ACADEMY CONSULTING CORPORATION

PRELIMINARY

GEOTECHNICAL SOILS EVALUATION

PROJECT NO:

0604-3086-F

UPDATED:

May 12, 2007

PROJECT SITE:

At Van Buren Boulevard and Clay Street
Riverside, California

ASSESSOR'S PARCEL NUMBERS:

163-300-001 & 163-400-006
Riverside County

PREPARED FOR:

Bill Gabel
c/o Jack Henderson
Santa Rosa Developers
200 South Main Street, Suite 200
Corona, California 92882

PMB C-233, 31735 Riverside Dr., Lake Elsinore Ca. 92530, Tel (951) 245-2200 Fax (951) 245-4211

ACADEMY CONSULTING CORPORATION

Updated: May 12, 2007

Bill Gabel
c/o Jack Henderson
Santa Rosa Developers
200 South Main Street, Suite 200
Corona, California 92882

SUBJECT: PRELIMINARY GEOTECHNICAL SOILS EVALUATION FOR THE SITE LOCATED AT VAN BUREN BOULEVARD AND CLAY STREET, RIVERSIDE, ASSESSOR'S PARCEL NUMBERS 163-300-001 & 163-400-006, RIVERSIDE COUNTY, CALIFORNIA.

Dear Mr. Gabel:

In accordance with your request and authorization, we have prepared this report of the Preliminary Geotechnical Evaluation conducted for the above subject site.

This report presents our findings, conclusions, and recommendations based on the limited scope of field evaluation at the time and location of our site review and may not represent conditions at other times or locations. By incorporating the "limitations" herein, there are no presentations and/or warranties, expressed, or implied to uniformity, chemical characteristics or merchantability of the property. Additional costs must be anticipated depending on future findings, regulatory requirements, or any other conditions. No specific design plans were available at the time of our soil evaluation.

If you have any questions regarding this report or if we may be of further assistance, please contact our office at your convenience. We appreciate this opportunity to be service to you.

Respectfully submitted,

FOR ACADEMY CONSULTING CORP.

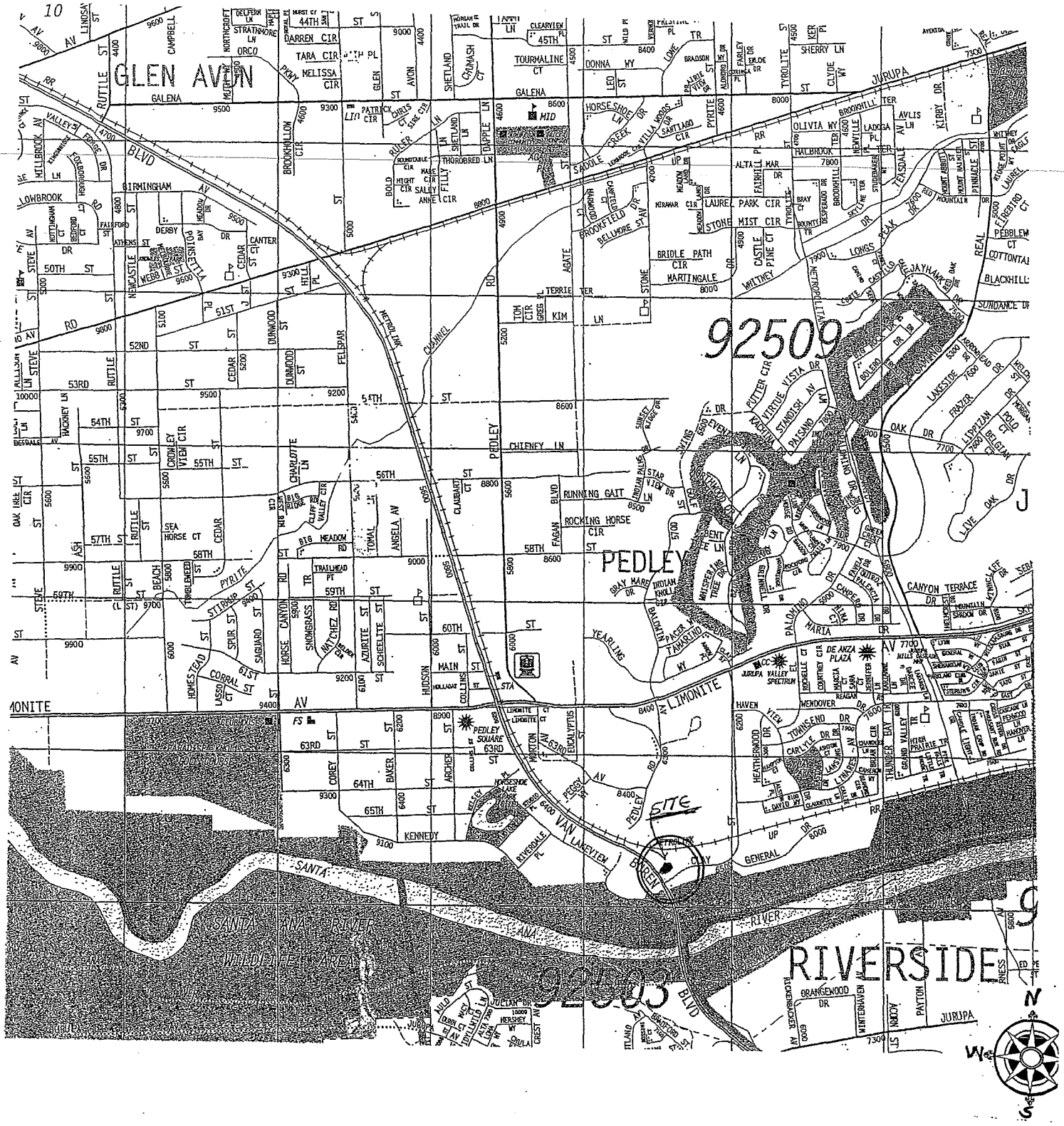
By Fred Jaleh M.S., P.E.

FJ:jlk

Enclosures

REGISTERED PROFESSIONAL ENGINEER
FRED JALEH CHIAN
GE 00433
EXP. 3/31/2010
GEOTECHNICAL
STATE OF CALIFORNIA

VICINITY MAP



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1.1 SCOPE OF EVALUATION

The scope of this evaluation included performing the following:

* *Review of available literature, reports, and maps pertinent to the site.*

* *Subsurface evaluation consisted of excavating four exploratory trenches to a maximum of 11.0 feet deep. The trenches were logged to determine subsurface soil deposit structures. Representative samples were obtained of surficial and subsurface materials for laboratory testing. The approximate locations of the exploratory trenches are shown in Enclosure A.*

* *Laboratory analysis of selected representative bulk samples for shear strength, maximum density, soluble sulfate, and expansive potential.*

* *Preparation of this report presenting our findings, conclusions, and recommendations.*

2.1 PROJECT DEVELOPMENT

It is our understanding that the proposed development is for commercial use and as self storage facilities.

Grading of the lot is anticipated to entail cuts and fills varying in depth.

3.1 SITE DESCRIPTION

The subject site is located at Van Buren Boulevard and Clay Street, in Riverside, Riverside County, California. The property is mostly accessible at this time, however, during field investigation access was limited to approximately 20 percent. The property is relatively flat. No signs of any water wells, natural water courses or rock outcroppings were observed on the property. Property previously used as concrete batch plant, sand and gravel storage area. During our original site evaluation all previous structures were being demolished and removed. Depth of removal within limited area is estimated to be within 20.0 to 30.0 feet.

3.2 SUBSURFACE EVALUATION LABORATORY TESTING

Four exploratory trenches were excavated in order to determine the conditions of the near-surface natural material. The trenches were logged, in-place moisture and density of the exposed materials were recorded, and representative bulk and relatively undisturbed samples were collected for laboratory testing.

Laboratory testing consisted of determining the in-place moisture density, maximum dry density, expansion potential, soluble sulfate content, and remolded direct shear. In-place moisture densities are shown in the trench logs (Enclosure A), and the laboratory test results are summarized in Enclosure A.

3.3 EARTH UNITS

Surficial deposits mantle the entire project site to the depth explored. These soils are silty sands.

4.1 GENERAL SITE GRADING

All grading shall be performed in accordance with the General Earthwork and Grading Specifications (Enclosure C), and the specifications of the local agencies should be implemented into the design of the proposed site. Prior to grading, deleterious trash and vegetation should be removed and hauled off-site. All areas prepared and approved to receive fill should be scarified, moisture conditioned, and compacted to a minimum of 90 percent relative compaction prior to fill placement. All non-engineered fill shall be removed to undisturbed approved depth. Due to previous demolition and removal activity, depth of removal within central portion of the property may vary significantly from 5 feet to approximately 30 feet. Depth of grading and removal and re-compaction to be determined during grading.

5.1 GROUNDWATER

No groundwater or evidence of seepage was encountered within the exploratory trenches at the time and location of trenching. However, subsurface conditions are known to vary significantly within vicinity of this site. Based on our information from Department of Water Resources groundwater may be below 50 feet.

6.1 CONSOLIDATION/COLLAPSE POTENTIAL

Considering the on-site low in-place densities, the susceptibility for consolidation/collapse under the proposed load is anticipated within the upper 5 feet throughout the site. However, all non engineered fill to be removed to depth considered competent by the soil engineer.

6.2 EXPANSION POTENTIAL/SOLUBLE SULFATE

Based on the laboratory test results, the on-site soils are primarily silty sand and are expected to have a low potential for expansion. The soluble sulfate tests indicated a soluble sulfate content negigible; therefore, Type II cement can be used for concrete works. However, at the conclusion of grading additional testing to be performed to address the issue more appropriately.

6.3 LIQUEFACTION

Liquefaction is a phenomenon in which cyclic stresses, produced by earthquake induced ground motion, create excess pore pressure in relatively cohesionless, loose soil. Historic groundwater is below 50 feet, no groundwater encountered during our excavation and densities are relatively dense at lower depth. Therefore, the potential for liquefaction at the subject site is considered negligible.

7.1 REMOVALS

Partial or complete removal of compressible surface and subsurface materials will be necessary during grading. The overexcavation materials may be moisture-conditioned and recompacted as structural fill. All non engineered fill shall be removed to undisturbed natural ground or suitable depth.

The actual depth and extent of required removals will be determined during earthwork operations based on-in-grading inspection; however, for planning purposes, the following shall be implemented:

1. *Area with man made non engineered fill shall be removed to competent undisturbed depth within previous structural removal area. This may extend between 5 to 30 feet to be determined by soil engineer during grading.*

2. *All other natural undisturbed area to be removed to minimum depth of 5 feet and replaced with minimum compaction of 90 percent of maximum density.*

3. *Minimum 36 inches of compacted fill material to be provided for all areas with structural use.*

7.2 CUT/FILL SLOPE

Proposed slopes within the site is proposed to be 2:1 or shallower grading with maximum elevation drop of 15 feet, mostly would be slope improvements along Van Buren Boulevard. No sign of any instability observed in this area.

