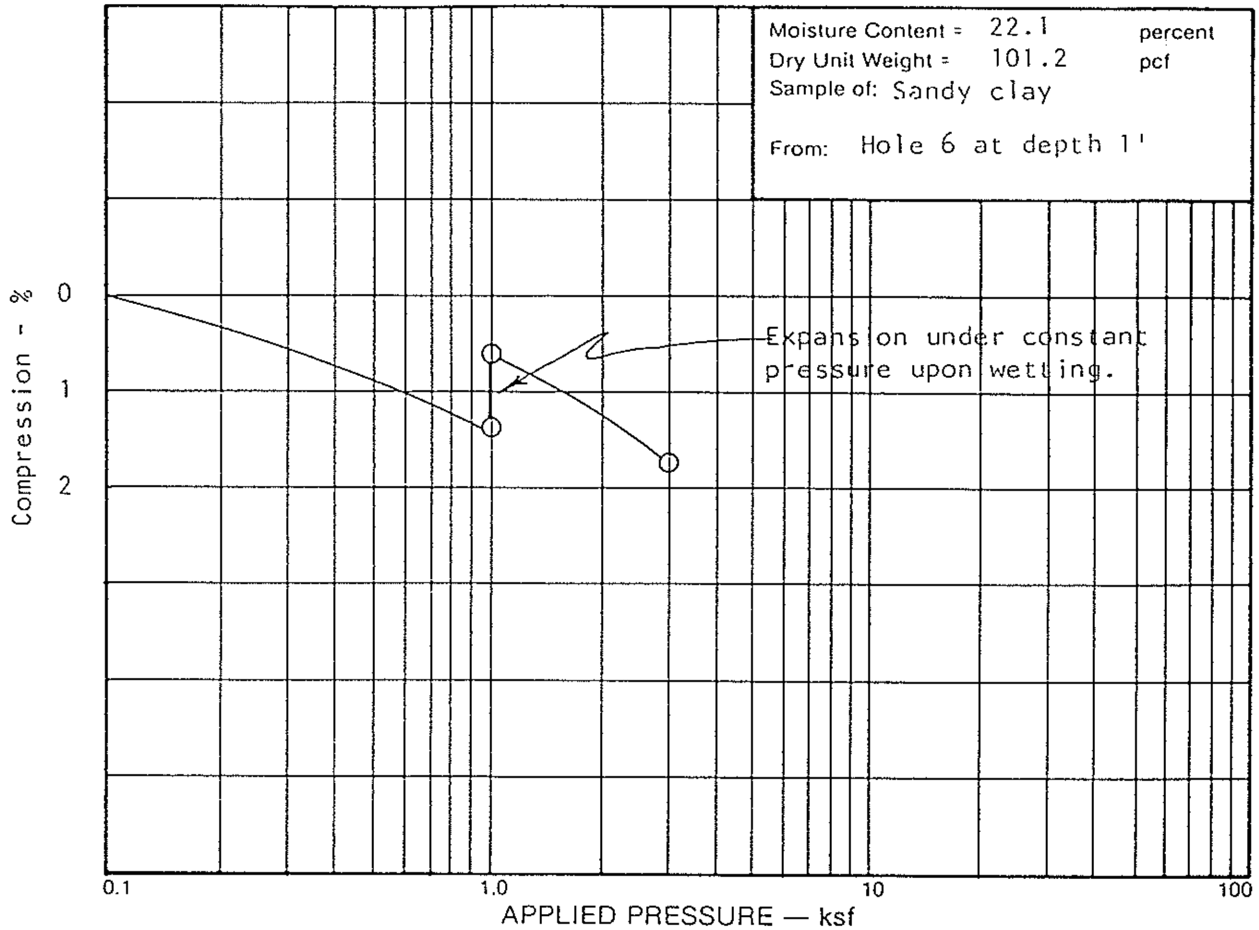
Reviewed By ______________________
David H. Adams, II, P.E.

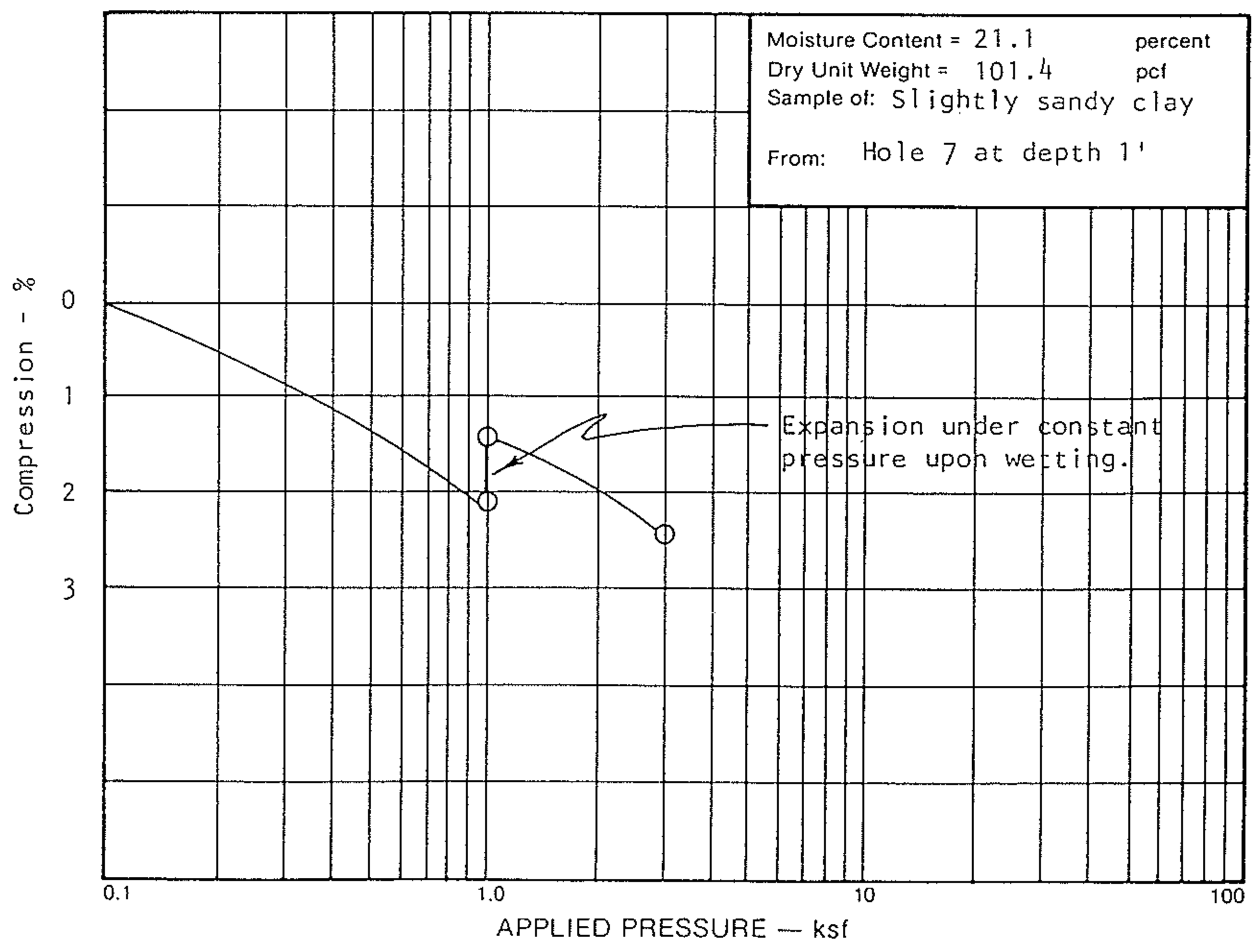
NK/moc
cc: Parsons & Associates
Attn: Mr. Don Parsons





