SECTION 02000

GEOTECHNICAL DATA

PART 1 – GENERAL

1.01 SUMMARY

A. These documents include a:

Subject: Geotechnical Investigation for Proposed Trumann Fire Station

Authored by: Anderson Engineering Consultants, Inc.
10205 Rockwood Road
Little Rock, Arkansas 72204

Prepared for: Miller-Newell Engineers, LTD and the City of Trumann, Arkansas

Dated: November 23, 1998

B. Extent of Inclusion of the Report: The entire report is bound herein.

C. Investigation: Visit the site and become acquainted with existing site conditions, including but not limited to, existing subsurface utilities and structures.

D. Site Information: Data concerning subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. Commentary in the report is the opinion solely of the Soil Investigator. It is expressly understood that neither the Owner nor the Architect/Engineer is responsible for interpretations or conclusions drawn therefrom by the contractor. Data is made available for the convenience of the Contractor. The Contractor may make additional test borings and other exploratory operations. All costs incurred in further explorations shall be paid by the Contractor.

E. After demolition and removal of the existing structures, the Contractor shall call for an evaluation of the soil by the Geotechnical Engineer. The Engineer shall propose necessary methods of soil testing and specify removal, replacement, processing, or other requirements for earthwork preparation. The Geotechnical Engineer shall work directly for the Owner.

F. The Geotechnical Engineer shall propose testing and specify earthwork in accordance with Section 01410, Division 2, Division 3, and Division 5 of this Project Manual, where practicable. If other methods and procedures are required, the scope, equipment, standards, methods, and procedures shall be clearly described.

G. The Geotechnical Engineer shall provide a fee for construction testing and specifications for the review by the Architect, prior to approval by the Owner.

END OF SECTION

GEOTECHNICAL INVESTIGATION

FOR

PROPOSED FIRE STATION

TRUMANN, ARKANSAS

* * * * *

MILLER-NEWELL ENGINEERS, LTD.

ENGINEERS

P. O. BOX 717

NEWPORT, ARKANSAS 72112

* * * * *

NOVEMBER 23, 1998

JOB NO. 6622

ANDERSON ENGINEERING CONSULTANTS, INC.

10205 ROCKWOOD ROAD -- LITTLE ROCK, ARKANSAS 72204

PHONE (501) 455-4545 FAX (501) 455-4552

Geotechnical Engineering - Environmental Assessments - Quality Control Of Construction Materials

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD -- LITTLE ROCK, ARKANSAS 72204
PHONE (501) 455-4545 FAX (501) 455-4552

November 23, 1998

Job No. 6622

Mr. Albert H. Miller, P.E.
Miller-Newell Engineers, LTD
P. O. Box 717
Newport, Arkansas 72112

Re: Geotechnical Investigation
Proposed Fire Station
Trumann, Arkansas

Dear Mr. Miller:

It is our pleasure to submit this report on the soil and foundation investigation for the proposed Fire Station at Trumann, Arkansas. The investigation consisted of field test borings, soils laboratory analyses, foundation design analyses, and pavement recommendations.

We recommend that our geotechnical services be continued in the foundation construction phases of the project for this is the most feasible means of assuring the owners, designers, and builders that the geotechnical design intent is being achieved. In the event adverse geotechnical conditions are encountered during excavation, they can be identified and evaluated so adequate remedial measures can be implemented during construction.

We wish to express our appreciation for the opportunity of serving you and members of the design team. Our Jonesboro, Arkansas, office is close to the project site and is available to provide testing during construction. We are available for further assistance at any time during final design and construction, should you desire additional consultation.

Very truly yours,

ANDERSON ENGINEERING CONSULTANTS, INC.

Bobby Van Cleave, E.I.
Staff Engineer

Scott W. Anderson, P.E.
Senior Geotechnical Engineer

BVC/SWA/acc
6622.GEO

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD LITTLE ROCK, ARKANSAS 72204

GEOTECHNICAL INVESTIGATION

FOR

PROPOSED FIRE STATION

TRUMANN, ARKANSAS

* * * * *

MILLER-NEWELL ENGINEERS, LTD

ENGINEERS

P. O. BOX 717

NEWPORT, ARKANSAS 72112

* * * * *

BY

ANDERSON ENGINEERING CONSULTANTS, INC.

GEOTECHNICAL CONSULTANTS

10205 ROCKWOOD ROAD

LITTLE ROCK, ARKANSAS 72204

NOVEMBER 23, 1998 JOB NO. 6622

TABLE OF CONTENTS

ABSTRACT

Proposed Fire Station	Job No. 6622
Date of Borings	11/05/98
Number of Borings	5
Maximum Depth Investigated	16.5 feet
Type of Samples	Standard Penetration

General Stratigraphy:
The overall stratigraphy consists of a thin layer of silty clay (CL) underlain by silty sand (SM) to the full depths investigated.