8.1 REGIONAL GEOLOGIC SETTING

Regionally, the site is located in the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are characterized by steep, elongated valleys that trend west to northwest. The northwest-trending topography is controlled by the Elsinore fault zone, which extends from the San Gabriel River Valley southeasterly to the United States/Mexico border. The Santa Ana Mountains lie along the western side of the Elsinore fault zone, while the Perris Block is located along the eastern side of the fault zone. The mountainous regions are underlain by Pre-Cretaceous, metasedimentary and metavolcanic rocks and Cretaceous plutonic rocks of the Southern California Batholith. Tertiary and Quaternary rocks are generally comprised of non-marine sediments consisting of sandstone, mudstones, conglomerates, and occasional volcanic units.

8.2 LOCAL GEOLOGIC AND SOIL CONDITIONS

Fill overlying granitic bedrock exists at the site. Fill materials were encountered to a depth of 2 to 4 feet and consisted of gravelly sand with pieces of concrete and crushed rock that was found to be dry and loose in-place. Granitic bedrock was encountered below the fill materials to the maximum depth explored (11 feet). Granitic bedrock was found to be moist and dense in-place.

8.3 FAULTING

The nearest active fault to the site is the Chino Fault Zone located approximately 15 kilometers to the southwest of the site.

8.4 LANDSLIDES

Landslides were not observed on or near the subject site. No potential of any landslide is anticipated within this site.

8.5 SECONDARY SEISMIC HAZARDS

Secondary effects of seismic activity normally considered as possible hazards to a site include several types of ground failure as well as induced flooding. Various general types of ground failures, which might occur as a consequence of severe ground shaking of the site, include landsliding, ground lurching and shallow ground rupture. The probability of occurrence of each type of ground failure depends on the severity of the earthquake, distance from faults, topography, subsurface soils, groundwater conditions, and other factors. Based on our subsurface exploration, all of the above secondary effects of seismic activity are considered unlikely.

8.6 SEISMIC DESIGN CONSIDERATIONS

Nearest Active Seismic Source is 15 kilometers to the southwest.

Type of Fault is B.

Soil Type is S_D.

Seismic Zone 4.

Near Source Factor $N_a - 1.0$.

Near Source Factor $N_v - 1.0$.

Seismic Zone Factor $Z - 0.4$.

Seismic Coefficient $C_a - 0.44\ N_a$.

Seismic Coefficient $Cv - 0.64\ N_v$.

9.1 SLABS-ON-GRADE
(IF APPLICABLE)

Concrete slabs-on-grade should have a minimum thickness of 4 inches nominal. The final pad surface should be saturated, then rolled to provide a smooth, dense surface upon which to place the concrete. Where moisture-sensitive materials are to be placed on slabs, the slab should be underlain by a moisture barrier (polyethylene plastic vapor barrier). Vapor barriers should have a minimum thickness of 10 mil and should be protected by a 2 inch thick layer of sand above and below in order to reduce the possibility of punctures and to aid in obtaining a satisfactory concrete cure. Prior to placing concrete, the slab subgrade should be moisture-conditioned to a minimum depth of 18 inches between optimum moisture content and 5 percent above optimum moisture content, as tested by the soils engineer. Effort should be made to minimize large moisture content variations in the underlying soils. The slab should be reinforced with #3 rebar, 15 inches on center each direction, doweled into foundation 12 inches.

9.2 UTILITY TRENCH BACKFILL

Utility trenches are anticipated to be excavated using trench equipment in good working condition. The on-site soils are expected to be suitable as trench backfill provided organic matter and cobbles over 4 inches in diameter are removed. Trench backfill should be densified to at least 92 percent relative compaction (ASTM Test Method D-1557-78).

9.3 SLOPE PLANTING AND DRAINAGE

We recommend that all graded slopes within the subject site be planted with groundcover as soon as possible to protect against erosion. Inadvertent oversteepening of cut slopes should be avoided during fine grading and landscaping.

All surface runoff should be collected and directed off-site. Accumulation of surface runoff should be directed off-site by providing a graded swale or an appropriate surface collector and conduit or other suitable outlet. Site runoff should not be permitted to run over the slope.

10.1 ADDITIONAL INSPECTION TESTING SERVICES

The Geotechnical Consultant should provide continuous inspections and testing during grading of the subject site. The recommendations provided in this report are based on preliminary design information and subsurface conditions disclosed by the limited trenches. The outlined subsurface conditions should be verified in the field during construction. The consultant should prepare a final as-grade report and maps summarizing all conditions encountered and any field modification to the recommendations provided herein. The primary aspects of engineering inspection and testing should include:

* *Inspection of all removal and over-excavation.*
* *Inspection and material testing during fill placement.*
* *After pre-saturation of the slab areas, but prior to placement of sand and visqueen.*
* *During utility trench excavation backfilling and re-compaction.*
* *Inspection of footing excavations.*
* *When any unusual conditions are encountered.*

10.2 CONSTRUCTION INSPECTION

All grading operations, including site clearing and stripping, should be inspected by a representative of this firm. The presence of our field representative will be for the purpose of providing observation and field testing, and will not include any supervising or directing of the actual work of the Contractor, his employees, or agents. Neither the presence of our field representative nor the observations and testing by our firm shall excuse the Contractor in any way for defects discovered in his work. It is understood that our firm will not be responsible for job or site safety on this project, which will be the sole responsibility of the Contractor.

Again, it is imperative that no clearing and/or grading operations be performed without the presence of a representative of this firm. An on-site pre-job meeting with the Developer, Contractor, and the Soils Engineer should occur prior to all grading related operations. It should be stressed that operations undertaken at the site without the presence of the Soils Engineer may result in exclusions of certain areas from the final compaction report for the project.

10.3 CONCLUSIONS AND RECOMMENDATIONS

The feasibility of the proposed development depends on the final project plan and strict adherence to the grading and maintenance recommendations.

The findings in this report are based upon data obtained from separate sampling locations at the time within the limited scope of our testing services, on work performed by the contractor or others responsible for uniformity and consistency of the work. Any conditions that appear different or inconsistent with the areas tested must be evaluated by this firm. The test result represents the results at the location, at that time only.

This report or portions thereof that are provided to contractors or others for preliminary information only, should be used as such, and are subject to reevaluation, and changes should be expected during the life of the development.

This report and it's contents are not intended or represented to be suitable for re-use of extensions or modifications of the project, or for use on any other project. Any variance from our prescribed requirements and recommendations would nullify this report, constituting indemnification of this firm, it's employees, and representatives from any and all liabilities and obligations toward any party. Furthermore, this report is valid for only one year from the date of issuance.

Any deviation, for any period of time, must be approved by this firm in writing. Periodic or minimum yearly inspection of any project with any deviation from our expressed requirement herein, is required to be performed by a soil engineer. Any underground leaks, flooding, excavation, and re-grading must be reported and/or performed under the supervision, testing, or written approval of a soil engineer.

This office will be further available to assist in assuring correct interpretation of this report's conclusions and recommendations.

10.4 LIMITATIONS

This report is issued with the understanding that it is the responsibility of the owner to ensure that the information and recommendations contained herein are called to the attention of all parties concerned, including but not limited to: the future owners, agents, designers, and contractors, and that necessary steps are taken to carry out such recommendations under any and all circumstances and conditions.

The interpretation, conclusions, and recommendations contained in this report are based on soil conditions as observed at the time and test locations or field observation, and as in most projects, may not necessarily represent any other areas at any other time. No representation of any kind is made to the quality, uniformity, chemical characteristic of site material, also suitability, merchantability, and/or cost of the final project plan. Furthermore, other conditions that may be encountered or changes in the conditions of the property can occur with the passage of time, whether it be due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation, the broadening of knowledge, or change of the plan. Accordingly, the findings of this report may be invalidated wholly or partially by any change, for any reason. Furthermore, this report is subject to review and revision as changed conditions are identified and a written approval is requested for any use of this report beyond one year, to be negotiated by this firm. This firm may discontinue it's service at any time for nonpayment. Furthermore, the use of this report by any party constitutes indemnification of the staff, representatives, and subcontractors of this firm, and acceptance of the terms and conditions of the "client's" authorization at all times, by all parties. Furthermore, any and all mitigative measures concerning this report should be performed under the supervision of this firm.

The use of this report is subject to a final review and approval of the project plan, building location, and footing inspection by this firm in order to assist in assuring correct interpretation of this report's recommendations for use in applicable sections.

10.5 SUMMARY

1.	*Allowable bearing value:*	*1500 psf*
2.	*Coefficient of friction:*	*0.30*
3.	*Minimum shrinkage:*	*15 percent*
4.	*Expansion:*	*Low*
5.	*Maximum density*	*127.0 pcf*
6.	*Optimum moisture content:*	*10.5 percent*
7.	*Permanent foundation (if applicable):*	
7A.	*Foundation:*	*12 inches wide by 15 inches below lowest adjacent grade reinforced with 2 - #4 bars on top and bottom.*
8.	*Slabs on grade:*	*4 inches = Reinforced with #3 rebar, 18 inches on center each direction, doweled into foundation 12 inches.*
9.	*Internal friction angle:*	*25 degrees*
10.	*Cohesion:*	*175 psf*

11.0 ENCLOSURE A

LABORATORY TESTING PROCEDURES

MOISTURE AND DENSITY TESTS

Moisture content and dry density determinations were performed on relatively undisturbed samples obtained from the test trenches. The results of these tests are presented in the trench logs. Where applicable, only moisture content was determined from "undisturbed" or disturbed samples.

CLASSIFICATION TESTS

Typical materials were subjected to mechanical grain-size analysis by wet sieving from U.S. Standard brass screens. Hydrometer analysis was performed when appreciable quantities of fines were encountered. The data was evaluated in determining the classification of the materials. The grain-size distribution curves are presented in the test data and the Unified Soil Classification is presented in both the test data and the trench logs.

MAXIMUM DENSITY TESTS

The maximum dry density and optimum moisture content of typical materials were determined in accordance with ASTM D-1557-78 (five layers). The results of these tests are presented in the test data.

EXPANSION INDEX TESTS

The expansion potential of selected materials was evaluated by the Expansion Index Test, U.B.C. Standard No. 29-2. Specimens are molded under a given compactive energy to approximately the optimum moisture content and approximately 50 percent saturation or approximately 90 percent relative compaction. The prepared 1 inch thick by 4 inches in diameter specimens are loaded to an equivalent 144 psf surcharge and are inundated with tap water until volumetric equilibrium is reached. The results of these tests are presented in the test data.