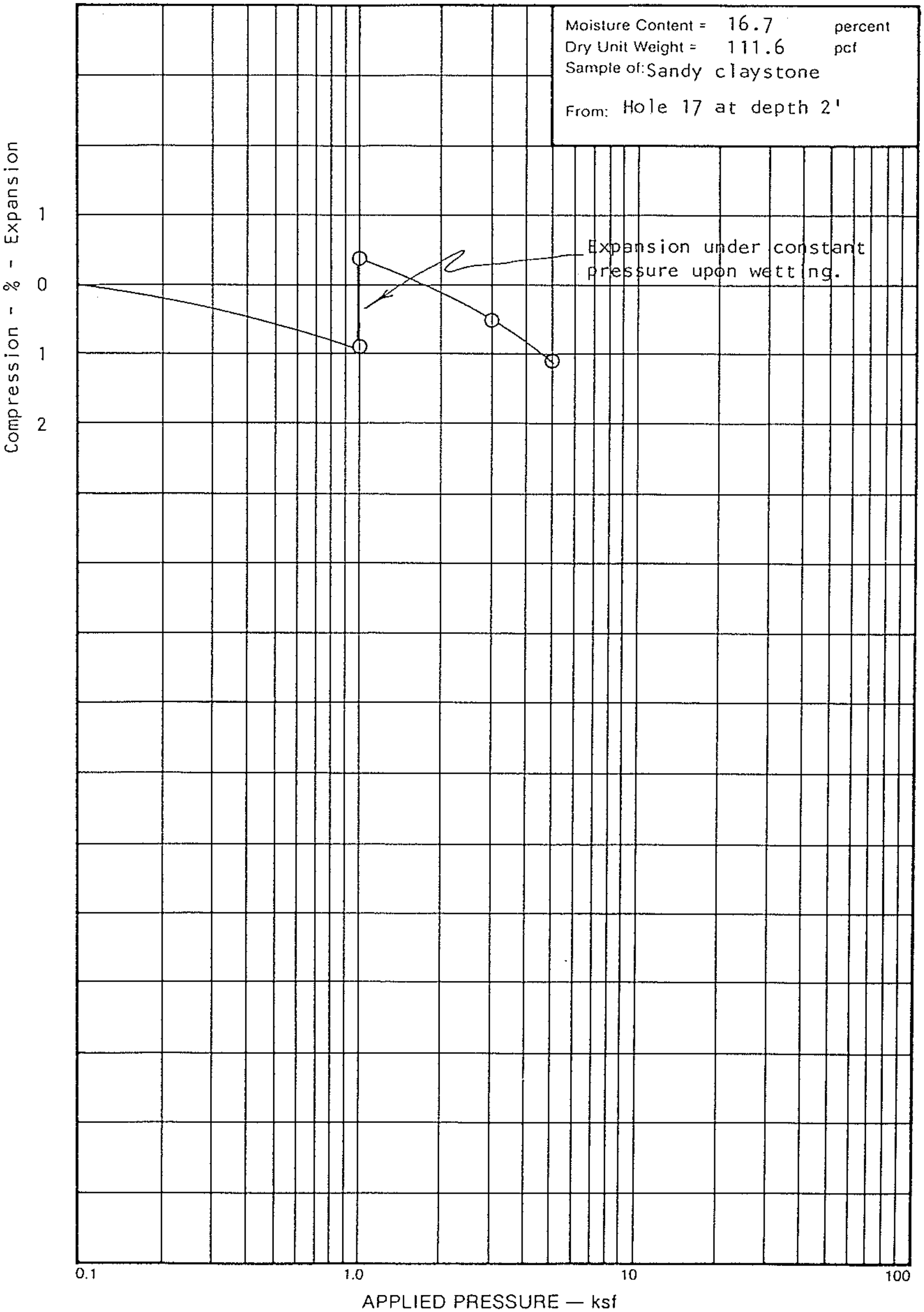
SWELL-CONSOLIDATION TEST RESULTS

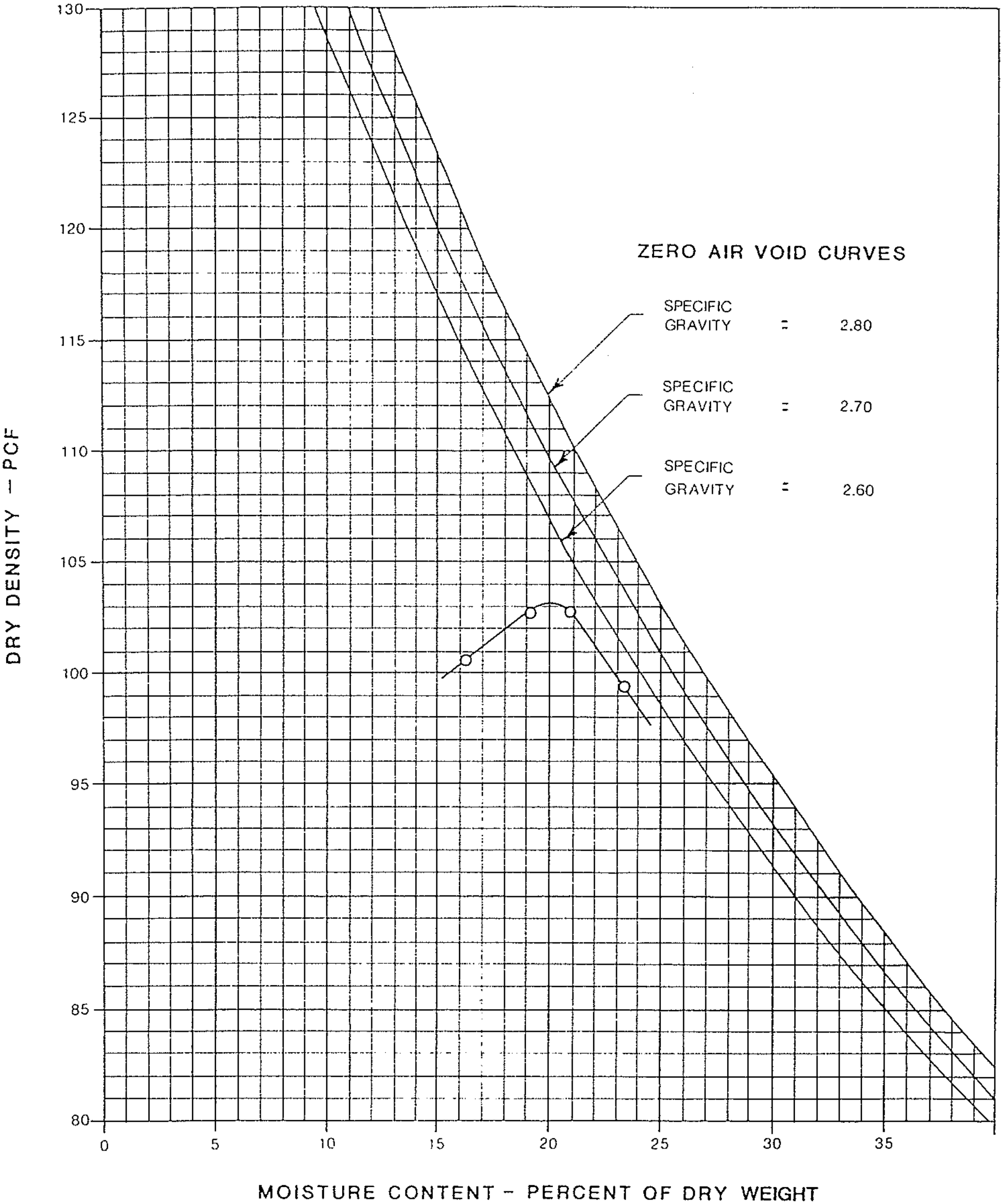




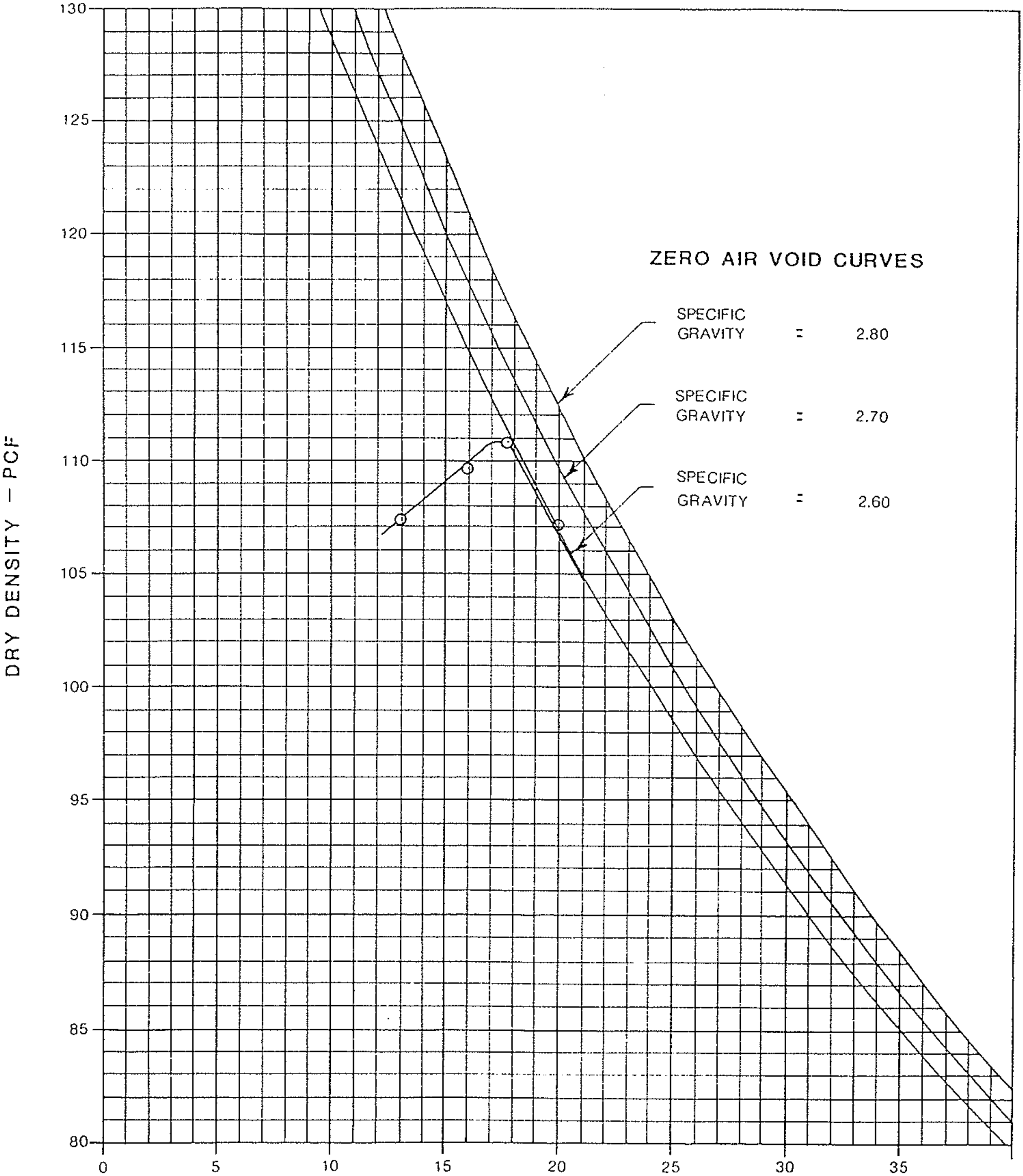
SWELL-CONSOLIDATION TEST RESULTS

chen and associates, inc.