Water Table (Static)	8.0 feet
Frost Depth	8.0 inches
Earthwork (Specify)	98% ASTM D 698 within 2% of optimum moisture
Borrow Area Soils	
On-Site	Suitable for use as fill when dried and compacted
Off-Site (Specify)	Select PI<15 Non-Expansive
Conventional Footings or Monolithic Slab	
Bearing Capacity	1300 psf
Bearing Depth (from existing grade)	2.0 feet
Total Settlement	0.80 inch
Differential Settlement	0.50 inch

NOTE: Undercutting of soft or wet soils may be required in the building and parking areas.

Abstract - Continued

Pavements		Light Duty	Heavy Duty
Flexible:	HMAC	2.0"	3.0"
	Crushed Stone or Clay-Gravel Base	6.0"	8.0"
	Compacted Subgrade	6.0"	8.0"
Rigid:	Concrete	5.0"	7.0"
	Crushed Stone or Clay-Gravel Base	4.0"	4.0"
	Compacted Subgrade	8.0"	8.0"

Note: A subgrade support fabric such as Mirafi 500X is required between the compacted select fill and the natural ground. Undercutting of soft soils may be required to accommodate placement of select fill.

APPLICABLE NOTES

1. Geotechnical Engineering and Quality Control Testing services by this firm are recommended during construction.

2. We have endeavored to analyze the site foundation conditions in accordance with basic geotechnical engineering principles; however, we are not aware of all the loading or structural conditions. Therefore, we suggest that your professional staff carefully review our report for any design criteria for which we may not be familiar, or for which we may have inadvertently omitted. Accordingly, the contractual documents should advise that no claims will be allowed as a result of our geotechnical investigation and recommendations.

3. If any conditions are encountered during final design and/or during construction which are materially different than those presented in this report or assumed to exist at the site, this firm should be notified at once so that we may have an opportunity to make further studies and recommendations.

4. This publication is intended for the use of professional personnel competent to evaluate the significance and limitations of its contents and who will accept responsibility for the applications of the material it contains.

5. It is considered prudent and recommended that the soils engineer be consulted further during the final stages of design, and the preparation of plans and specifications, to ascertain that the earthwork and foundation recommendations have been interpreted and implemented basically in accordance with our intent. It thus may be necessary to submit supplementary recommendations to assure compatibility of these items. All communications concerning this report must be made in writing.

6. This geotechnical engineering investigation report is not intended to be utilized as an earthwork specification for construction.

7. Unused soil samples will be retained for inspection and/or further use for only 30 days unless specifically requested otherwise.

8. It should be understood that the assessment of site environmental conditions or the presence of contaminants in the soil, rock, surface water or groundwater of the site was beyond the scope of this study, unless otherwise noted.

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

As the client of a consulting geotechnical engineer, you should know that site subsurface conditions cause more construction problems than any other factor ASFE/The Association of Engineering Firms Practicing in the Geosciences offers the following suggestions and observations to help you manage your risks.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

Your geotechnical engineering report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. These factors typically include: the general nature of the structure involved, its size, and configuration; the location of the structure on the site; other improvements, such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask your geotechnical engineer to evaluate how factors that change subsequent to the date of the report may affect the report's recommendations.

Unless your geotechnical engineer indicates otherwise, do not use your geotechnical engineering report:

- when the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size, elevation, or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership; or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems that may occur if they are not consulted after factors considered in their report's development have changed.

SUBSURFACE CONDITIONS CAN CHANGE

A geotechnical engineering report is based on conditions that existed at the time of subsurface exploration. Do not base construction decisions on a geotechnical engineering report whose adequacy may have been affected by time. Speak with your geotechnical consultant to learn if additional tests are advisable before construction starts.Note, too, that additional tests may be required when subsurface conditions are affected by construction operations at or adjacent to the site, or by natural events such as floods, earthquakes, or ground water fluctuations. Keep your geotechnical consultant apprised of any such events.

MOST GEOTECHNICAL FINDINGS ARE PROFESSIONAL JUDGMENTS

Site exploration identifies actual subsurface conditions only at those points where samples are taken. The data were extrapolated by your geotechnical engineer who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your geotechnical engineer can work together to help minimize their impact. Retaining your geotechnical engineer to observe construction can be particularly beneficial in this respect.

A REPORT'S RECOMMENDATIONS CAN ONLY BE PRELIMINARY

The construction recommendations included in your geotechnical engineer's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Because actual subsurface conditions can be discerned only during earthwork, you should retain your geotechnical engineer to observe actual conditions and to finalize recommendations. Only the geotechnical engineer who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations are valid and whether or not the contractor is abiding by applicable recommendations. The geotechnical engineer who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Consulting geotechnical engineers prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your geotechnical engineer prepared your report expressly for you and expressly for purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the geotechnical engineer. No party should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.