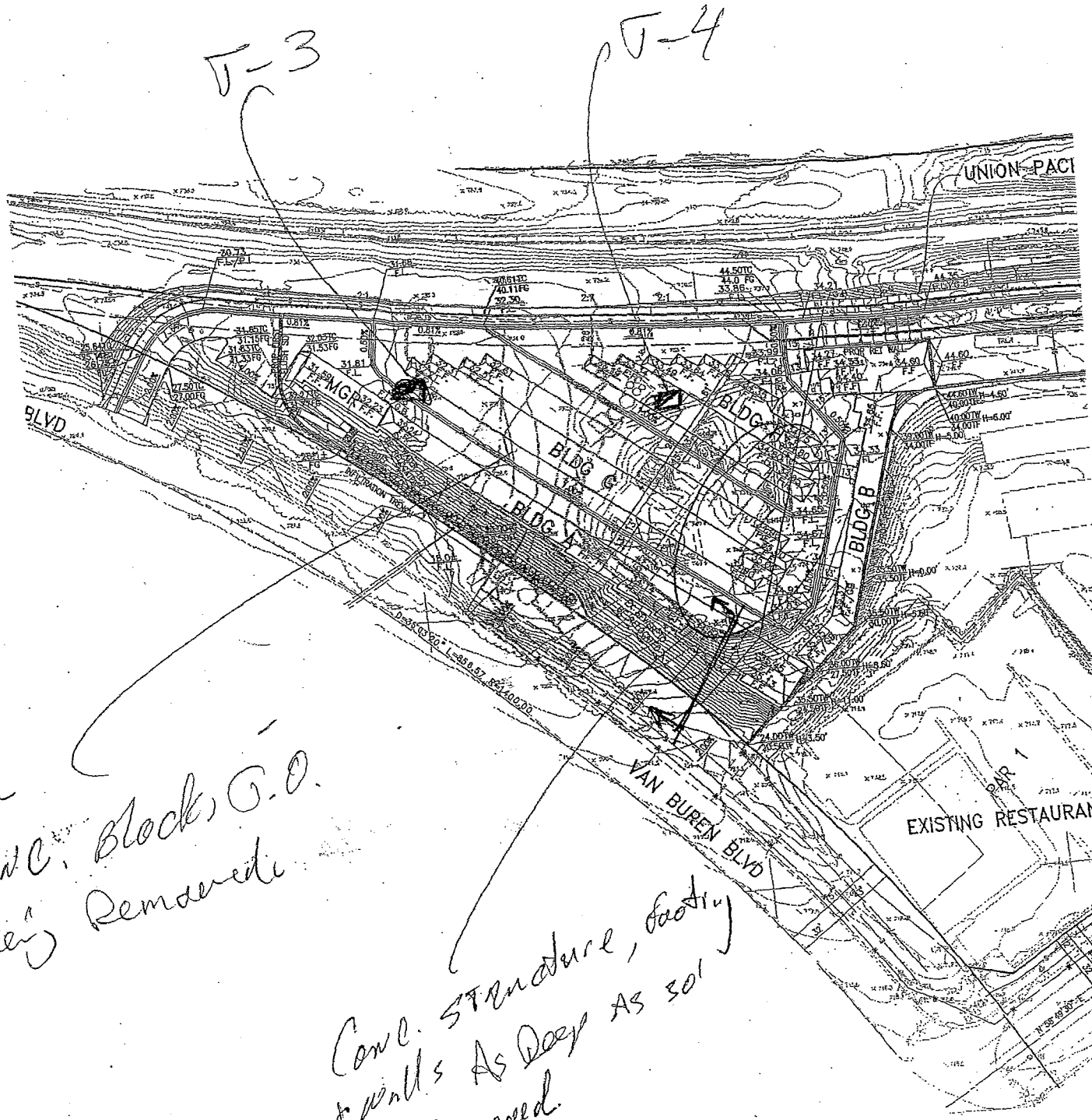
CONSOLIDATION TESTS

Consolidation tests were performed on selected, relatively undisturbed samples recovered from the sampler. Samples were placed in a consolidometer and loads were applied in geometric progression. The percent consolidation for each load cycle was recorded as the ratio of the amount of vertical compression to the original 1 inch in height. The consolidation pressure curves are presented in the test data. Where applicable, time-rates of consolidation were also recorded. A plot of these rates can be used to estimate time of consolidation.

SOLUBLE SULFATES

The soluble sulfate contents of selected samples were determined by the California Materials Method No. 417.

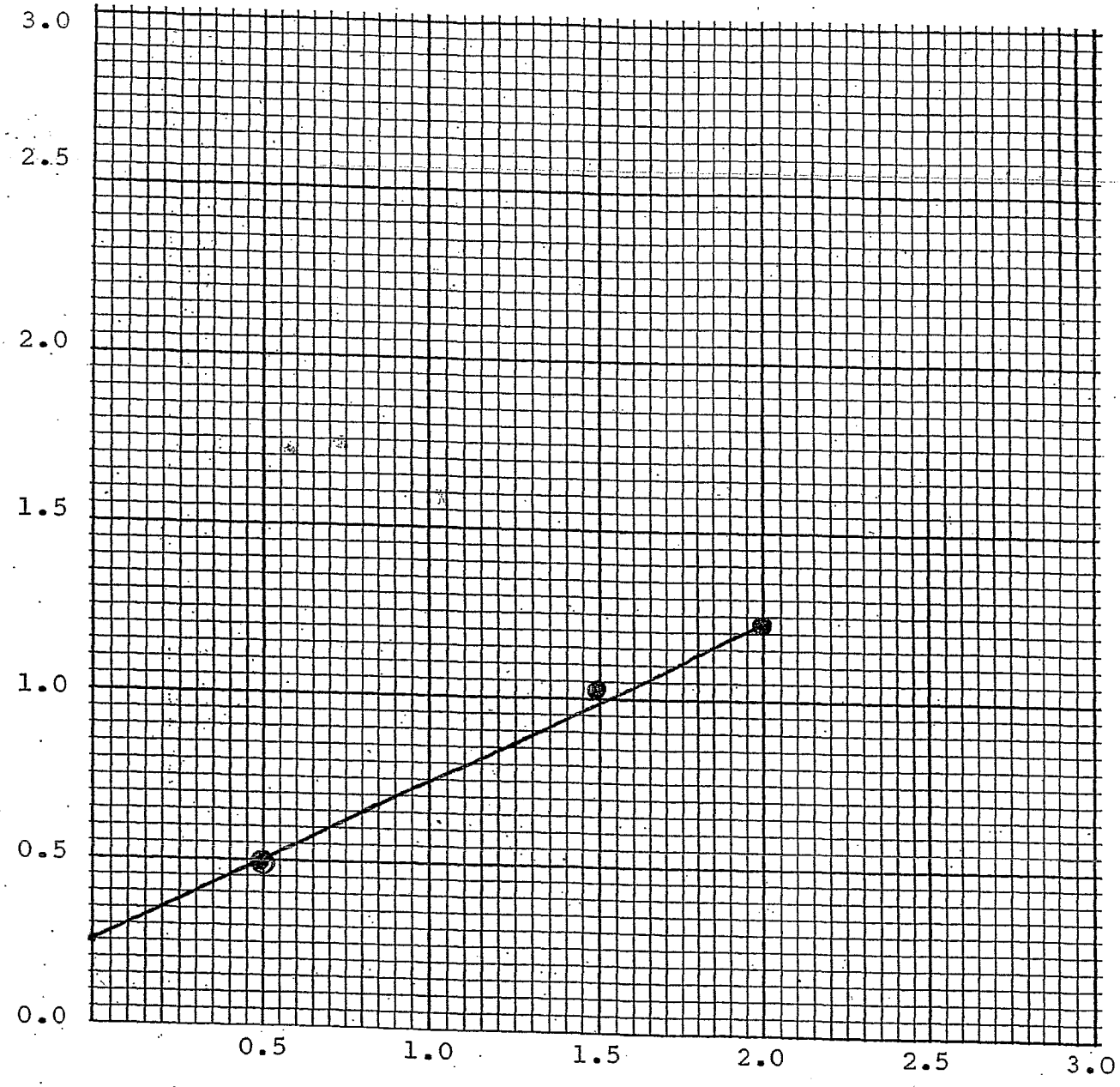
APPROXIMATE TE



Broken Conc. Block, C.O. Bldg Removed

Conc. Structure, footing & walls As Deep As 8'0" Bldg Removed.

PROJECT NO. 0604-3086 TRENCH# T-2 SAMPLE# 1 DEPTH 5.0'



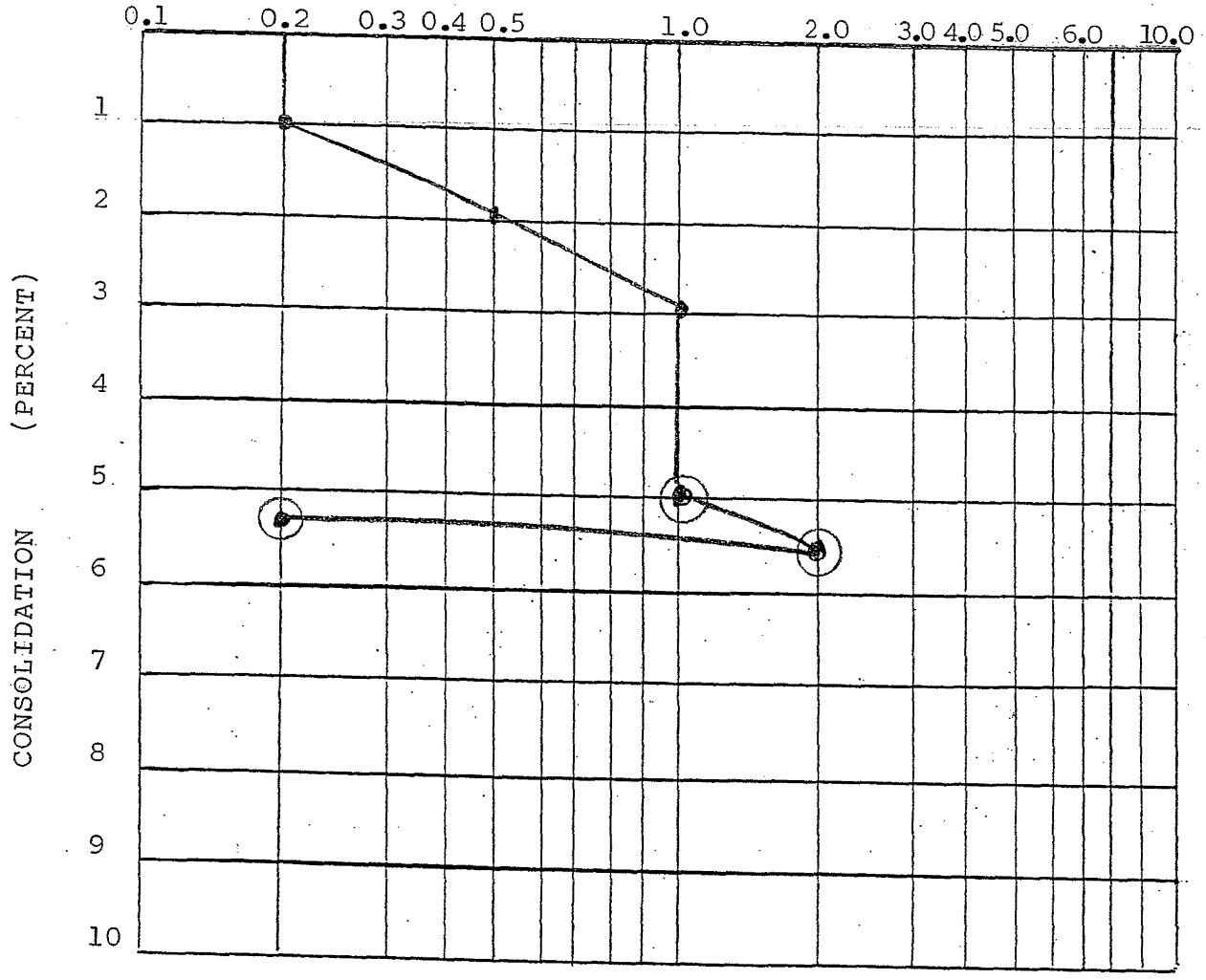
NORMAL LOAD IN KSF

SAMPLE TEST CATEGORIES

✓	Remolded	Ultimate Shear Strength	
	Undisturbed	Normal Shear Strength	
✓	Saturated	Angle of Friction (degrees)	25
	Dry	Cohesion Strength (PSF)	250