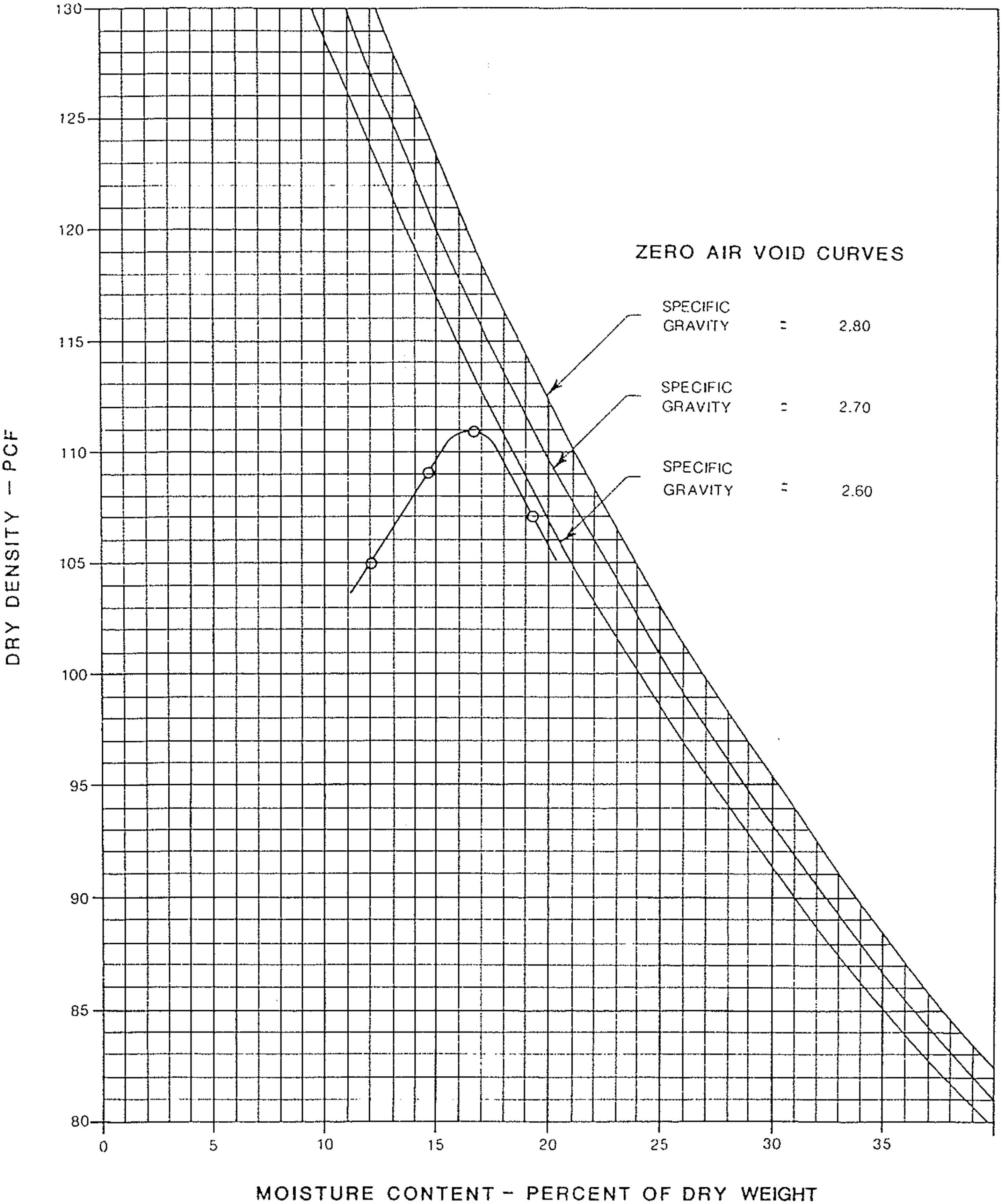


HOLE NO.	DEPTH NO.	SAMPLE NO.	MAXIMUM DRY DENSITY	OPTIMUM MOISTURE CONTENT	SOIL DESCRIPTION	COMPACTION TEST CHEN AND ASSOCIATES, INC.	
3	0.5'	-	103.2 pcf	20.0 %	Sandy clay	METHOD: ASTM-D-698-78 Method A	
					LL 53 PI 36 -200 89 %	JOB NO.: 1 557 84 DATE: May 1984	FIG. NO. 8



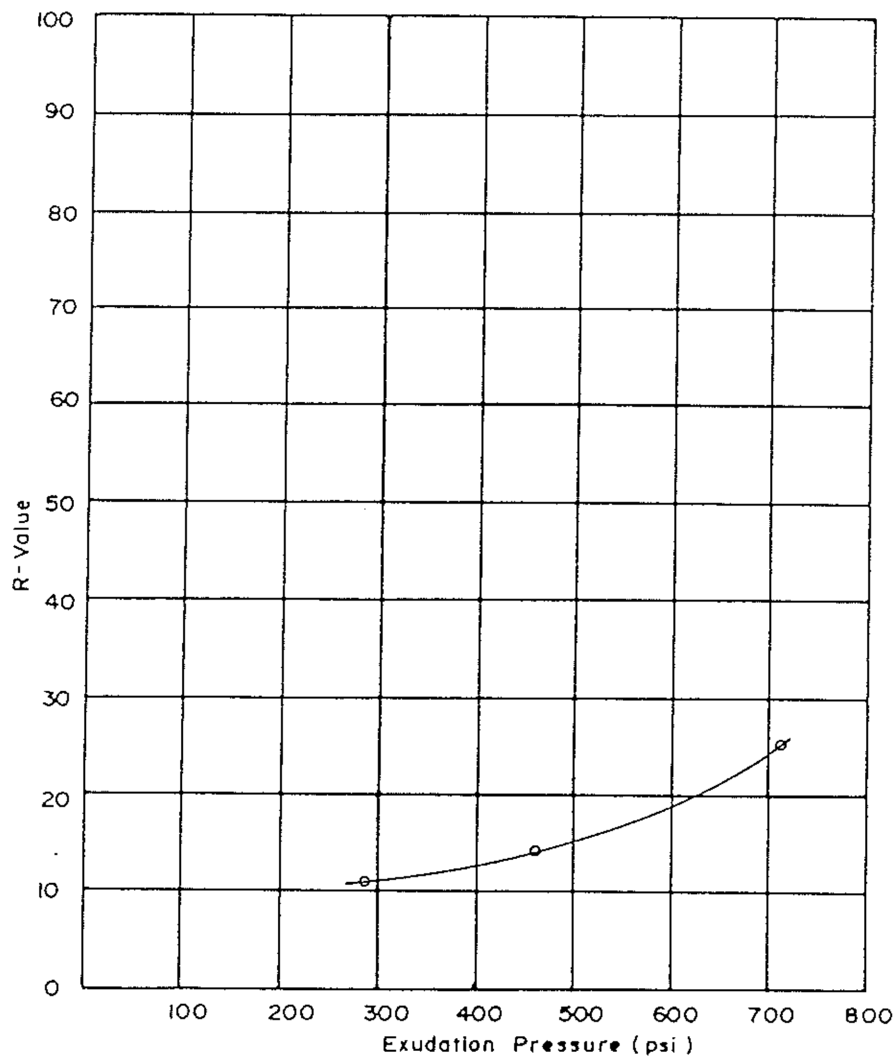
MOISTURE CONTENT - PERCENT OF DRY WEIGHT

HOLE NO.	DEPTH NO.	SAMPLE NO.	MAXIMUM DRY DENSITY	OPTIMUM MOISTURE CONTENT	SOIL DESCRIPTION	COMPACTION TEST CHEN AND ASSOCIATES, INC.
15	1.5'		110.9 pcf	17.4 %	Claystone LL 51 PI 36 -200 83 %	METHOD: ASTM-D-698-78 Method A JOB NO.: 1 557 84 DATE: May 1984 FIG. NO. 9



HOLE NO.	DEPTH NO.	SAMPLE NO.	MAXIMUM DRY DENSITY	OPTIMUM MOISTURE CONTENT	SOIL DESCRIPTION	COMPACTION TEST CHEN AND ASSOCIATES, INC.	
24	0.5'-6		110.9 pcf	16.4%	Sandy clay LL 42 PI 28 -200 81 %	METHOD: ASTM-D-698-78 Method A JOB NO.: 1 557 84 DATE: May 1984	FIG. NO. 10

Test Specimen	1	2	3	4	R-Value (300 psi)
Moisture Content (%)	22.0	20.1	18.0		
Density (pcf)	102.2	107.3	109.9		
R-Value by Exudation Pressure	11.2	14.7	25.2		11



Soil Type Sandy clay

Location Hole 3, 0.5' to 6'

Gravel 0 % Sand 11 % Silt and Clay 89 %

Liquid Limit 53 % Plasticity Index 36 %

1 557 84	chen and associates, inc.	HVEEM STABILOMETER TEST RESULTS	Fig. 11

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96 South Zuni
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Casper
Cheyenne
Colorado Springs
Glenwood Springs
Rock Springs
Salt Lake City

November 26, 1984

Subject: Preliminary Subsurface Investigation, Proposed Province Towne Development, Trilby Road and LeMay Avenue, Fort Collins, Colorado

Job No. 1 1124 84

Dueck Development, Inc.
791 Chambers Road
Suite 300
Aurora, Colorado 80011

ATTN: Mr. Kenneth P. Dueck

Gentlemen:

This report presents the results of a preliminary subsurface investigation for the proposed Province Towne Development located near the intersection of Trilby Road and LeMay Avenue, Fort Collins, Colorado. We have previously performed pavement design for the internal streets in this project under our Job No. 1 557 84, dated July 2, 1984. The purpose of this investigation was to determine the excavation difficulties for the utility trenches at this site and explore the observed sink holes.

PROPOSED CONSTRUCTION

The proposed site will be developed by construction of single and multi-family residential units and low to midrise commercial and industrial units. An existing lake located at the west would be elongated by relocating the dam to the north to provide additional estate lots along the shoreline. A network of internal roads and associated utility lines including water and sewer will be constructed at the site. The locations and depths of utility lines are not known at this time.

SUBSURFACE INVESTIGATIONS

The subsurface investigation at the site was performed by excavating 7 Test Pits at the approximate locations shown on Fig. 1. The logs of exploratory pits are shown on Fig. 2. The subsurface conditions are highly erratic due to the large area investigated. With the exception of Test Pit 4, the subsurface condition consists of zero to a thin veneer of topsoil overlying 1 to 19.5 feet of stiff to very stiff, sandy clay overlying medium to very hard, claystone bedrock. One and a half feet of weathered claystone bedrock was also encountered in Test Pit 1. Bedrock was not encountered in Test Pit 7 to the maximum excavated depth, 20 feet. Occasional thin cemented

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sandstone lenses were also encountered in claystone bedrock in Test Pits 5 and 6. Test Pit 4, excavated at the location of the apparent sink hole encountered 3 feet of fill material 5 feet below the ground surface. Fill material generally consisted of sandy clay with occasional bottles, metal and pipes. Clay drain tiles were encountered at a depth of 8 feet below the ground surface.

The laboratory tests indicate the subsurface soils possess a negligible swell potential upon being loaded and wetted at natural state. The results of laboratory testing are presented on Fig. 3 and summarized on Table 1.