GEOENVIRONMENTAL CONCERNS ARE NOT AT ISSUE

Your geotechnical engineering report is not likely to relate any findings, conclusions, or recommendations

PURPOSE

The primary purposes of this geotechnical investigation were:

a. To determine the physical and engineering properties of the soils within the area of the proposed construction with respect to their suitability for the support of the proposed facility.

b. To make recommendations for the earthwork, type of foundation and pavements suited for the prevailing soil conditions within the proposed construction area.

c. To evaluate and recommend the design procedures for the various soil, foundation and pavement items in accordance with current engineering practices.

SCOPE

The scope of this geotechnical investigation includes the following:

a. The geological features of the job site area consist essentially of alluvial sands and clays to the full depths investigated. Thus, the site stratigraphy was defined by four continuous flight auger borings terminated at from 6.5 to 16.5 feet.

b. Field testing consisted of Standard Penetration test samples taken in two of the borings. Soils were visually classified in the field by a soils engineering technician.

c. The soils analyses were based on N-values obtained from the Standard Penetration tests, visual observations, and other routine inspection and classification methods. The soils were classified basically in accordance with the Unified Soils Classification System and visual classifications are given on the logs. Due to the granular nature of the site soils, laboratory testing was not performed.

d. The foundation bearing capacity and settlement analyses were based on AECI's current foundation design procedures, using the Standard Penetration N-values obtained during drilling and the results of the laboratory testing program.

e. The flexible and rigid pavement designs shown in this report are based on the CBR design method estimated from field and laboratory tests on the top 5.0 feet of soil in the pavement areas of the site.

AUTHORITY

This geotechnical investigation was authorized on October 20, 1998, by Mr. Albert Miller, P.E. of Miller-Newell Engineers LTD, the owner's representative for the proposed project by signed acceptance of AECI Proposal No. 98467.

GEOTECHNICAL INVESTIGATION

On November 4 and 5, 1998, five geotechnical test borings were made at the site of the proposed project in Trumann, Arkansas. The site is located as shown on the Vicinity Map, Plate 1. The borings were placed on site as shown on the Plan of Borings, Plate 2. The logs of the borings are given on Plates 3 through 6. The Field Classification System for Soil Exploration and Key to the Soil Classifications and Symbols are given on Plates 7 and 8, respectively. The Unified Soils Classification System is given on Plate 9.

GEOLOGY AND STRATIGRAPHY

The site of the proposed project is located at the southwest corner of West Main Street and U.S. Highway 63, and is bounded on the east side by Pine Avenue in the City of Trumann, Arkansas. The proposed site is a vacant lot and grass covered. The site at the time of investigation was relatively flat to gently sloping. Since the site is poorly drained, access will be difficult after stripping during rainy weather.

The geology of the Trumann, Arkansas, area consists of alluvial and terrace deposits of silts, sands and clays of the Quaternary alluvium geologic groups. The soils range, in general, from clays to sands. The site soils are consistent with the area geology. The site stratigraphy consists of a thin layer of stiff silty clay (CL) underlain by very loose to medium dense silty sand (SM) to the full depths investigated.

The long term static groundwater was encountered within the depths investigated in the test borings from 8.0 to 10.0 feet. Thus, it may be assumed that it will have some effect on design and construction of the proposed project. The groundwater may be encountered in wetter months within the top 3.0 feet of the site and will have a tendency to collect in deeper utility or foundation excavations and thus, temporary dewatering by gravity, ditches or pumping will be required to place foundations or backfill utility trenches.

SEISMICITY

The seismic analyses should include the selection of an appropriate site coefficient established from the subsurface conditions. The structure's foundations should be designed using guidelines as set forth in Arkansas Act 1100-1991 (as amended).

The predominant soil type is medium dense silty sand (SM) overlain by silts and silty clays. Based upon the subsurface soil conditions and the Arkansas Sate Building Services guidelines, the following data are considered applicable.

Seismic Zone	3
Soil Profile Type	S_3
Soil Coefficient	1.5
Peak Acceleration Coefficient (A_a)	0.24
Effective Peak Velocity-Related Acceleration Coefficient (A_v)	0.24

Based on the low (N<10) values compounded by a high water and varied silty soils, liquefaction appears imminent at this location under extreme seismic stress. A registered structural engineer should review all foundation plans prior to construction to determine foundation stability against seismic forces.