CONSOLIDATION CURVE

PRESSURE - KIPS / SQUARE FOOT



PROJECT# 3086-F TRENCH/BORING# 1 SAMPLE# _____ DEPTH 3'

Moisture Before Test _____

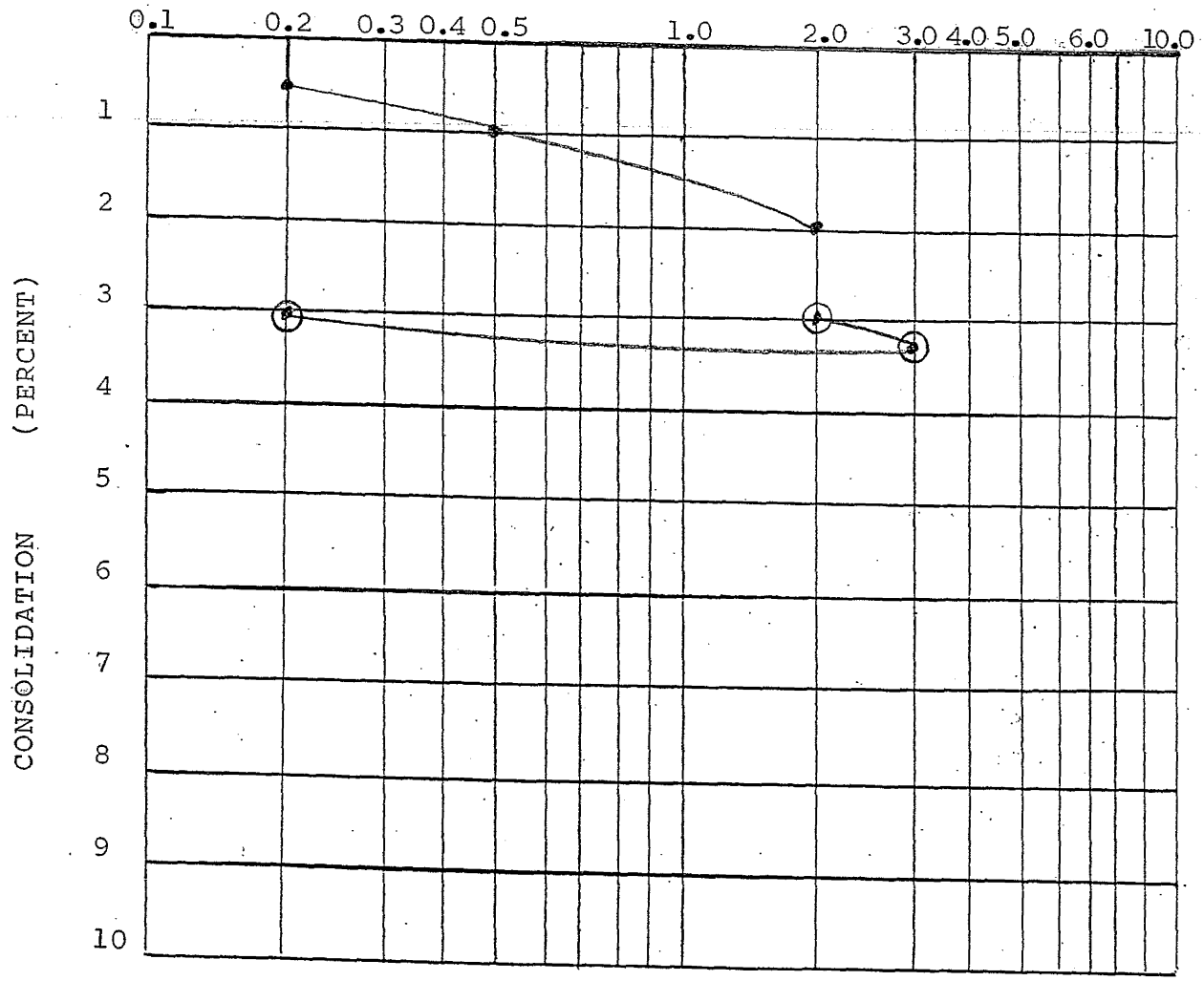
Moisture After Test _____

CONSOLIDATION SYMBOLS: • NATURAL MOISTURE CONTENT

⊙ SATURATED

CONSOLIDATION CURVE

PRESSURE - KIPS / SQUARE FOOT



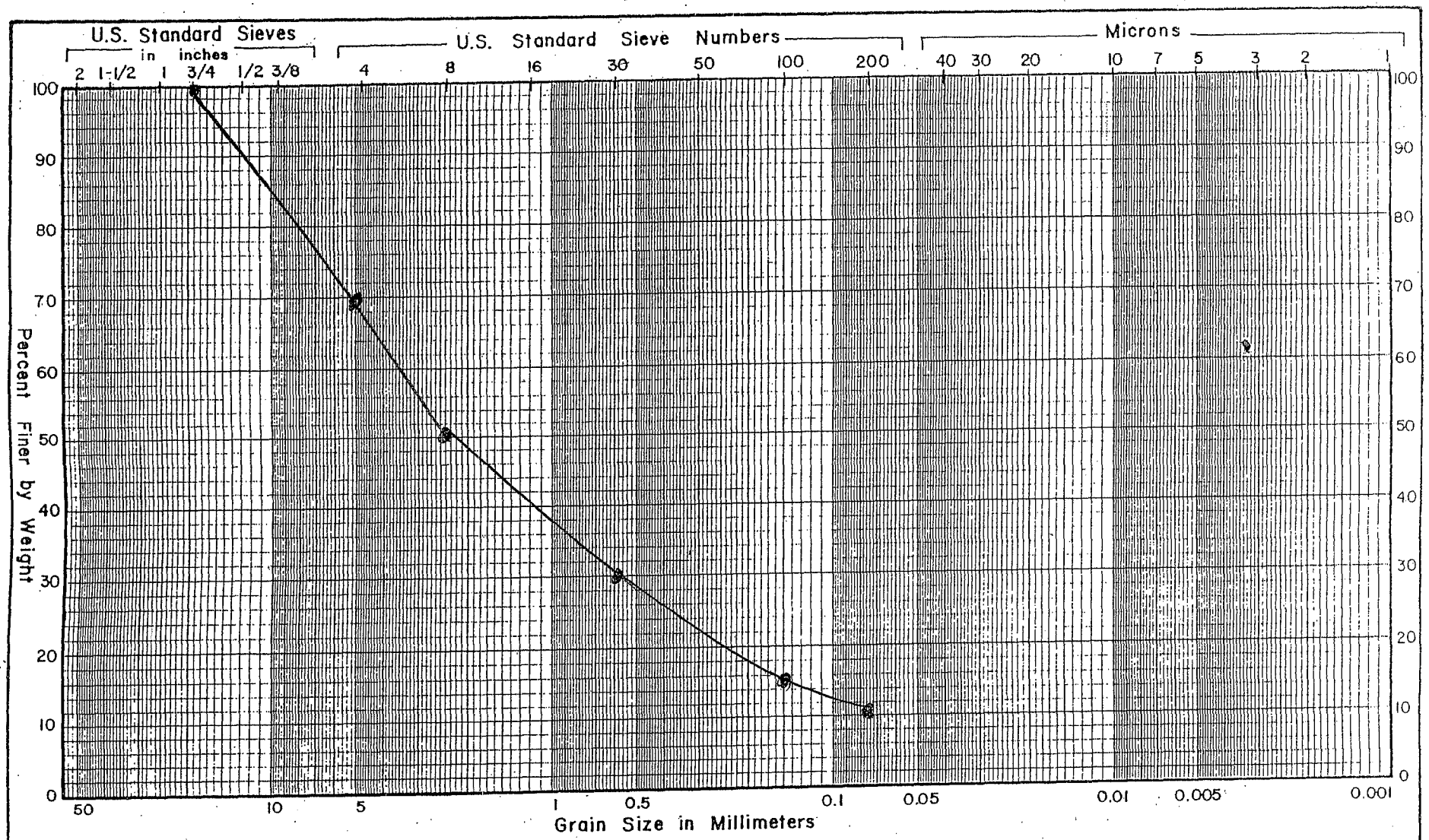
PROJECT# 3086-F TRENCH/BORING# 2 SAMPLE# _____ DEPTH 5'

Moisture Before Test _____

Moisture After Test _____

CONSOLIDATION SYMBOLS: • NATURAL MOISTURE CONTENT

⊙ SATURATED



Gravel		Sand			Silt or Clay
Coarse	Fine	Coarse	Medium	Fine	

Symbol	Hole No.	Sample No.	Depth or Elev.	Field Moisture (%)	LL (%)	PI (%)	Activity PI/-2u	Cu D_{60}/D_{10}	Cc $\frac{(D_{30})^2}{D10 \times D60}$	Percent Passing No. 200	Percent Passing 2u	U.S.C.S.

GRADATION

3086-F

3.0' T-2

TRENCH LOG

DATE: 05/18/06 HOLE #: T-1

PROJECT SITE: At Van Buren Boulevard and Clay Street, Riverside, California. TECH: FJ RIG: Backhoe

DEPTH FEET	GRAPH	#	BLOW COUNT	DRY DENSITY	MOISTURE %	SOIL	GEO DESCRIPTION
01							Gravelly sand, fine to coarse, tan gray in color, fill, few blocks
02	2.0			110.5	2.3		of concrete.
03	3.5			118.9	4.8		
04							4′ Silty sand, sandy, decomposed granite,
05	5.0			118.5	5.2		relatively moist, dense, tan brown in color.
06							
07							
08							8′
09							Very Dense.
10							
11							11′
12							End of Trench.
13							
14							
15							

TRENCH LOG

DATE: 05/18/06 HOLE #: T-2
PROJECT SITE: At Van Buren Boulevard and Clay Street, Riverside, California. TECH: FJ RIG: Backhoe

DEPTH FEET	GRAPH	#	BLOW COUNT	DRY DENSITY	MOISTURE %	SOIL	GEO DESCRIPTION
01							Silty sand mixed with crushed rock and concrete.
02							2' Silty sand, sand, decomposed granite, fine to coarse.
03	3.0			112.4	4.6		3' Sand, decomposed granite, fine to coarse,
05	5.0			115.7	5.2		dense, whitish tan in color.
06							
07	7.0			123.3	4.6		7' Same, density increase.
08							
09							9' Very Dense.
10							
11							11' End of Trench.
12							
13							
14							
15							

TRENCH LOG

DATE: 05/18/06 HOLE #: T-3
PROJECT SITE: At Van Buren Boulevard and Clay Street, Riverside, California. TECH: FJ RIG: Backhoe