Groundwater was flowing into Test Pits 3 and 5 immediately above the bedrock. The test pits were backfilled after excavation, preventing subsequent water level readings.

EXCAVATION CONSIDERATIONS

We observed no signs of major slope instability during our field investigation. Natural hillsides in the area appear to have a stable geologic history. Major stability problems are not anticipated if site grading is carefully planned.

Permanent unretained cuts in the overburden soils less than 10 feet in height may be 1:1 (horizontal to vertical). The risk of slope instability will be signficantly increased if seepage is encountered in cuts. An investigation should be conducted to determine if the seepage will adversely affect the cut stability.

Good surface drainage should be provided around all permanent cuts to direct surface runoff away from the cut face. Cut slopes and other stripped areas should be protected against erosion by revegetation or other methods.

Fills up to 10 feet in height can be used if the fill slopes do not exceed 2:1 (horizontal to vertical) and the fills are properly compacted and drained. The ground surface underlying all fills should be carefully prepared by removing all organic matter, scarification to a depth of 8 inches and recompacting to 95% of the maximum standard Proctor density prior to fill placement. Fills should be benched into hillsides at a slope exceeding 4:1 (horizontal to vertical).

No formal stability analyses were performed to evaluate the slopes recommended above. Published literature and our experience with similar cuts and fills indicate the recommended slopes should have adequate factors of safety. If a detailed stability analysis is required, we should be notified.

The majority of the excavation at the site can be performed by conventional excavating equipment. In confined areas, such as deep cuts for utility trenches and building corners in bedrock where thin cemented lenses of sandstone are encountered, may have to be ripped or lightly blasted. Dewatering should be planned in the areas where flowing water is encountered. We recommend that suitable dewatering equipment, including sumps be utilized to pump the water to permit performing the work in dry.

The overburden soils are suitable for use as roadfill, backfill around structures and fill for utility and landscaping purposes. The native soils will be expansive when compacted and should not be used as structural fill below floor slabs. Structural fill may have to be imported to the site. The fill should be compacted as follows:

Area	Percentage of Maximum Standard Proctor Density (ASTM D-698)
Spread Footing Foundations	100%
Beneath Buildings and Parking Lots	95%
Interior Utility Trenches	95%
Exterior Utility Trenches	
A. Paving and Slabs	95%
B. Landscape and Other Areas	90%
Interior Foundation Wall Backfill	95%
Exterior Foundation Wall Backfill	
A. Paving and Slabs	95%
B. Landscape and Other Areas	90%
Roadway Embankments	95%
Dam Embankment	95%

SINK HOLES

Our investigation indicates that the sink holes observed at the site are surficial depressions due to previous man-made activities. They appear to be at the junctions of the tile drains used for irrigation purposes and collecting the runoff from the irrigation. We recommend that prior to overlot grading, all fill, loose and deleterious material from the sink holes and associated trenches be overexcavated and replaced by fill placed in thin lifts and compacted to at least 95% of the standard Proctor density.

WATER SOLUBLE SULFATES

The concentration of water soluble sulfates measured in samples obtained from the exploratory holes ranges from less than 0.044% to approximately 1.2%. The results of laboratory testing are presented on Table I. This concentration of water soluble sulfates represents a severe degree of sulfate attack on concrete exposed to these materials. The degree of attack is based on information presented in the U.S. Bureau of Reclamation Concrete Manual.

Based on this information, we recommend all concrete exposed to the on-site materials contain a sulfate resistant cement with less than 5% tri-calcium aluminate (Type II modified or Type V). Concrete should be a relatively rich mix and should be air entrained.

BURIED METAL CORROSION

Data was collected to determine the potential corrosive environment for metal placed beneath the surface of the ground at the site. The data includes soil group classification, electrical resistivity and pH.

The general characteristics of the soils and bedrock indicate the soils are moderately to badly corrosive based on sandy clays with a low water table. This conclusion was based on information as presented in the Handbook of Steel Drainage and Highway Construction Products published by the American Iron and Steel Institute.

Electrical resistivity measurements conducted at the site indicate resistivity values of between 110 and 18,800 ohm-centimeters. The results of electrical resistivity testing are summarized on Table II. The resistivity close to natural moisture content vary between approximately 150 and 1,480 ohm-centimeters. These resistivities are classified as having bad corrosion resistance on a scale of bad, fair, good and excellent presented in the handbook referenced above.

The data presented above indicates the subsurface conditions will be strongly aggressive towards iron and other buried metals. We recommend a qualified corrosion engineer review the information to design an appropriate level of corrosion protection for buried metal.

MISCELLANEOUS

This report is preliminary in natural and useful for general planning. Further soil and foundation investigation is recommended once the location of the various structures are known. If after reading this report, you have any questions or need additional information, please call.