EARTHWORK

The field test data indicates that the silty clay (CL) or silty sand (SM) surface soils will have moderate to poor compaction and strength properties due to their type and high natural moisture content. These soils will require significant drying to achieve optimum moisture

content. The overburden soils will pump readily when the moisture content surpasses optimum moisture content. The contractor should be prepared to provide temporary construction drainage and equipment to facilitate drying of the wet soils. Undercutting and replacement may also be required in the building and paving areas due to very soft, wet, silts. Choking or bridging of soft soils with clay gravel may be required to stabilize the site to allow mobility of construction equipment.

It is recommended that 98% Standard compaction be used in all earthwork for buildings and pavement areas. Soils in the upper 4.0 feet of the site are not suitable for use as fill due to their moisture content and should be avoided unless dried. Any off-site borrow soils required should be clay gravel (GC) or clayey sand (SC) type soils and have a PI of less than 15. All fill soils should be placed in 8.0-inch lifts with a moisture content within two percentage points of optimum moisture content. A geotextile such as Mirafi 500X may greatly aid in stabilization of undercut areas in building and parking areas. A unit rate for this item should be included in the bidding documents so that construction delays can be minimized.

FOUNDATIONS

Conventional spread footings or a reinforced monolithic slab foundation can perform satisfactorily for the support of the proposed facility when properly constructed. The bearing capacity for footings founded on the silty clay (CL) natural ground is 1300 psf at a depth of 2.0 feet as shown by the calculations and curve given on Plates 10 and 11. An explanation of bearing capacity calculations is provided on Plate 12.

The magnitude of anticipated settlement is a function of the longtime applied load to the foundations and the compressibility of the supporting soils within the depth of significant stresses. Based upon a Q_a equal to 1300 psf, we recommend that the foundation be designed for a total settlement of 0.80 inch and a corresponding differential settlement of 0.50 inch as long as the span between adjacent columns comply with the local building codes and that there is no imperfections in the bearing strata of the footing excavations.

Evaluation by the soils engineer or his representative is recommended to verify that the allowable bearing value has not been reduced by disturbance due to excavating and/or massive imperfections in the bearing strata, in which case deeper excavations will be required and/or the subgrade improved to yield the design bearing value. Any areas undercut shall be backfilled with clay gravel as previously recommended.

FLOOR SLABS

Differential movement of the floor slab may be caused by a difference in the allowable gross bearing capacity, differing heave and/or variable thicknesses of compressible soils below the floors. A 6.0-inch thick layer of ~~clay gravel~~ granular material (sand) fill should be used ~~as a vapor barrier~~ and shall be compacted to at least 98% Standard compaction. A modulus of subgrade reaction (k) equal to 125 pci can be used for design of floor slabs if all other earthwork criteria are met.

PAVEMENTS

The following pavement designs and pavement recommendations are based on numerous reasonable assumptions concerning the pavement use, site conditions, and maintenance. The pavement designs presented herein are based on the earthwork recommendations presented earlier and an assumed CBR value of 4 based on correlation with the soil physical properties. AECI must be notified immediately of any soils or site conditions which vary from those assumed herein.

Flexible Pavement

Based upon a CBR of 4, the required parking lot pavement structure for light duty pavement would consist of 6.0 inches of compacted subgrade, 6.0 inches of clay gravel base course (AHTD Class 5), and 2.0 inches (AHTD Type II) of hot mix. For heavy duty pavements, 8.0 inches of compacted subgrade, 8.0 inches of clay gravel base, and 3.0 inches of hot mix would be required. The recommended flexible pavement structures are shown on Plate 13. The base course should be compacted to a minimum of 100% Standard compaction to properly support the flexible pavement.

Rigid Pavement

As an option to the proposed flexible pavement, a non-reinforced concrete pavement may be utilized. The light duty pavement areas should consist of 5.0 inches of concrete, 4.0 inches of clay gravel base, and 6.0 inches of compacted subgrade. The heavy duty pavement areas, including access to dumpsters or truck docks, should consist of 7.0 inches of concrete, 4.0 inches of clay gravel base, and 8.0 inches of compacted subgrade. Plate 13 shows the

recommended rigid pavement structures. The base course should be compacted to a minimum of 100% Standard compaction to properly support the concrete pavement. The paving concrete should have a minimum 28-day compressive strength of 4000 psi and be entrained with 5% air as recommended by the ACI code. The jointing pattern and load transfer devices should be as recommended by the ACI and the PCA criteria.

CONCLUSIONS AND RECOMMENDATIONS

As a result of this geotechnical investigation, the following recommendations are offered for consideration:

1. As previously discussed, conventional footings or a reinforced monolithic slab, enhanced for rigidity, would serve satisfactorily for the proposed structure. It is concluded that this will be an economical type of foundation and should be designed in accordance with the necessary structural and/or architectural requirements determined by the designers with the owner's ultimate approval.
2. The conventional footings or monolithic slab foundations should be designed utilizing a maximum allowable bearing of 1300 psf at a depth of 2.0 feet from existing grade.
3. Soil in the upper 4.0 feet of the site will not be suitable for use as fill without significant drying; thus, off-site non-expansive granular fill shall be placed in 8.0-inch thick lifts and be compacted within two percentage points of optimum moisture content to 98% Standard Proctor density as per ASTM D 698. The select off-site fill shall not have a PI in excess of 15. Clay-gravel (GC) or clayey sand (SC) are the most suitable structural fill for this project.