DEPTH FEET	GRAPH	#	BLOW COUNT	DRY DENSITY	MOISTURE %	SOIL	GEO DESCRIPTION
01							Fill, sandy, silt, concrete block mix.
02	2.0			102.7	3.5		2' Sand, decomposed granite, fine to coarse
03							grain, relative dense, tan brown in color.
04	4.0			114.6	4.7		
05							
06							
	6.5			119.8	4.6		
07							7' Sand, decomposed granite, fine to large
08							grain, relatively dense, tan brown in color.
09							
10							
11							11' End of Trench.
12							
13							
14							
15							

TRENCH LOG

DATE: 05/18/06 HOLE #: T-4
PROJECT SITE: At Van Buren Boulevard and Clay Street, Riverside, California. TECH: FJ RIG: Backhoe

DEPTH FEET	GRAPH	#	BLOW COUNT	DRY DENSITY	MOISTURE %	SOIL	GEO DESCRIPTION
01							Fill, silty sandy crushed rock, loose.
02							
03	3.0			108.4	4.6		
							3'
							Silty sand, fine to
04							medium grain, relatively
							moist, tan brown in
							color, density increase.
05	5.0			118.3	4.3		
06							
07	7.0			120.7	4.5		7'
							Sand, decomposed
							granite, fine to large,
08							relatively dense,
							tan brown in color.
09							
10							
11							11'
							End of Trench.
12							
13							
14							
15							

12.0 ENCLOSURE B

MAXIMUM DRY DENSITY TEST RESULTS

SOIL TYPE	SOIL DESCRIPTION	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOISTURE (%)
A	Fine to coarse silty sand, tan in color.	127.5	10.5

EXPANSION INDEX RESULTS

SAMPLE LOCATION	EXPANSION CLASSIFICATION	EXPANSION INDEX
T-3 - 5.0 feet	Low	25

SULFATE CONTENT (% BY WEIGHT)	P.H.	RESISTIVITY (OHM-CM)	CHLORIDE CONTENT (PPM)
None detected	7.3	2500	60

13.0 ENCLOSURE C

STANDARD GRADING AND EARTHWORK SPECIFICATIONS

No deviation from these specifications should be permitted unless specifically superseded in the geotechnical report of the project or by written communication signed by the geotechnical consultant. Evaluation performed by the geotechnical consultant during the course of grading may result in subsequent recommendations which could supersede these specifications or the recommendations of the geotechnical report.

1.0 GENERAL

1.1 The geotechnical consultant is the owner's or developer's representative on the project. For the purpose of these specifications, observations by the geotechnical consultant include observations by the soils engineer, geotechnical engineer, engineering geologist, and those performed by persons employed by and responsible to the geotechnical consultant.

1.2 All clearing, site preparation, or earthwork performed on the project shall be conducted and directed by the contractor under the supervision of the geotechnical consultant.

1.3 The contractor shall be responsible for the safety of the project and satisfactory completion of all grading. During grading, the contractor shall remain accessible.

1.4 Prior to the commencement of grading, the geotechnical consultant shall be employed for the purpose of providing field, laboratory, and office services for conformance with the recommendations of the geotechnical report and these specifications. It will be necessary that the geotechnical consultant provide adequate testing and observations so that he may determine that the work was accomplished as specified. It shall be the responsibility of the contractor to assist the geotechnical consultant and keep him apprised of work schedules and changes so that he may schedule his personnel accordingly.

1.5 It shall be the sole responsibility of the contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes, agency ordinances, these specifications, and the approved grading plans. If, in the opinion of the geotechnical consultant, unsatisfactory conditions, such as questionable soil, poor moisture condition, inadequate compaction, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the geotechnical consultant will be empowered to reject the work and recommend that construction be stopped until the conditions are rectified.

1.6 *It is the contractor's responsibility to provide access to the geotechnical consultant for testing and/or grading observations purposes. This may require the excavation of test pits and/or the relocation of grading equipment.*

1.7 *A final report shall be issued by the geotechnical consultant attesting to the contractor's conformance with these specifications.*

2.0 SITE PREPARATION

2.1 *All vegetation and deleterious material shall be disposed of off-site. This removal shall be observed by the geotechnical consultant and concluded prior to fill placement.*

2.2 *Soil, alluvium, or bedrock materials determined by the geotechnical consultant as being unsuitable for placement in compacted fills shall be removed from the site or used in open areas as determined by the geotechnical consultant. Any material incorporated as a part of a compacted fill must be approved by the geotechnical consultant prior to fill placement.*

2.3 *After the ground surface to receive fill has been cleared, it shall be scarified, disced, or bladed by the contractor until it is uniform and free from ruts, hollows, hummocks, or other uneven features which may prevent uniform compaction.*

The scarified ground surface shall then be brought to optimum moisture, mixed as required, and compacted as specified. If the scarified zone is greater than twelve inches in depth, the excess shall be removed and placed in lifts not to exceed six inches or less.

Prior to placing fill, the ground surface to receive fill shall be observed, tested, and approved by the geotechnical consultant.

2.4 *Any underground structures or cavities such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipe lines, or others are to be removed or treated in a manner prescribed by the geotechnical consultant.*

2.5 *In cut-fill transition lots and where cut lots are partially in soil, colluvium or un-weathered bedrock materials, in order to provide uniform bearing conditions, the bedrock portion of the lot extending a minimum of 5 feet outside of building lines shall be over-excavation a minimum of 3 feet and replaced with compacted fill. Greater over-excavation could be required as determined by geotechnical consultant where deep fill of 20 feet transitions to bedrock over a short distance. (Typical details are given on Figure D-1.)*

3.0 COMPACTED FILLS

3.1 Material to be placed as fill shall be free of organic matter and other deleterious substances, and shall be approved by the geotechnical consultant. Soils of poor gradation, expansion, or strength characteristics shall be placed in areas designated by geotechnical consultant or shall be mixed with other soils to serve as satisfactory fill material, as directed by the geotechnical consultant.

3.2 Rock fragments less than twelve inches in diameter may be utilized in the fill, provided:

1. They are not placed in concentrated pockets.

2. There is a minimum of 75% overall of fine grained material to surround the rocks.

3. The distribution of rocks is supervised by the geotechnical consultant.

3.3 Rocks greater than twelve inches in diameter shall be taken off-site, or placed in accordance with the recommendations of the geotechnical consultant in areas designated as suitable for rock disposal. (A typical detail for Rock Disposal is given in Figure D-2).

3.4 Material that is spongy, subject to decay, or otherwise considered unsuitable shall not be used in the compacted fill.

3.5 Representative samples of materials to be utilized as compacted fill shall be analyzed by the laboratory of the geotechnical consultant to determine their physical properties. If any material other than that previously tested is encountered during grading, the appropriate analysis of the material shall be conducted by the geotechnical consultant as soon as possible.

3.6 Material used in the compacting process shall be evenly spread, watered, processed, and compacted in thin lifts not to exceed six inches in thickness to obtain a uniformly dense layer. The fill shall be placed and compacted on a horizontal plane, unless otherwise approved by the geotechnical consultant.

3.7 If the moisture content or relative compaction varies from that required by the geotechnical consultant, the contractor shall rework the fill until it is approved by the geotechnical consultant.

3.8 Each layer shall be compacted to 90 percent of the maximum density in compliance with the testing method specified by the controlling governmental agency or ASTM 1557-70, whichever applies.

If compaction to a lesser percentage is authorized by the controlling governmental agency because of a specific land use of expansive soil condition, the area to receive fill compacted to less than 90 percent shall either be delineated on the grading plan or appropriate reference made to the area in the geotechnical report.

3.9 All fills shall be keyed and benched through all topsoil, colluvium alluvium, or creep material, into sound bedrock or firm material where the slope receiving fill exceeds a ratio of five horizontal to one vertical, in accordance with the recommendations of the geotechnical consultant.

3.10 The key for side hill fills shall be a minimum width of 15 feet within bedrock or firm materials, unless otherwise specified in the geotechnical report. (See detail on Figure D-3).

3.11 Sub-drainage devices shall be constructed in compliance with the ordinances of the controlling governmental agency, or with the recommendations of the geotechnical consultant. (Typical Canyon Sub-drain details are given in Figure D-4).

3.12 The contractor will be required to obtain a minimum relative compaction of 90 percent out to the finish slope face of fill slopes, buttresses, and stabilization fills. This may be achieved by either over building the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment, or by any other procedure which produces the required compaction approved by the geotechnical consultant.

3.13 All fill slopes should be planted or protected from erosion by other methods specified in the geotechnical report.

3.14 Fill-over-cut slopes shall be properly keyed through topsoil, colluvium or creep material into rock or firm materials, and the transition shall be stripped of all soil prior to placing fill. (See detail on Figure D-3).

4.0 CUT SLOPES

4.1 The geotechnical consultant shall inspect all cut slopes at vertical intervals not exceeding ten feet.

4.2 If any conditions not anticipated in the geotechnical report such as perched water, seepage, lenticular or confined strata of potentially adverse nature, unfavorably inclined bedding, joints or fault planes encountered during grading, these conditions shall be analyzed by the geotechnical consultant, and recommendations shall be made to mitigate these problems. (Typical details for stabilization of a cut slope are given in Figures D-3 and D-5).

4.3 *Cut slopes that face in the same direction as the prevailing drainage shall be protected from slope wash by a non-erodible interceptor swale placed at the top of the slope.*

4.4 *Unless otherwise specified in the geotechnical report, no cut slopes shall be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies.*

4.5 *Drainage terraces shall be constructed in compliance with the ordinances of controlling governmental agencies, or with the recommendations of the geotechnical consultant.*

5.0 TRENCH BACKFILLS

5.1 *Trench excavations for utility pipes shall be backfilled under the supervision of the geotechnical consultant.*

5.2 *After the utility pipe has been laid, the space under and around the pipe shall be backfilled with clean sand or approved granular soil to a depth of at least one foot over the top of the pipe. The sand backfill shall be uniformly jetted into place before the controlled backfill is placed over the sand.*

5.3 *The on-site materials, or other soils approved by the geotechnical consultant shall be watered and mixed as necessary prior to placement in lifts over the sand backfill.*

5.4 *The controlled backfill shall be compacted to at least 90 percent of the maximum laboratory density as determined by the ASTI D1557-70 or the controlling governmental agencies.*

5.5 *Field density tests and inspection of the backfill procedures shall be made by the geotechnical consultant during backfilling to see that proper moisture content and uniform compaction is being maintained. The contractor shall provide test holes and exploratory pits as required by the geotechnical consultant to enable sampling and testing.*

6.0 GRADING CONTROL

6.1 *Inspection of the fill placement shall be provided by the geotechnical consultant during the progress of grading.*

6.2 *In general, density tests should be made at intervals not exceeding two feet of fill height or every 500 cubic yards of fill placed. This criteria will vary depending on soil conditions and the size of the job. In any event, an adequate number of field density tests shall be made to verify that the required compaction is being achieved.*

6.3 Density tests should also be made on the surface material to receive fill as required by the geotechnical consultant.

6.4 All cleanout, processed ground to receive fill, key excavations, sub-drains, and rock disposals should be inspected and approved by the geotechnical consultant prior to placing any fill. It shall be the contractor's responsibility to notify the geotechnical consultant when such areas are ready for inspection.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 Erosion control measures, when necessary, shall be provided by the contractor during grading and prior to the completion and construction of permanent drainage controls.