NARENDER KUMAR
REGISTERED
17078
PROFESSIONAL ENGINEER
STATE OF COLORADO

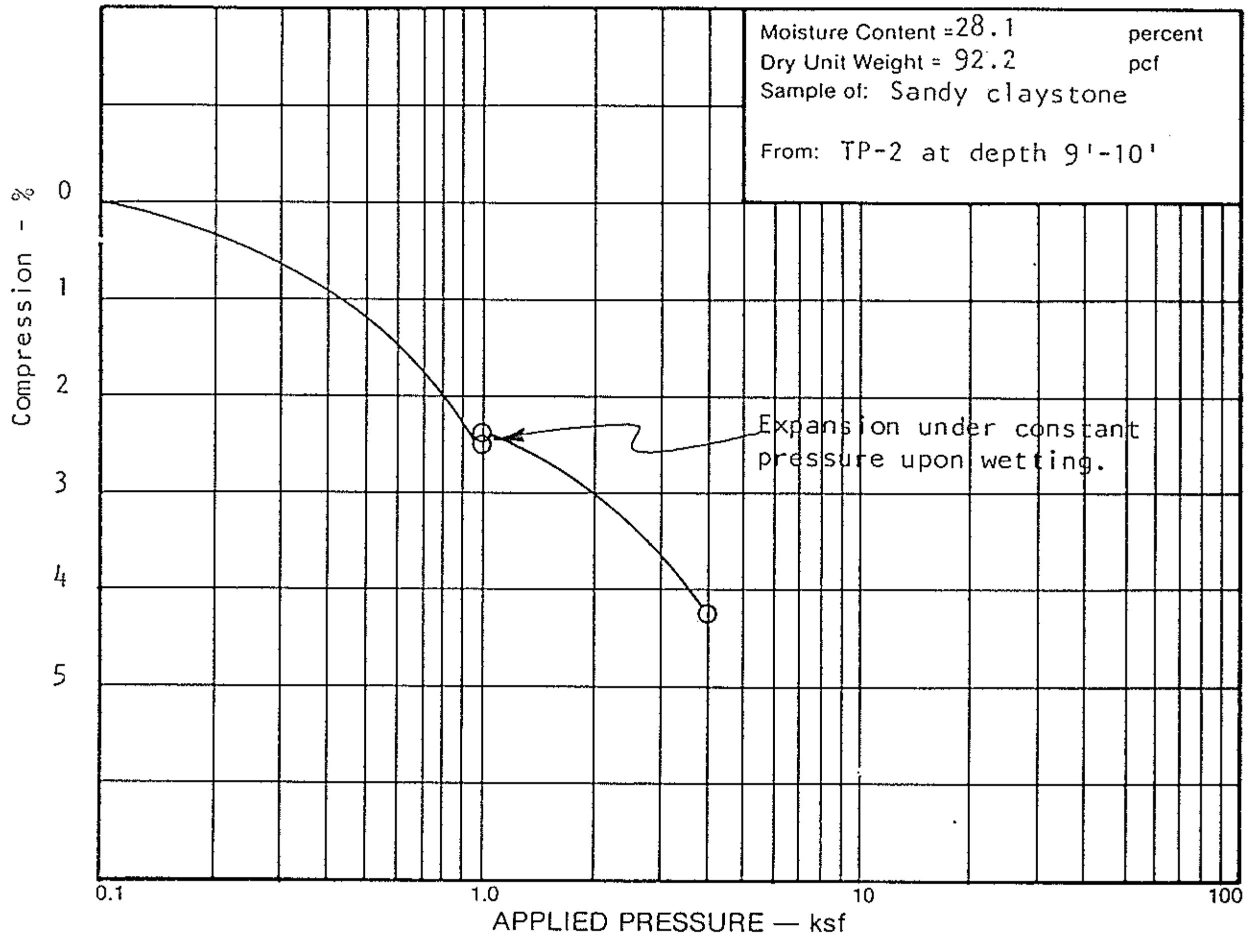
Sincerely,

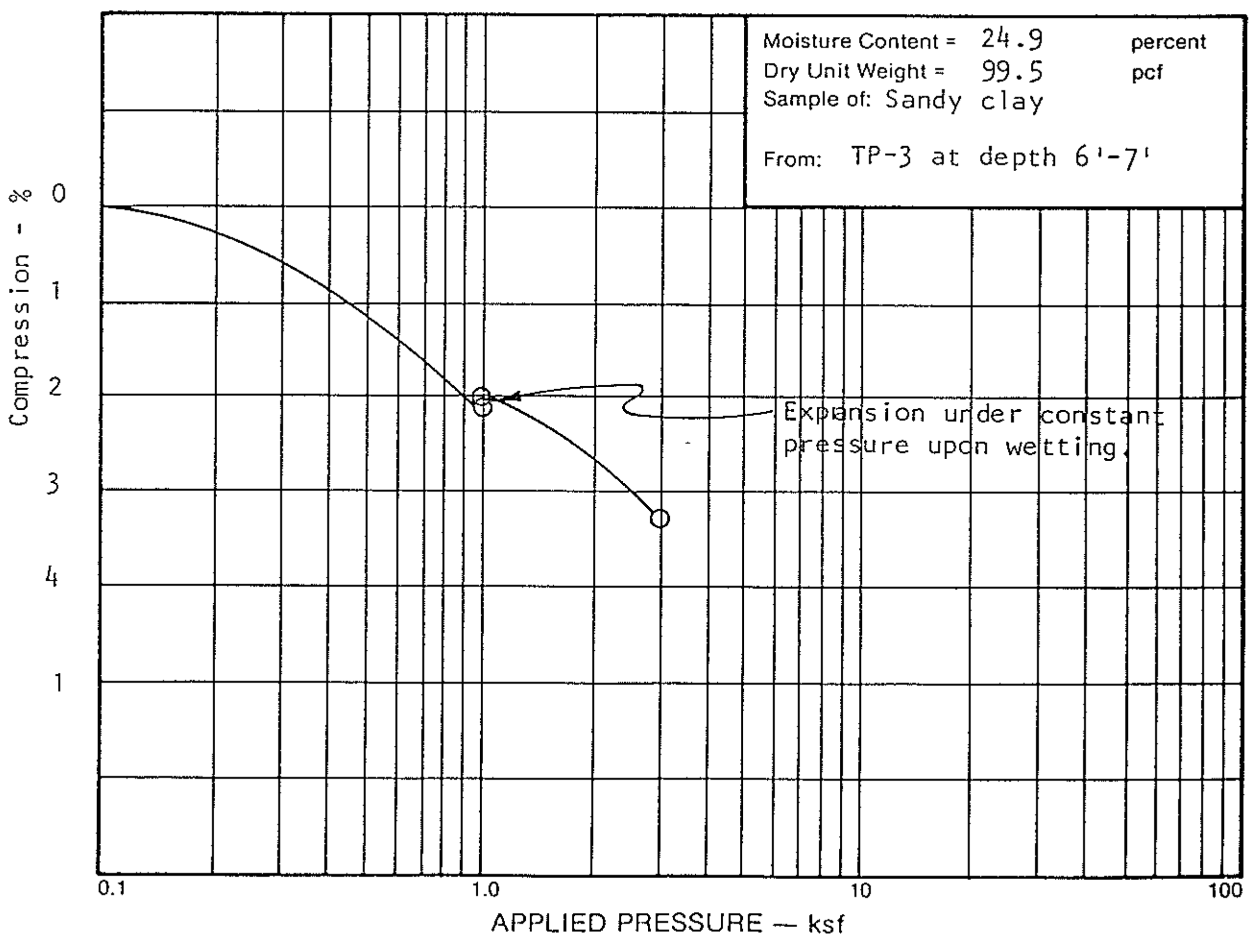
CHEN & ASSOCIATES, INC.

By

Narender Kumar, P.E.

NK/jj
Rev. By: FHC
cc: Parsons and Associates
ATTN: Don Parsons





1 1124 84

SWELL-CONSOLIDATION TEST RESULTS

Fig. 3

TABLE I

SUMMARY OF LABORATORY TEST RESULTS 1 1124 84

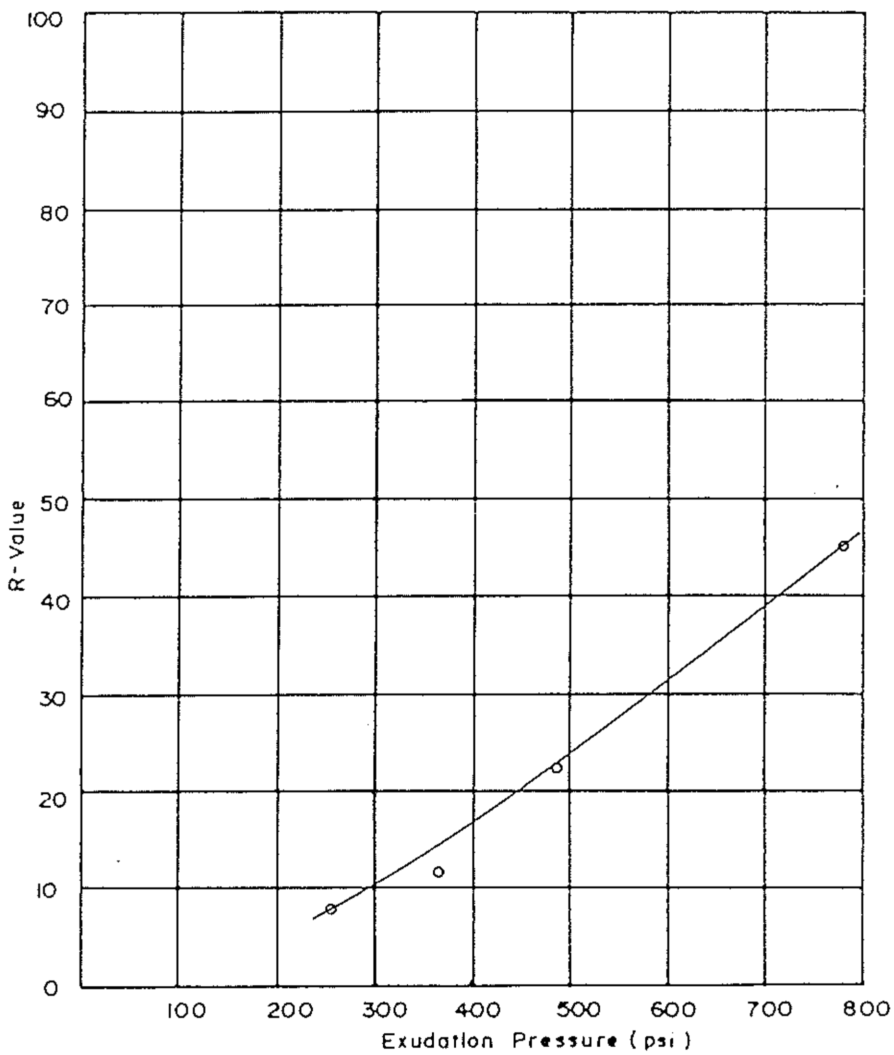
SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION		PERCENT PASSING NO. 200 SIEVE	ATTERBERG LIMITS		pH	WATER SOLUBLE SULFATE (%)	SOIL OR BEDROCK TYPE
Test Pits	DEPTH (FEET)			GRAVEL (%)	SAND (%)		LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
TP-2	9'-10'	24.9	99.5			82	51	36	8.1	0.72	Sandy claystone
TP-3	8'-9'	28.1	92.2			83	57	43	9.0	1.2	Sandy clay
TP-7	18'-19'	13.3	-			73	34	23	8.1	0.044	Sandy clay

TABLE II

ELECTRICAL RESISTIVITY

Test Pits	Depths	Moisture Content	Resistivity (ohm-cm)
2	9'-10'	7.9	18,800
		14.5	840
		27.9	280
		41.2	240
3	8'-9'	6.9	17,200
		13.1	7,200
		25.5	150
		38.5	110
7	18'-19'	6.7	4,800
		12.9	1,480
		25.5	760
		38.0	720

Test Specimen	1	2	3	4	R-Value (300 psi)
Moisture Content (%)	20.7	19.4	17.4	15.3	
Density (pcf)	105.1	107.1	112.8	119.2	
R-Value by Exudation Pressure	8.8	11.8	23.0	45.8	8



Soil Type Sandy clay

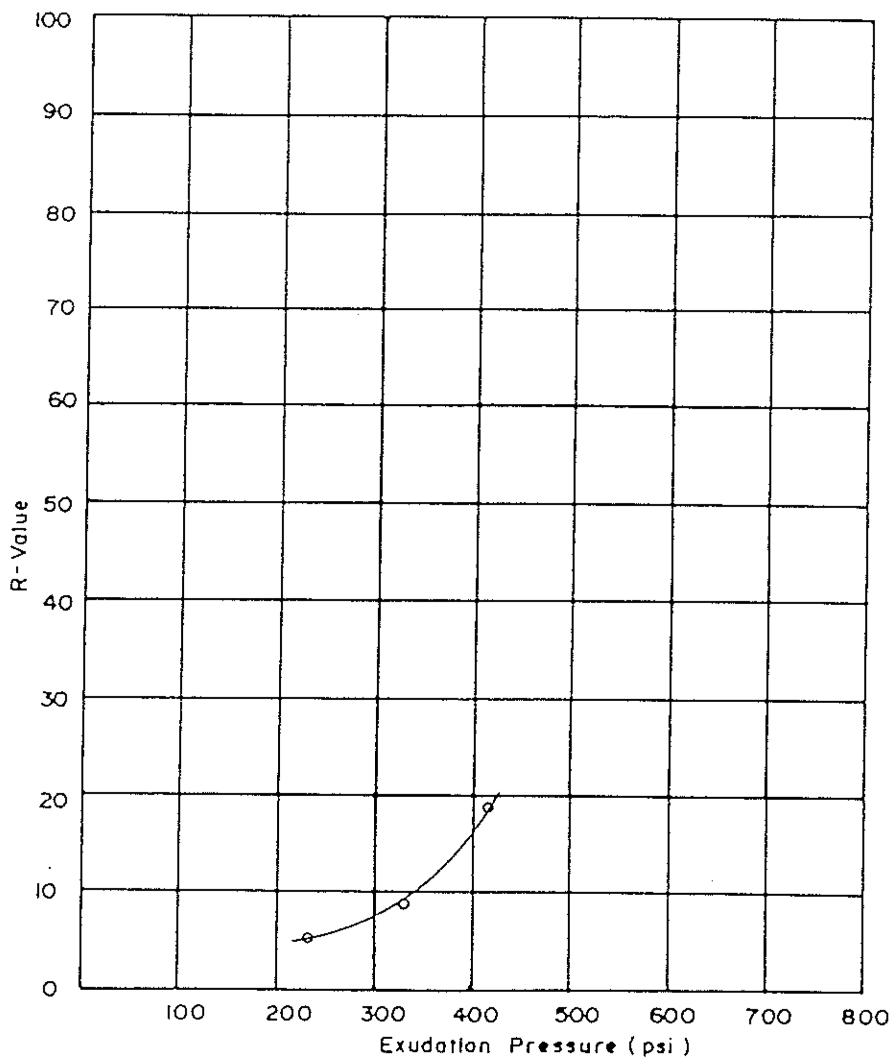
Location Hole 10, 0.5' to 10'

Gravel % Sand 15 % Silt and Clay 85 %

Liquid Limit 43 % Plasticity Index 28 %

1 557 84	chen and associates, inc.	HVEEM STABILOMETER TEST RESULTS	Fig. 12

Test Specimen	1	2	3	4	R-Value (300 psi)
Moisture Content (%)	19.8	18.3	17.4		
Density (pcf)	109.1	112.2	114.1		
R-Value by Exudation Pressure	5.8	9.4	19.3		8