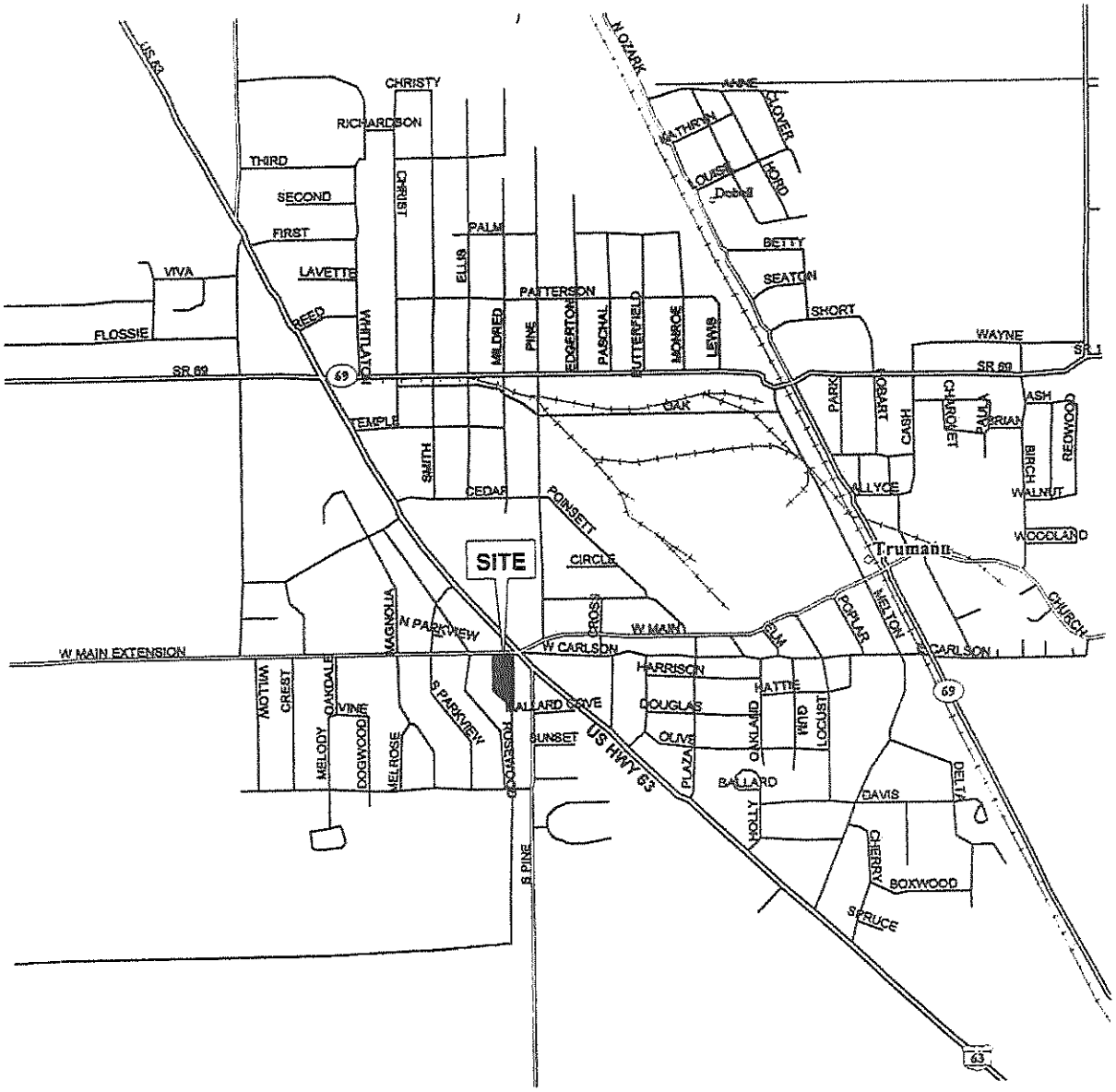
4. Draining of any perched water encountered during construction and undercutting of soft, wet or pumping silts may be required in the building areas. The contractor should be prepared to make select fill available to facilitate foundation and pavement construction.
5. All utility excavations to be backfilled should be well compacted using clay gravel (GC) fill at 98% of Standard compaction. A good surface and subsurface drainage system will aid the performance life of pavements and utilities.
6. Quality control testing should be utilized in the construction of the foundation, undercutting, fill placement, and floor slab construction with adequate testing to verify that the design requirements have been achieved.
7. Geotechnical engineering services should be utilized in the foundation construction phase, and our recommendations are based upon this so that adequate compensation can be made for conditions that may occur which differ significantly from those assumed as a result of this investigation.
8. Other recommendations are given throughout the text of this report.