7.2 Upon completion of grading and termination of inspections by the geotechnical consultant, no further filling or excavation, including that necessary for footings, foundations, large tree wells, retaining walls, or other features shall be preformed without the approval of the geotechnical consultant.

7.3 Care shall be taken by the contractor during final grading to preserve any berms, drainage terraces, interceptor swales, or other devices of permanent nature on or adjacent to the property.

GENERAL BASIC RECOMMENDATIONS FOR SLABS-ON-GRADE

11. *Concrete shall not be placed at temperatures exceeding the recommended limits (50 degrees F winter, 100 degrees F summer).*

12. *The sub-grade should be relatively moist prior to placing concrete slabs-on-grade.*

13. *Daily information must be kept on file containing concrete tickets, time of pour, temperature, and other factors effecting concrete placement and finishing.*

14. *If slabs are poured at different time, construction joints are necessary.*

15. *All fluffy loose material generated by trenching must be removed or re-compacted properly under the supervision of this firm.*

16. *Excessive moisture should not be allowed within 5.0 feet of any concrete foundation and slab area, unless proper design factors have been introduced into consideration.*

17. *Any additional specifications concerning curing of the concrete must be provided by the concrete ready mix company or the supplier.*

18. *It is the responsibility of the owner, the contractor, and/or the supplier to inform the soil engineer of any unsuitable conditions prior to placing concrete. All such conditions must be reported in writing for additional recommendations or corrections.*

19. *Prior to concrete pour, the contractor, owner, and builder must ensure all recommendations provided are completely carried out and approved by this firm.*

20. *The owner and his contractor are the responsible parties to ensure uniformity of the structural area to be used.*

GENERAL BASIC RECOMMENDATIONS FOR SLABS-ON-GRADE

1. *Concrete used for residential concrete slabs must achieve a minimum compression strength as recommended or as requested by local regulatory agencies.*

2. *The concrete should have a minimum cement content of 5.2 sacks/cubic yard.*

3. *The maximum water content should be 7.0 gallons/cubic yard in order to maintain an acceptable water to cement ratio.*

4. *Maximum slump at which the concrete should be placed should not exceed more than 6.0 inches.*

5. *Maximum size of aggregate for concrete should be between 3/4 to 1 1/2 inches.*

6. *Please note that every gallon of water added to the concrete above the design mix, will result in the loss of 1.0 inch slump and 200 psi in compression strength.*

7. *Delivery time, including unloading of concrete shall not exceed 90 minutes.*

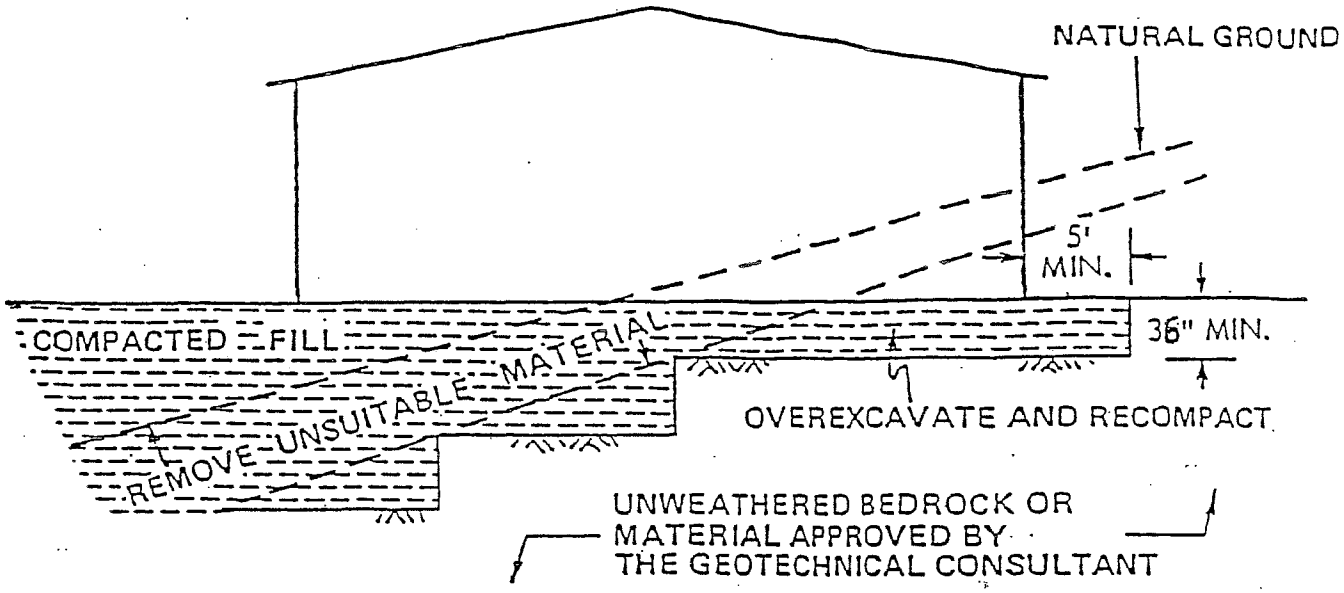
8. *Slabs must be cured using Hunt's curing compound, or any approved equivalent curing method.*

9. *Reinforcement should be placed within 3.0 inches from the bottom or according to the specifications.*

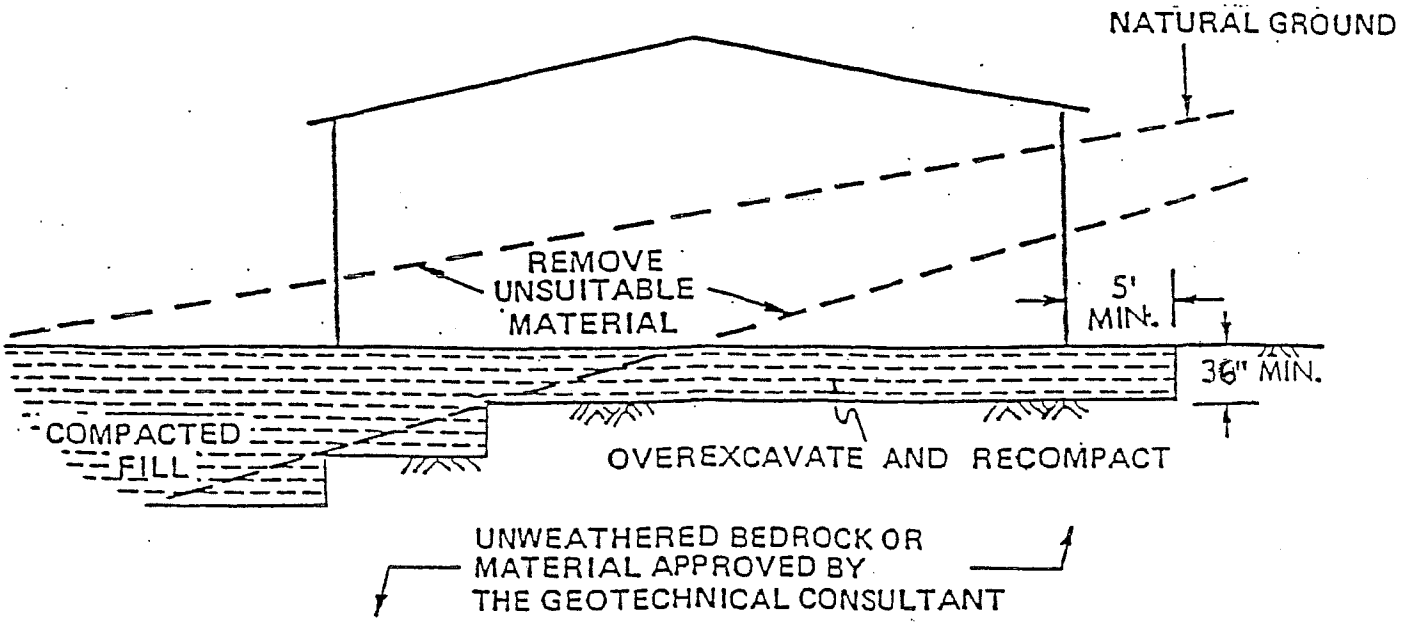
10. *Control joints should be placed typically on 10.0 foot center for 4.0 inch nominal slabs in order to reduce excessive cracking. Formula for joint spacing = 2.5 x slab thickness.*

TRANSITION LOT DETAILS

CUT-FILL LOT



CUT LOT

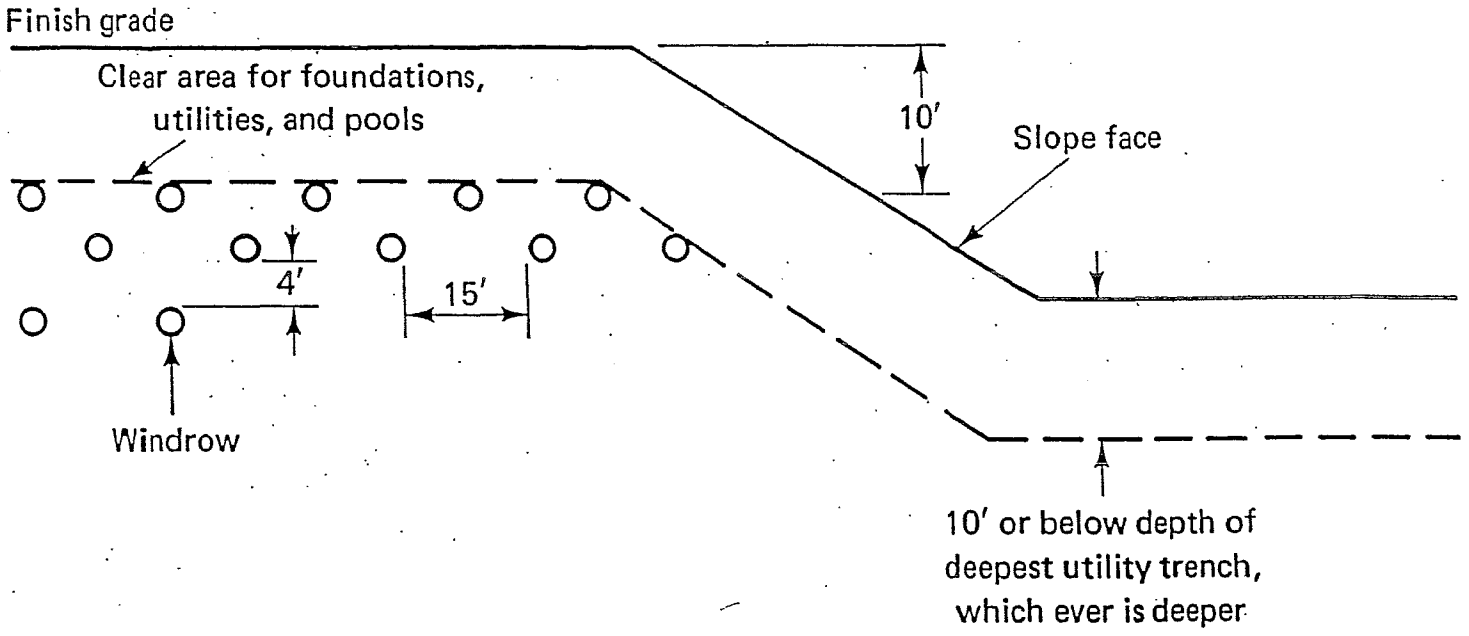


NOTE:
Deeper overexcavation and recompaction shall be performed if determined to be necessary by the geotechnical consultant.