Soil Type Claystone

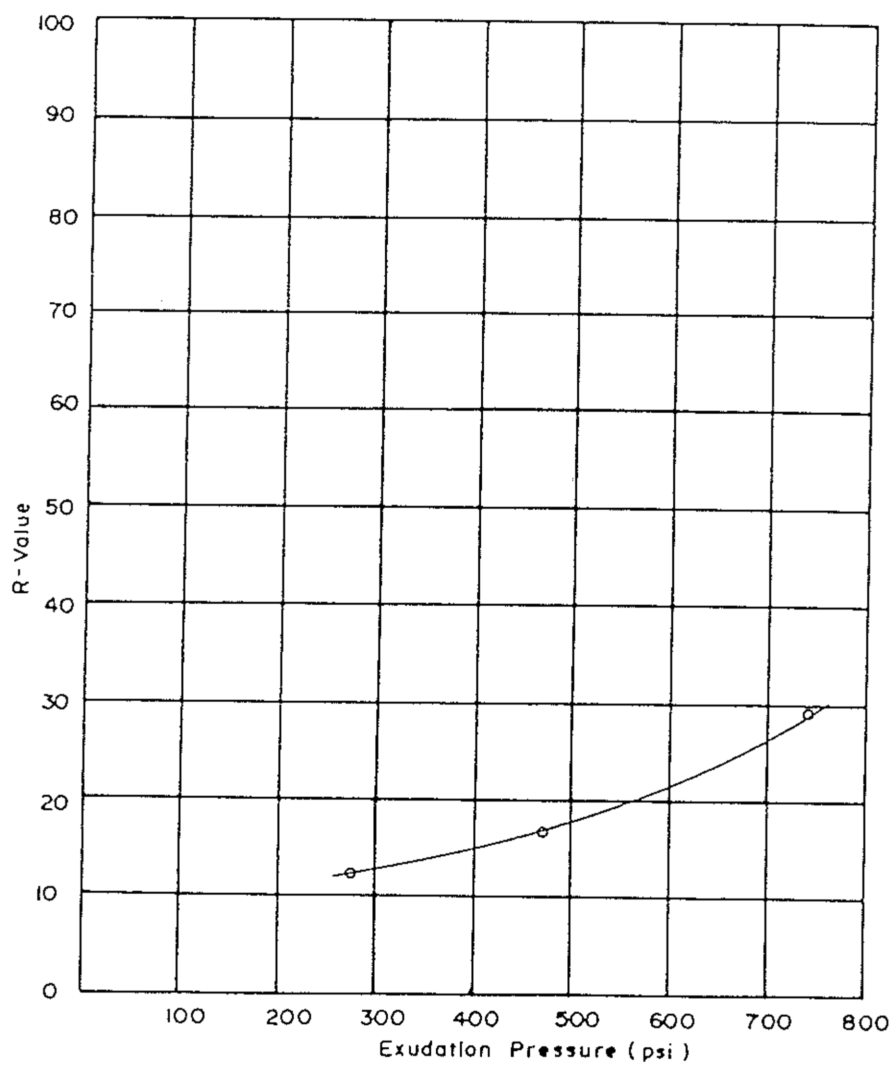
Location Hole 15, 1.5' to 8'

Gravel 0 % Sand 17 % Silt and Clay 83 %

Liquid Limit 51 % Plasticity Index 36 %

1 557 84	chen and associates, inc.	HVEEM STABILOMETER TEST RESULTS	Fig. 13

Test Specimen	1	2	3	4	R-Value (300 psi)
Moisture Content (%)	18.6	17.0	15.1		
Density (pcf)	111.8	114.2	118.0		
R-Value by Exudation Pressure	12.6	17.5	29.3		13



Soil Type Sandy clay

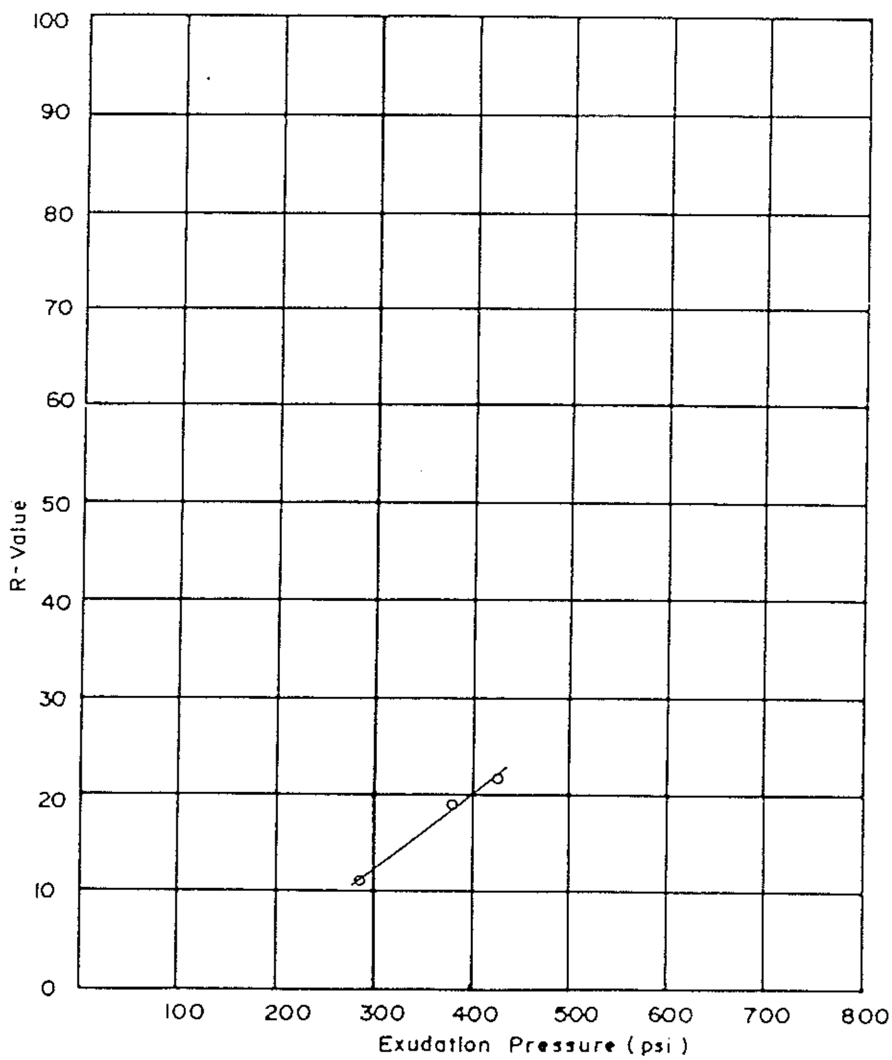
Location Hole 24, 0.5' to 6.0'

Gravel 0 % Sand 19 % Silt and Clay 81 %

Liquid Limit 42 % Plasticity Index 28 %

1 557 84	chen and associates, inc.	HVEEM STABILOMETER TEST RESULTS	Fig.14

Test Specimen	1	2	3	4	R-Value (300 psi)
Moisture Content (%)	16.8	15.8	15.5		
Density (pcf)	114.5	115.1	116.3		
R-Value by Exudation Pressure	11.9	19.6	21.2		12



Soil Type Weathered claystone

Location Hole 26, 0.5' to 6.0'

Gravel 0 % Sand 36 % Silt and Clay 64 %

Liquid Limit 33 % Plasticity Index 16 %

CHEN AND ASSOCIATES

TABLE I

SUMMARY OF LABORATORY TEST RESULTS 1 557 84

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION		PERCENT PASSING NO. 200 SIEVE	ATTERBERG LIMITS		AASHTO CLASSIFICATION	R VALUE	SOIL OR BEDROCK TYPE
HOLE	DEPTH (FEET)			GRAVEL (%)	SAND (%)		LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
1	1	22.8	102.5			85	40	21	A-6(18)		Weathered claystone
3	0.5-6					89	53	36	A-7-6(33)	11	Sandy clay
4	7	13.9	116.5			63	37	17	A-6(9)		Sandy claystone
6	1	22.1	101.2			86	51	33	A-7-6(29)		Sandy clay
7	1	21.1	101.4			89	50	33	A-7-6(31)		Sandy clay
10	0.5-10					85	43	28	A-7-6(23)	8	Sandy clay
13	2	20.6	104.5			93	50	31	A-7-6(31)		Weathered claystone
14	2	21.2	97.5			81	43	26	A-7-6(20)		Fill: sandy clay
15	1.5-8					83	51	36	A-7-6(30)	8	Claystone
17	2	16.7	111.6			67	37	19	A-6(11)		Sandy claystone
19	6	21.1	105.1			75	46	29	A-7-6(21)		Sandy clay