* * * * *

APPENDIX A

PLATES

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD LITTLE ROCK ARKANSAS 72204



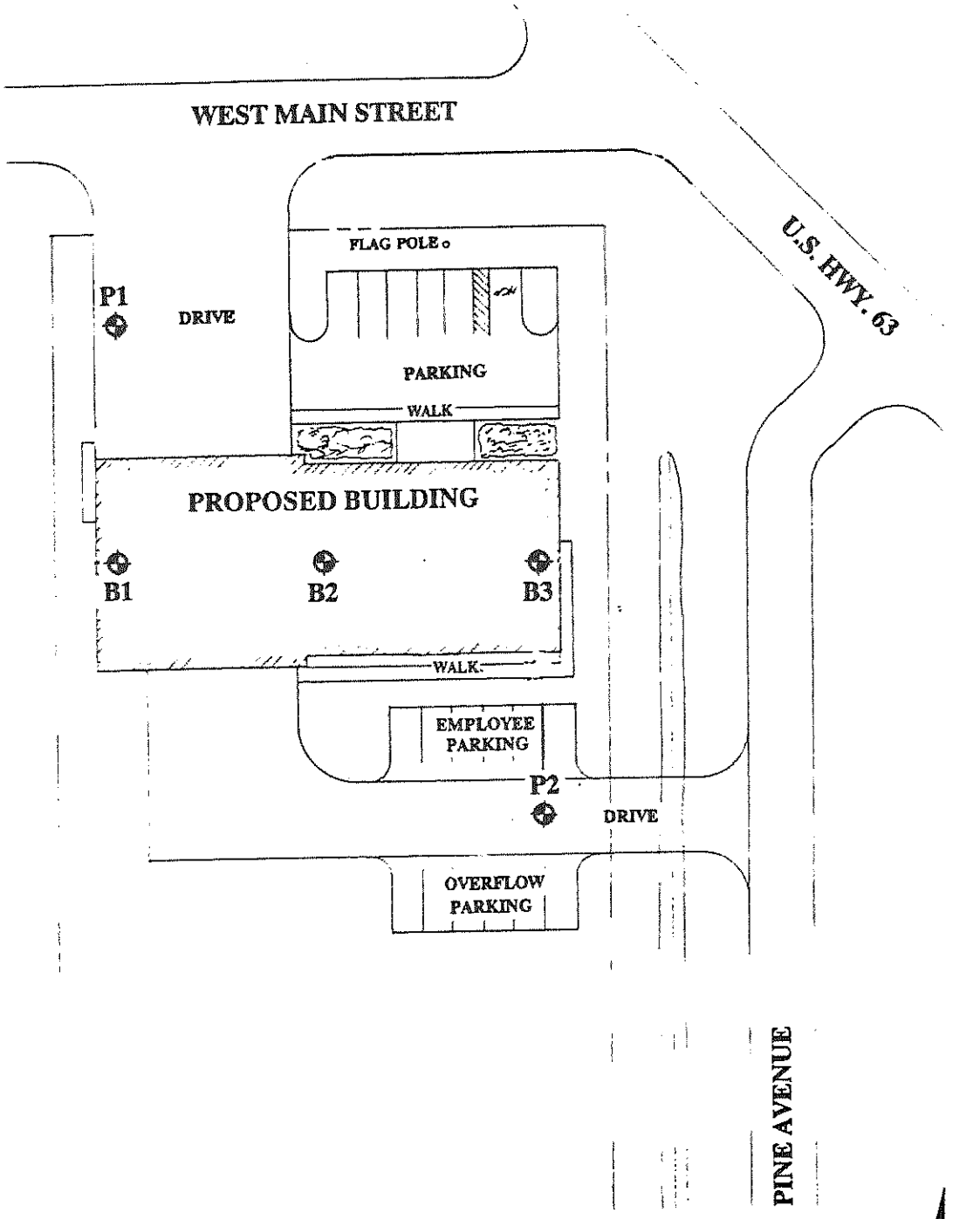
NORTH

VICINITY MAP

TRUMANN, ARKANSAS

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD LITTLE ROCK, ARKANSAS 72204

NOT DRAWN TO SCALE.