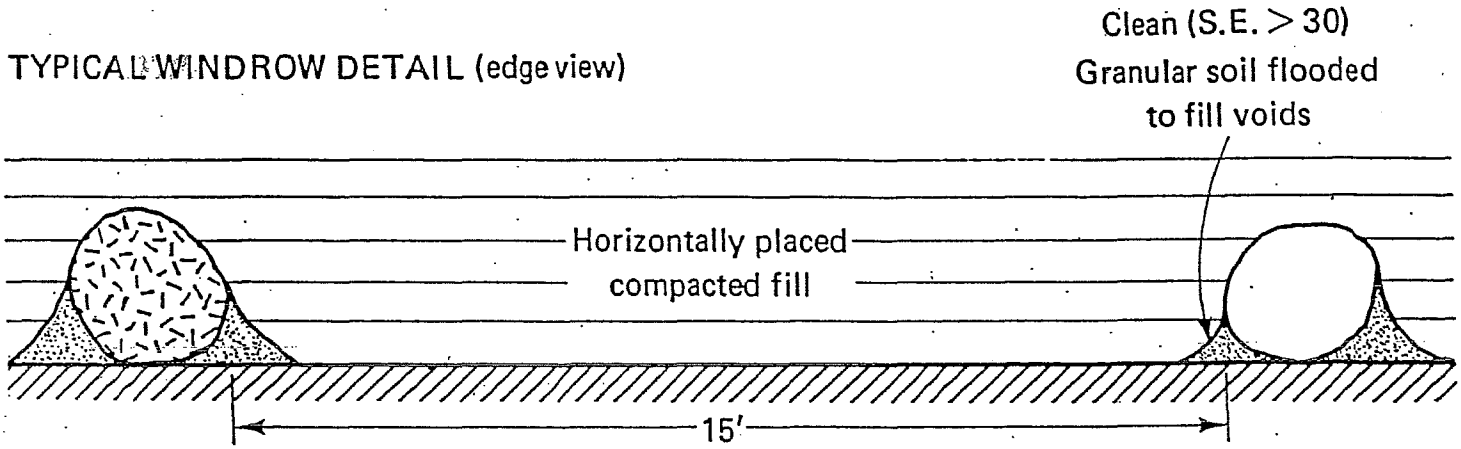
ROCK DISPOSAL DETAIL

(Boulders greater than two feet in diameter)

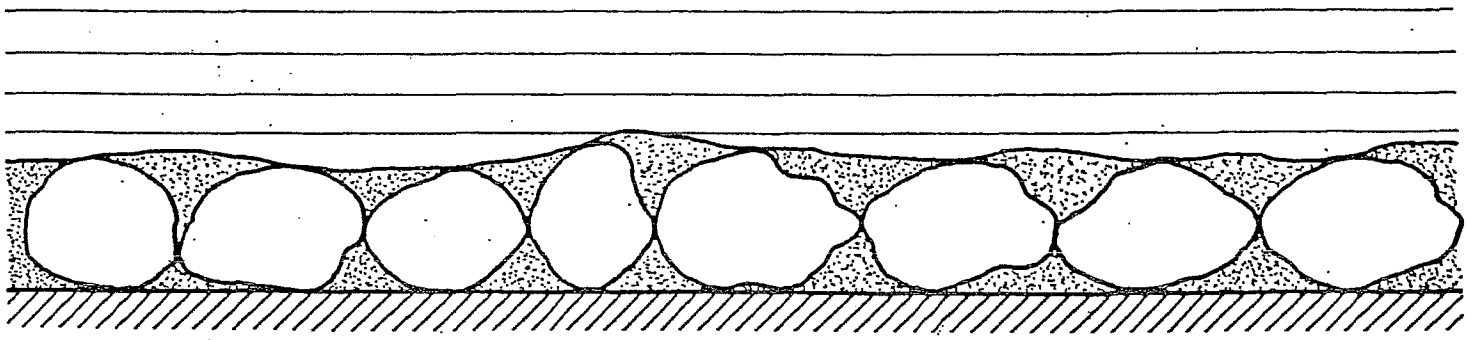
BUILDING



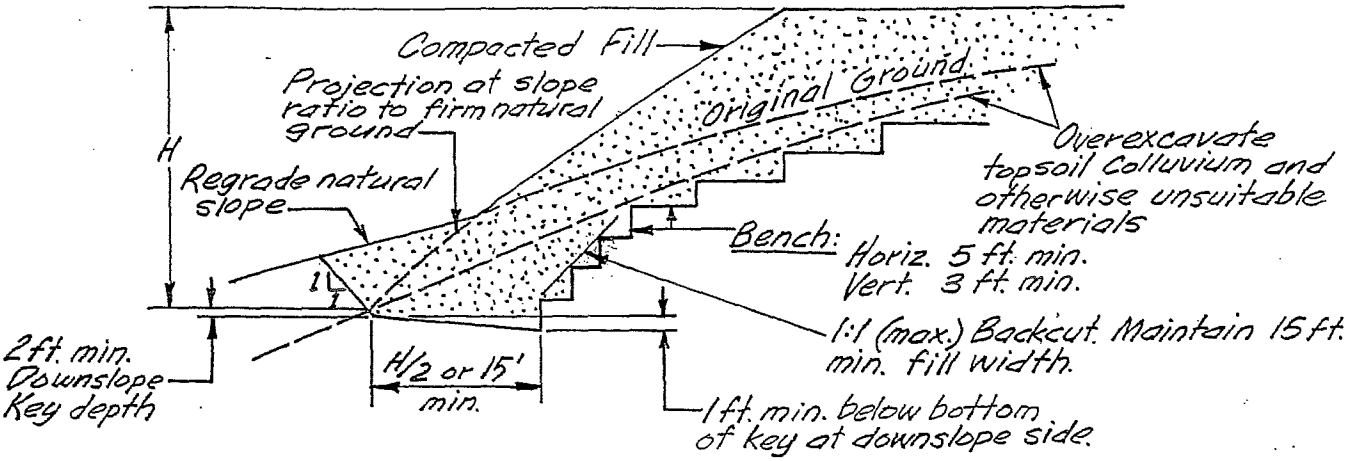
TYPICAL WINDROW DETAIL (edge view)



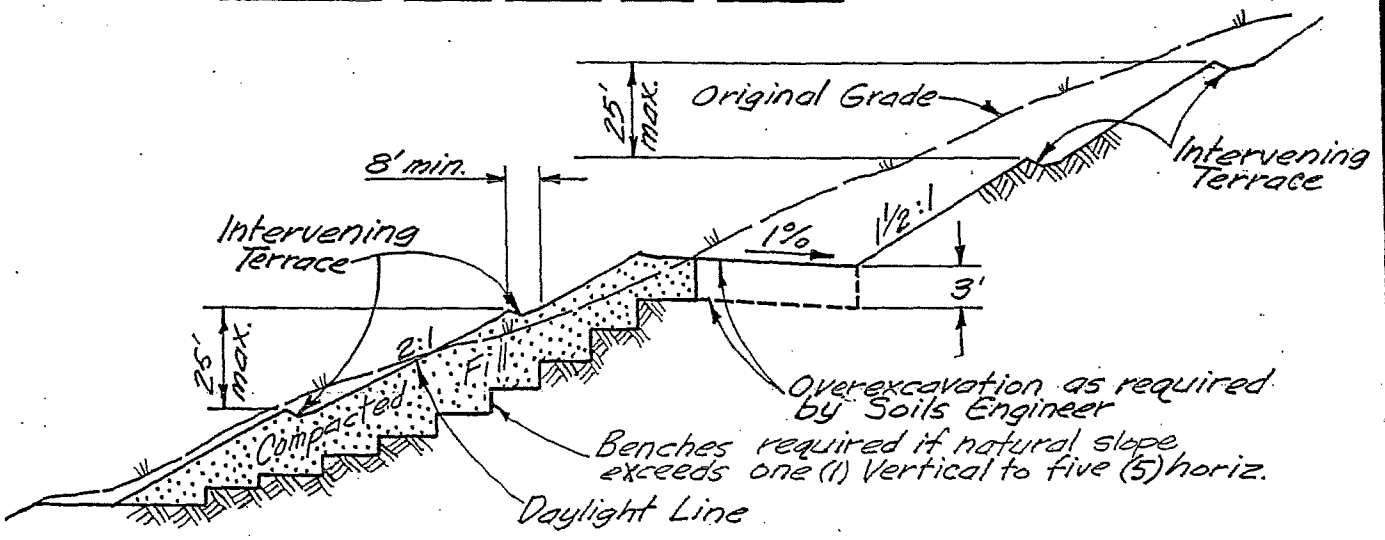
PROFILE VIEW



TYPICAL FILL OVER NATURAL SLOPE



TYPICAL FILL OVER CUT SLOPE

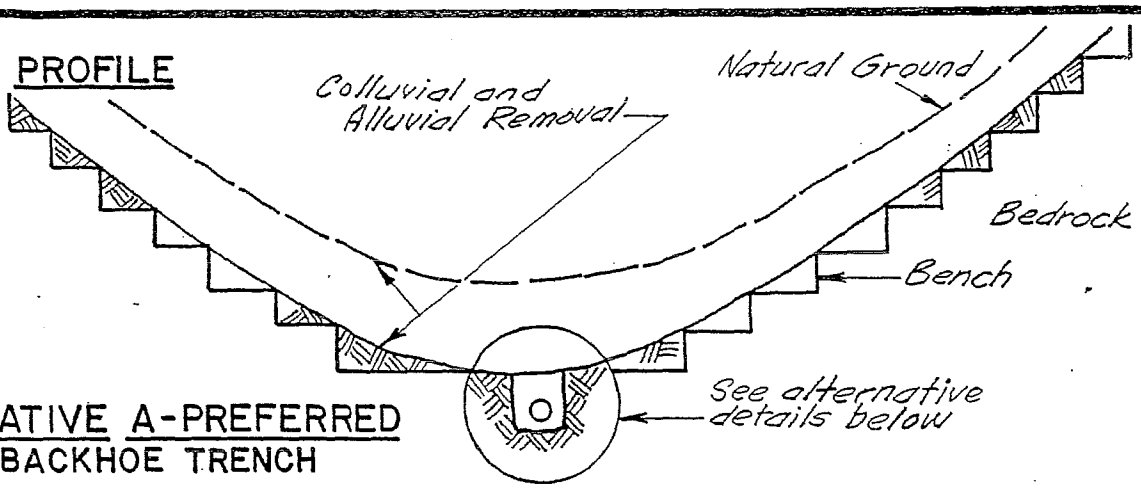


NOTE:

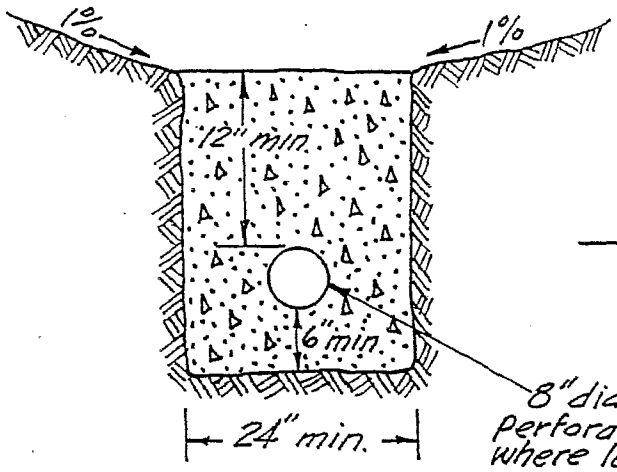
If overfilling and cutting back to grade is adopted, 15' may be reduced to 12' min. In no case however, shall the fill width be equal to less than half the fill height remaining.