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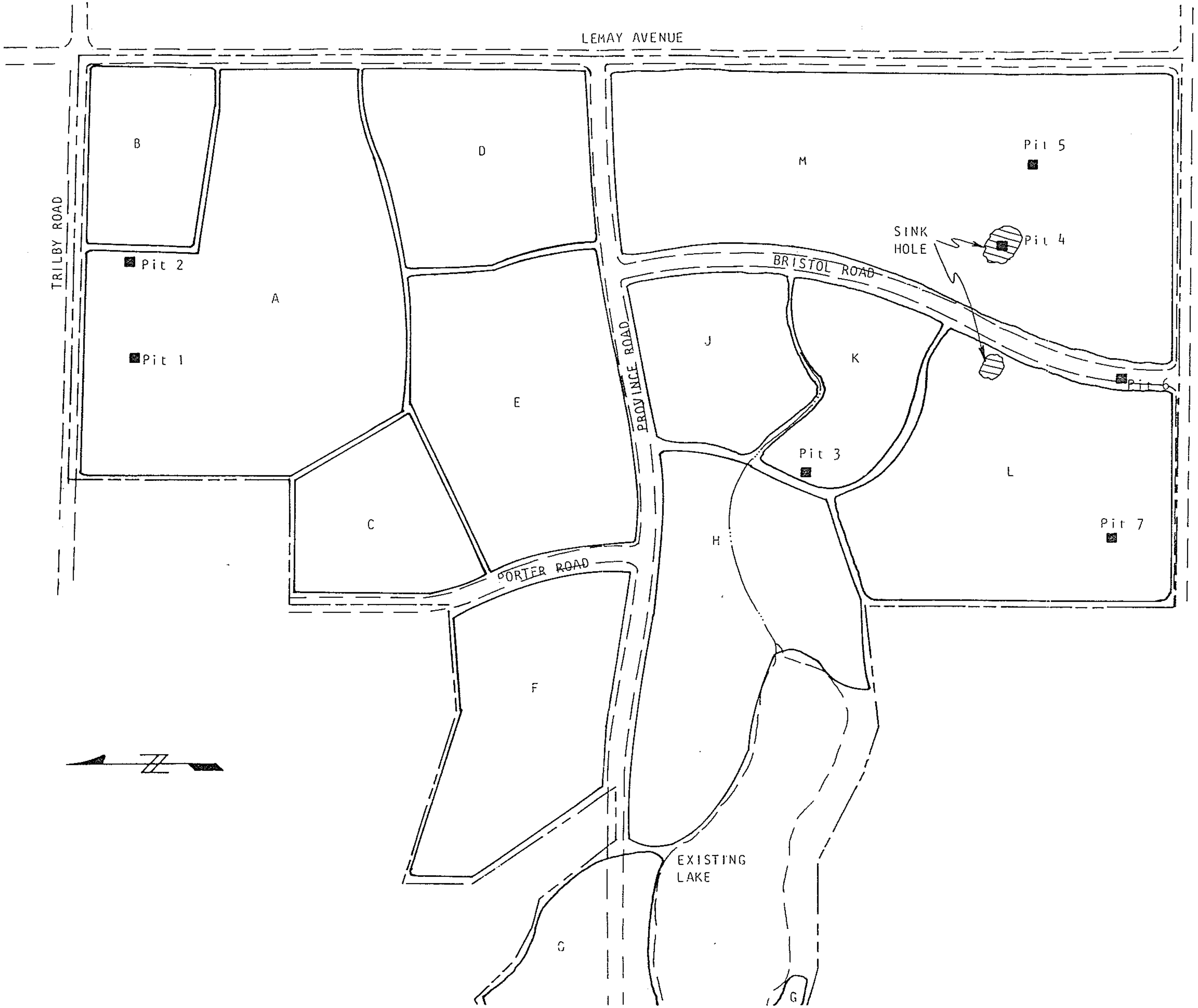
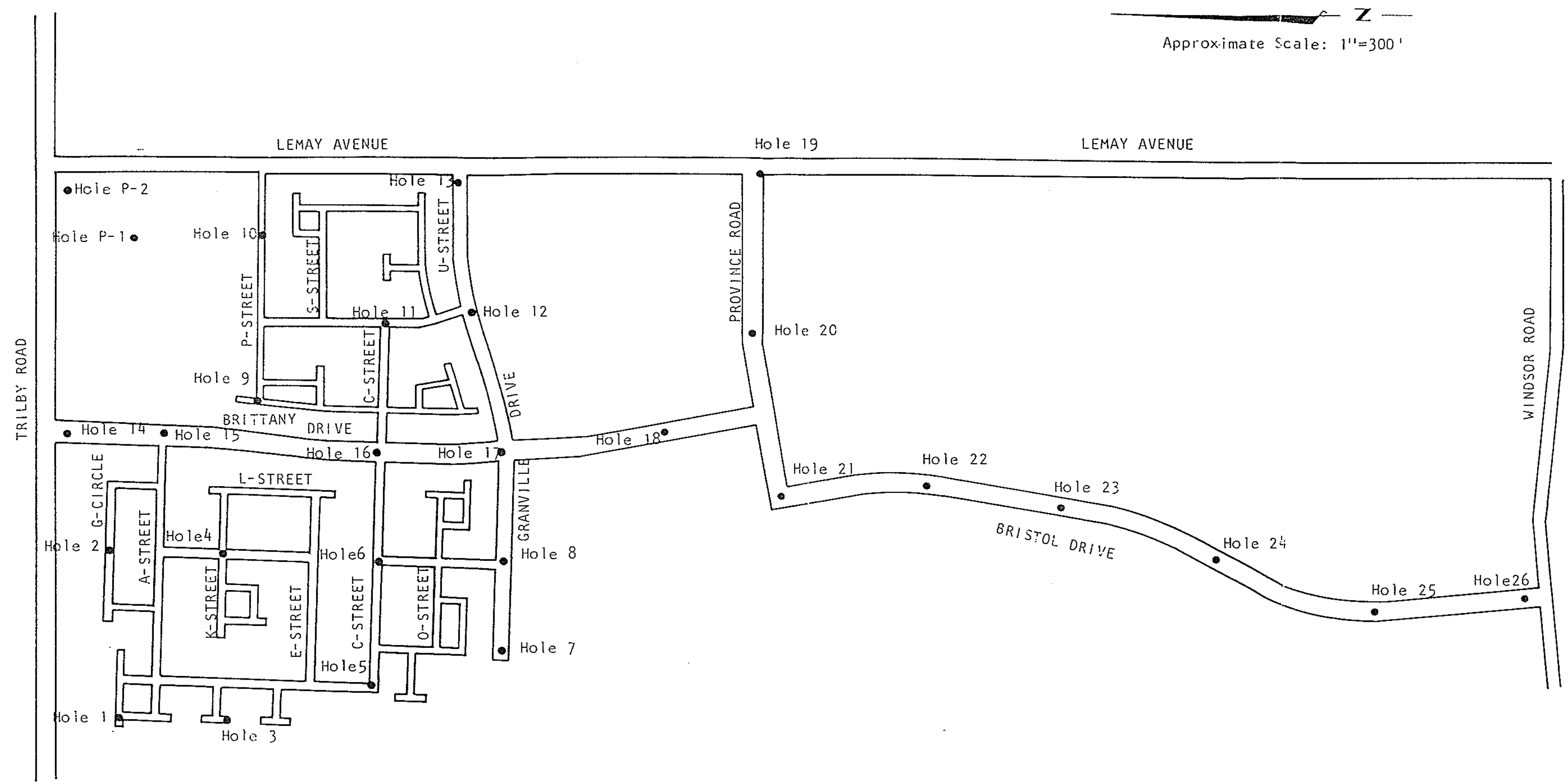
TABLE I

SUMMARY OF LABORATORY TEST RESULTS 1 557 84

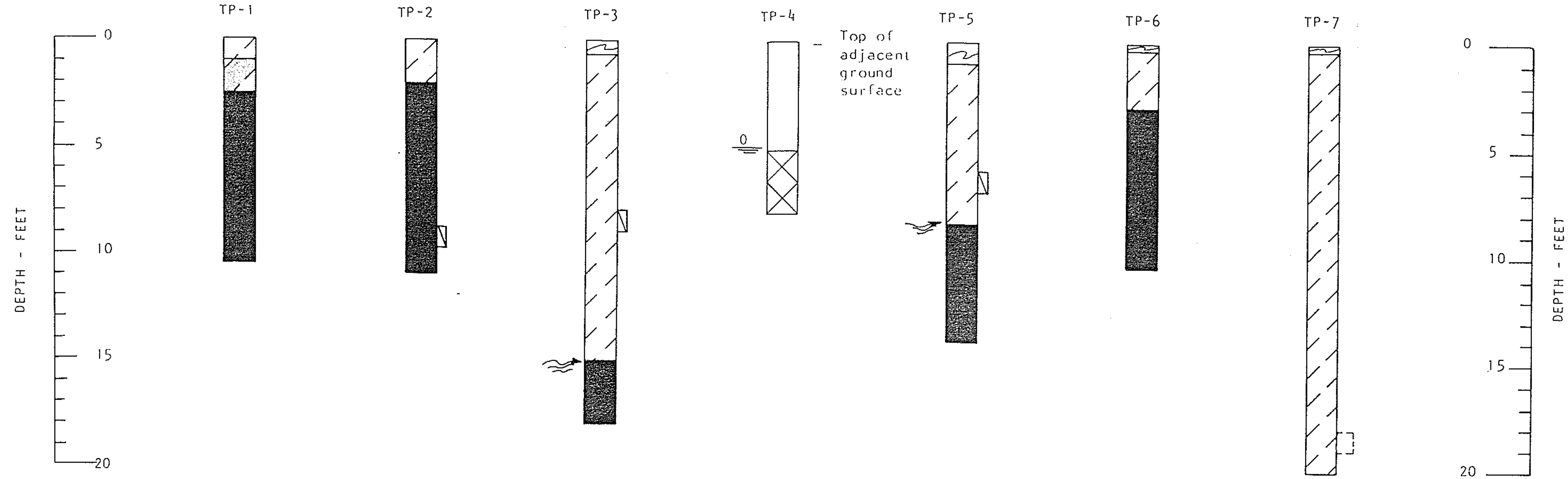
Sample Location: Hole	Sample Location: Depth (feet)	Natural Moisture Content (%)	Natural Dry Density (PCF)	Gradation: Gravel (%)	Gradation: Sand (%)	Percent Passing No. 200 Sieve	Atterberg Limits: Liquid Limit (%)	Atterberg Limits: Plasticity Index (%)	Unconfined Compressive Strength (PSF)	R Value	Soil or Bedrock Type
21	1	18.5	108.5			70	41	26	A-7-6(16)		Sandy clay
23	2	18.9	108.2			78	38	20	A-6(14)		Weathered claystone
24	0.5-6					81	42	28	A-7-6(22)	13	Sandy clay
26	0.5-6					64	33	16	A-6(9)	12	Weathered claystone
P-1	2	19.0	107.5			78	42	26	A-7-6(19)		Sandy clay
P-2	1	22.6	101.2			68	39	23	A-6(13)		Fill: sandy clay



1 1124 84	Chen & Associates	PROVINCE TOWNE	LOCATION OF EXPLORATORY HOLES	Fig. 1



1 557 84	Chen & Associates	BRITTANY PLACE, FORT COLLINS, CO	LOCATION OF EXPLORATORY HOLES	Fig. 1



Topsoil

Fill, sandy clay, scattered debris including bottles, metal pipes and clay pipes, very soft, soggy, wet, brown.