PLAN OF BORINGS

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

LOG OF BORING

PROJECT: PROPOSED TRUMANN FIRE STATION
TRUMANN, ARKANSAS
FOR: MILLER, NEWELL ENGINEERS
DATE: 11/05/98 **JOB NO:** 6822
DRILLER: STONE
SIMCO 2400
GEOTECHNICIAN: ROACH

BORING NO: B1
LOCATION: SEE PLAN OF BORINGS
BORING TYPE: AUGER W/SPT
GROUND ELEVATION: NOT FURNISHED

LEGEND

S Shelby Tube | NX Diamond Core | P Penetration Test
Core | Standard Penetration | J-Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No.	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	8		5.0 INCHES OF TOPSOIL STIFF MOIST BROWN SANDY CLAY (CL) PP = 0.75 TSF
	P2	6		LOOSE MOIST BROWN SILTY SAND (SM)
5	P3	13		MEDIUM DENSE MOIST BROWN SILTY SAND (SM)
	P4	10		MEDIUM DENSE MOIST BROWN SILTY SAND (SM)
10	P5	4		VERY LOOSE MOIST BROWN SILTY SAND (SM)
15	P6	7		LOOSE MOIST BROWN SILTY SAND (SM)
20				BOTTOM OF HOLE AT 16.5 FEET IN SILTY SAND (SM). BORING CAVED AT 10.0 FEET. WATER WAS ENCOUNTERED AT 8.0 FEET DURING DRILLING. WATER LEVEL AT 8.0 FEET UPON COMPLETION OF DRILLING.
25				
30				
35				

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

LOG OF BORING

PROJECT: PROPOSED TRUMANN FIRE STATION
TRUMANN, ARKANSAS
FOR: MILLER, NEWELL ENGINEERS

BORING NO: B2
LOCATION: SEE PLAN OF BORINGS
BORING TYPE: AUGER W/SPT
GROUND ELEVATION: NOT FURNISHED

DATE: 11/05/98
JOB NO: 6622
DRILLER: STONE
SIMCO 2400
GEOTECHNICIAN: ROACH

LEGEND

S Shelby Tube | NX Diamond Core | P Penetration Test
Core | Standard Penetration | J-Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No.	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	7		5.0 INCHES OF TOPSOIL STIFF MOIST BROWN SANDY CLAY (CL) PP = 0.75 TSF
	P2	8		LOOSE MOIST BROWN SILTY SAND (SM)
5	P3	14		MEDIUM DENSE MOIST BROWN SILTY SAND (SM)
	P4	13		MEDIUM DENSE MOIST GRAYISH BROWN SILTY SAND (SM)
10	P5	15		MEDIUM DENSE MOIST BROWN SILTY SAND (SM)
15	P6	2		VERY LOOSE MOIST GRAYISH BROWN SILTY SAND (SM)
20				BOTTOM OF HOLE AT 16.5 FEET IN SILTY SAND (SM). BORING REMAINED OPEN. WATER WAS ENCOUNTERED AT 10.0 FEET DURING DRILLING. WATER LEVEL AT 10.0 FEET UPON COMPLETION OF DRILLING.
25				
30				
35				

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

LOG OF BORING

PROJECT: PROPOSED TRUMANN FIRE STATION
TRUMANN, ARKANSAS
FOR: MILLER, NEWELL ENGINEERS

BORING NO: B3
LOCATION: SEE PLAN OF BORINGS
BORING TYPE: AUGER W/SPT
GROUND ELEVATION: NOT FURNISHED

DATE: 11/04/98 **JOB NO:** 6622
DRILLER: STONE
SIMCO 2400
GEOTECHNICIAN: ROACH

LEGEND

S Shelby Tube | NX Diamond Core | P Penetration Test
Core | Standard Penetration | J-Jar
Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No.	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	8		5.0 INCHES OF TOPSOIL STIFF MOIST BROWN SANDY CLAY (CL) PP = 0.75 TSF
	P2	7		MEDIUM STIFF MOIST BROWNISH GRAY SILTY CLAY (CL) PP = 0.75 TSF
5	P3	12		MEDIUM DENSE MOIST BROWNISH GRAY SILTY SAND (SM)
	P4	16		MEDIUM DENSE MOIST BROWN SILTY SAND (SM)
10	P5	13		MEDIUM DENSE MOIST BROWN SILTY SAND (SM)
15	P6	2		VERY LOOSE MOIST BROWN SILTY SAND (SM)
				BOTTOM OF HOLE AT 16.5 FEET IN SILTY SAND (SM). BORING REMAINED OPEN. WATER WAS ENCOUNTERED AT 8.0 FEET DURING DRILLING. WATER LEVEL AT 8.0 FEET UPON COMPLETION OF DRILLING.
20				
25				
30				
35				

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

LOG OF BORING

PROJECT: PROPOSED TRUMANN FIRE STATION
TRUMANN, ARKANSAS
FOR: MILLER, NEWELL ENGINEERS

BORING NO: P1
LOCATION: SEE PLAN OF BORINGS
DATE: 11/05/98
JOB NO.: 6622
BORING TYPE: AUGER W/SPT
DRILLER: STONE
SIMCO 2400
GEOTECHNICIAN: ROACH
GROUND ELEVATION: NOT FURNISHED