	TITLE:	
	GRADING DETAIL	D – 3

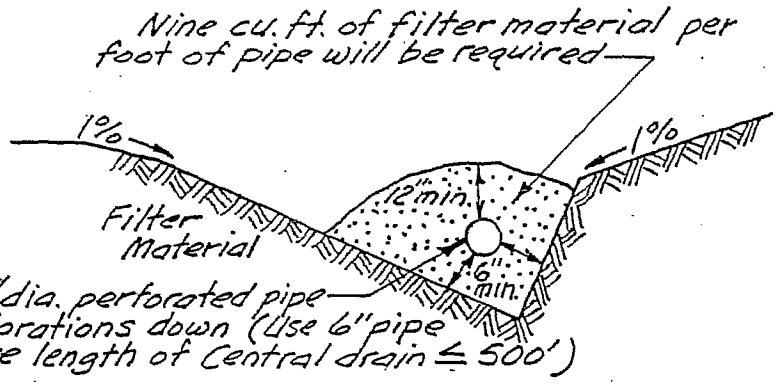
CANYON PROFILE



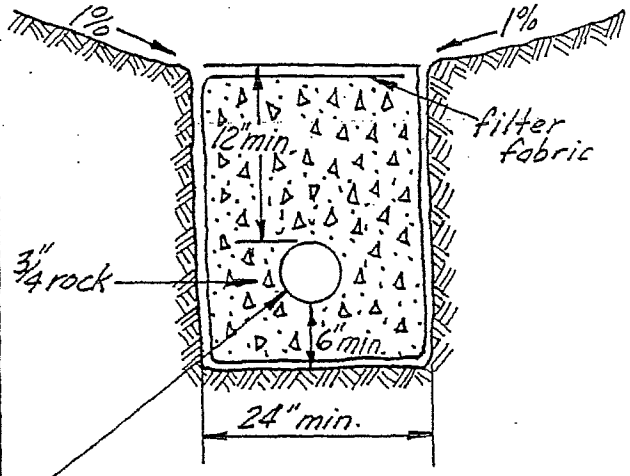
ALTERNATIVE A-PREFERRED
BACKHOE TRENCH



ALTERNATIVE C
DOZER V TRENCH



ALTERNATIVE B
BACKHOE TRENCH



NOTES:

1. Final 20 ft of pipe should be non-perforated, positive connection should be provided between length of pipes.
2. Perforations should be at 90° angle 3/8" max. dia. w/min. of 8 uniformly spaced perforations per ft. in lower portion of pipe. In any case dia. of perforation should be < D85 of filter material.
3. Pipe material unless otherwise approved should be PVC or ABS and sections connected w/collars. Pipe should be of Sch. 40 (min.) Verification of schedule shall be made by Tract Engineer based on prop. depth of fill.
4. Filter mat. should consist of State of CA. class 2 permeable filter mix.
5. For alternative B 3/4" rock in a filter fabric should be used.
6. Use of filter fabric shall be app. by Controlling agency.

TITLE:

TYPICAL CANYON SUBDRAIN

D – 4

FOUNDATION AND SLAB RECOMMENDATIONS FOR EXPANSIVE SOILS

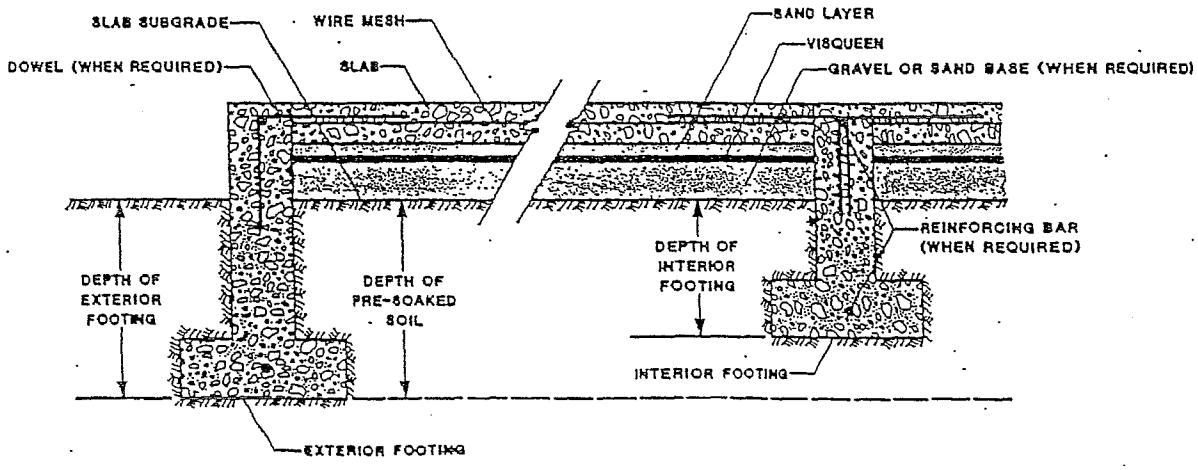
(ONE AND TWO-STORY RESIDENTIAL BUILDINGS)

	EXPANSION INDEX 0 - 20 VERY LOW EXPANSION	EXPANSION INDEX 21 - 50 LOW EXPANSION	EXPANSION INDEX 51 - 90 MEDIUM EXPANSION	EXPANSION INDEX 91 - 130 HIGH EXPANSION
1-STORY FOOTINGS	ALL FOOTINGS 12 INCHES DEEP. FOOTINGS CONTINUOUS. NO STEEL REQUIRED FOR EXPANSION FORCES.	ALL FOOTINGS 12 INCHES DEEP. FOOTINGS CONTINUOUS. 1-NO. 4 BAR TOP AND BOTTOM.	EXTERIOR FOOTINGS 18 INCHES DEEP. INTERIOR FOOTINGS 12 INCHES DEEP. 1-NO. 4 BAR TOP AND BOTTOM.	EXTERIOR FOOTINGS 24 INCHES DEEP. INTERIOR FOOTINGS 12 INCHES DEEP. 1-NO. 5 BAR TOP AND BOTTOM.
2-STORY FOOTINGS	ALL FOOTINGS 18 INCHES DEEP. FOOTINGS CONTINUOUS. NO STEEL REQUIRED FOR EXPANSION FORCES.	ALL FOOTINGS 18 INCHES DEEP. FOOTINGS CONTINUOUS. 1-NO. 4 BAR TOP AND BOTTOM.	ALL FOOTINGS 18 INCHES DEEP. FOOTINGS CONTINUOUS. 1-NO. 4 BAR TOP AND BOTTOM.	EXTERIOR FOOTINGS 24 INCHES DEEP. INTERIOR FOOTINGS 18 INCHES DEEP. 1-NO. 5 BAR TOP AND BOTTOM.
GARAGE DOOR GRADE BEAM	NOT REQUIRED.	12 INCHES DEEP. 1-NO. 4 BAR TOP AND BOTTOM.	18 INCHES DEEP. 1-NO. 4 BAR TOP AND BOTTOM.	24 INCHES DEEP. 1-NO. 5 BAR TOP AND BOTTOM.
LIVING AREA FLOOR SLABS	3 1/2 INCHES THICK. NO MESH REQUIRED FOR EXPANSION FORCES. NO BASE REQUIRED. 6 MIL VISQUEEN MOISTURE BARRIER PLUS 1 INCH SAND.	3 1/2 INCHES THICK. 6 X 6-10/10 WIRE MESH AT MID-HEIGHT. 2 INCHES GRAVEL OR SAND BASE. 6 MIL VISQUEEN MOISTURE BARRIER PLUS 1 INCH SAND.	3 1/2 INCHES THICK. 6 X 6-10/10 WIRE MESH AT MID-HEIGHT. 4 INCHES GRAVEL OR SAND BASE. 6 MIL VISQUEEN MOISTURE BARRIER PLUS 1 INCH SAND.	4 INCHES THICK. 6 X 6-6/6 WIRE MESH AT MID-HEIGHT. NO. 3 DOWELLS FROM FOOTING TO SLAB AT 36 INCHES ON CENTER. 4 INCHES GRAVEL OR SAND BASE. 6 MIL VISQUEEN MOISTURE BARRIER PLUS 1 INCH SAND.
GARAGE FLOOR SLABS	3 1/2 INCHES THICK. NO MESH REQUIRED FOR EXPANSION FORCES. NO BASE REQUIRED. NO MOISTURE BARRIER REQUIRED.	3 1/2 INCHES THICK. 6 X 6-10/10 WIRE MESH OR QUARTER SLABS. ISOLATE FROM STEM WALL FOOTINGS. 2 INCHES ROCK, GRAVEL OR SAND BASE. NO MOISTURE BARRIER REQUIRED.	3 1/2 INCHES THICK. 6 X 6-10/10 WIRE MESH OR QUARTER SLABS. ISOLATE FROM STEM WALL FOOTINGS. 4 INCHES ROCK, GRAVEL OR SAND BASE. NO MOISTURE BARRIER REQUIRED.	4 INCHES THICK. 6 X 6-6/6 WIRE MESH OR QUARTER SLABS. ISOLATE FROM STEM WALL FOOTINGS. 4 INCHES ROCK, GRAVEL OR SAND BASE. NO MOISTURE BARRIER REQUIRED.
PRE-SOAKING OF LIVING AREA AND GARAGE SLAB SOILS	NOT REQUIRED. MOISTEN PRIOR TO POURING CONCRETE.	SOAK TO 12 INCHES DEPTH TO 4% ABOVE OPTIMUM MOISTURE CONTENT.	SOAK TO 18 INCHES DEPTH TO 5% ABOVE OPTIMUM MOISTURE CONTENT.	SOAK TO 24 INCHES DEPTH TO 5% ABOVE OPTIMUM MOISTURE CONTENT.

NOTES: 1) ALL DEPTHS ARE RELATIVE TO SLAB SUBGRADE.
2) SPECIAL DESIGN IS REQUIRED FOR VERY HIGHLY EXPANSIVE SOILS.

FOUNDATION AND SLAB DETAIL

(NOT TO SCALE)



FOUNDATION AND SLAB RECOMMENDATIONS

JOB NO.:	DATE:	FIGURE NO.:

14.0 ENCLOSURE D

PUBLISHED REFERENCES

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