Clay (CL), sandy to very sandy, medium stiff to very stiff, slightly moist to very moist, brown.

Weathered claystone bedrock, sandy, firm, brown.

Claystone bedrock, sandy, occasional thin cemented sandstone lenses, medium to very hard, moist, brown and black.

Hand drive sample

Disturbed bulk sample

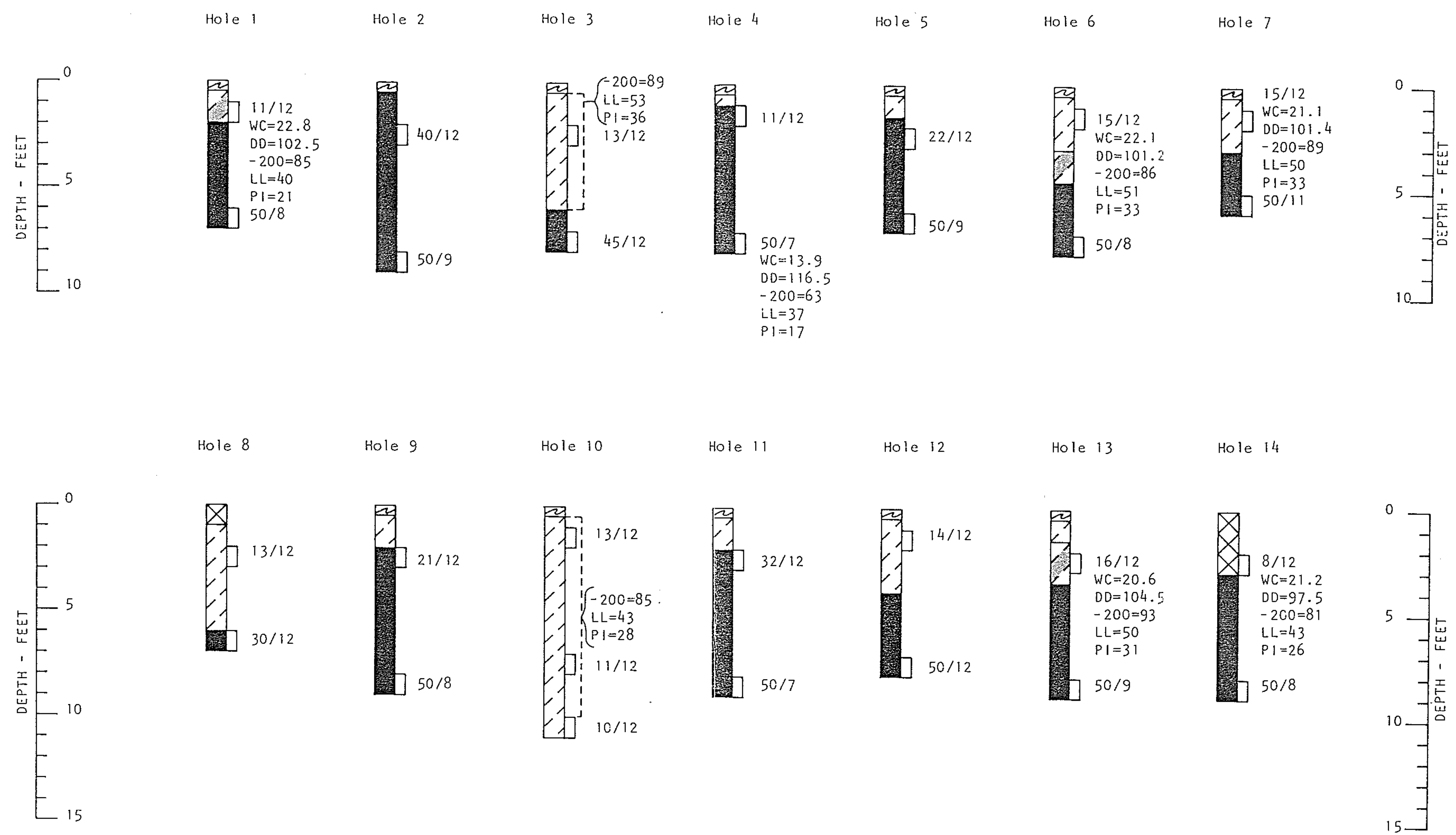
Water flowing into the pit

0 Depth to water level and number of days after drilling measurement was made.

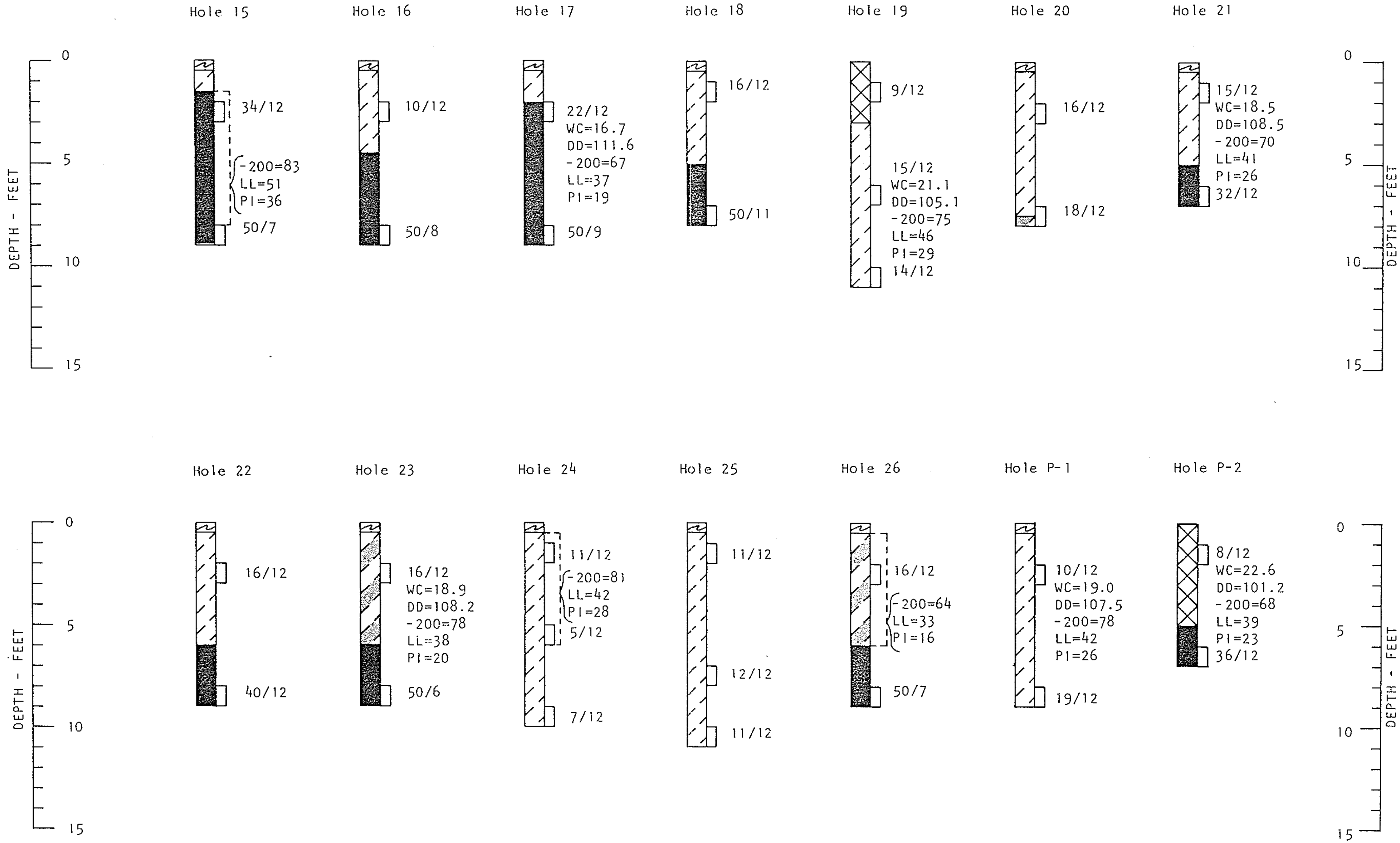
NOTES:

1. Test pits were excavated with Bantam 266 backhoe.
2. Locations of test holes were measured approximately by pacing from features shown on the site plan provided.
3. Elevations of test holes were not measured and logs of test holes are drawn to depth.
4. Water level readings shown on the logs were made at the time and under conditions indicated. Fluctuations in the water level may occur with time.

1 1124 84	**Chen & Associates**	LEGEND AND NOTES	**Fig.** 2



1 557 84	**Chen & Associates**	BRITTANY PLACE, FORT COLLINS, CO.	LOGS OF EXPLORATORY HOLES	Fig.2



1 557 84	**Chen & Associates**	BRITTANY PLACE, FORT COLLINS, CO.	LOGS OF EXPLORATORY HOLES	**Fig.** 3

LEGEND:

Topsoil

Fill, sandy clay, moist, brown.

Clay (CL-CH), sandy, medium to very stiff, moist, olive and brown.

Weathered claystone, sandy, firm, moist, olive and brown.

Claystone bedrock, hard to very hard, moist, olive and brown.

Drive sample, 2-inch I.D. California liner sample.

11/12 Drive sample blow count. Indicates that 11 blows of a 140-pound hammer falling 30 inches were required to drive the California sampler 12 inches.

Disturbed bulk sample.

NOTES:

1. Test holes were drilled on May 8 and May 10, 1984 with a 4-inch diameter continuous flight power auger.

2. Locations of test holes were measured approximately by taping from features shown on the site plan provided.

3. Elevations of test holes were not measured and logs of test holes are drawn to depth.

4. The test hole locations should be considered accurate only to the degree implied by the method used.

5. The lines between materials shown on the test hole logs represent the approximate boundaries between material types and the transitions may be gradual.

6. No free water was encountered in the test holes at the time of drilling. Test holes were backfilled immediately after completion of drilling.

7. Laboratory Test Results:
   WC=Water Content (%);
   DD=Dry Density (pcf);
   -200=Percentage passing No. 200 Sieve;
   LL=Liquid Limit (%);
   PI=Plasticity Index (%).