LEGEND

S Shelby Tube | NX Diamond Core | P Penetration Test
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Static Water Table | Hydrostatic Water Table | No Recovery

Depth In Feet	Sample Type & No.	N-Blows Per Foot	Graphic Symbol	VISUAL DESCRIPTION OF STRATUM
0	P1	6		5.0 INCHES OF TOPSOIL MEDIUM STIFF MOIST BROWN SANDY CLAY (CL) PP = 0.75 TSF
	P2	6		LOOSE MOIST BROWN SILTY SAND (SM)
5	P3	12		MEDIUM DENSE MOIST BROWN SILTY SAND (SM)
10				BOTTOM OF HOLE AT 6.5 FEET IN SILTY SAND (SM). BORING REMAINED OPEN. NO WATER WAS ENCOUNTERED IN THIS BORING.

LOG OF BORING

PROJECT: PROPOSED TRUMANN FIRE STATION
TRUMANN, ARKANSAS
FOR: MILLER, NEWELL ENGINEERS

BORING NO: P2
LOCATION: SEE PLAN OF BORINGS
DATE: 11/05/98
JOB NO.: 6622
BORING TYPE: AUGER W/SPT
DRILLER: STONE
SIMCO 2400
GEOTECHNICIAN: ROACH
GROUND ELEVATION: NOT FURNISHED

0	P1	7		5.0 INCHES OF TOPSOIL MEDIUM STIFF MOIST BROWN SANDY CLAY (CL) PP = 0.75 TSF
	P2	6		MEDIUM STIFF MOIST BROWN SANDY CLAY (CL) PP = 0.75 TSF
5	P3	11		STIFF MOIST BROWN SANDY CLAY (CL) PP = 1.00 KSF
10				BOTTOM OF HOLE AT 6.5 FEET IN CLAY (CL). BORING REMAINED OPEN. NO WATER WAS ENCOUNTERED IN THIS BORING.

ANDERSON ENGINEERING CONSULTANTS, INC.
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

FIELD CLASSIFICATION SYSTEM
FOR SOIL EXPLORATION

NON COHESIVE SOILS

(Silt, Sand, Gravel and Combinations)

Density

Very Loose	- 5 blows/ft. or less
Loose	- 6 to 10 blows/ft.
Medium Dense	- 11 to 30 blows/ft.
Dense	- 31 to 50 blows/ft.
Very Dense	- 51 blows/ft. or more

Relative Proportions

Descriptive Term	Percent
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

Particle Size Identification

Boulders	-	8-inch diameter or more
Cobbles	-	3 to 8-inch diameter
Gravel	- Coarse	- 1 to 3-inch
	Medium	- ½ to 1-inch
	Fine	- ¼ to ½-inch
Sand	- Coarse	- 0.6 mm to ¼-inch (dia. of pencil lead)
	Medium	- 0.2 mm to 0.6 mm (dia. of broom straw)
	Fine	- 0.05 mm to 0.2 mm (dia. of human hair)
Silt		- 0.06 mm to 0.002 mm (Cannot see particles)

COHESIVE SOILS

(Clay, Silt and Combinations)

Consistency

Very Soft	- 3 blows/ft. or less
Soft	- 4 to 5 blows/ft.
Medium Stiff	- 6 to 10 blows/ft.
Stiff	- 11 to 15 blows/ft.
Very Stiff	- 16 to 30 blows/ft.
Hard	- 31 blows/ft. or more

Plasticity

Degree of Plasticity	Plasticity Index
None to slight	0 - 4
Slight	5 - 7
Medium	8 - 22
High to Very High	over 22

NOTES

Classification on logs are made by visual inspection.

Standard Penetration Test - Driving a 2.0-inch O.D., 1⅜-inch I.D., sampler a distance of 1.0 foot into undisturbed soil with a 140-pound hammer free falling a distance of 30.0 inches. It is customary for AECI to drive the spoon 6.0 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6.0 inches of penetration on the drill log (Example: 6/8/9). The standard penetration test results can be obtained by adding the last two figures (i.e., 8 + 9 = 17 blows/ft.).

Strata Changes - In the column "Soil Descriptions" on the drill log the horizontal lines represent strata changes. A solid line (------) represents an actually observed change, a dashed line (- - - -) represents an estimated change.

Groundwater observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs.

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KEY TO SOIL CLASSIFICATIONS AND SYMBOLS

UNIFIED SOIL CLASSIFICATION SYSTEM(1)

Major Divisions		Letter	Symbol: Hatching	Symbol: Color	Name
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW		RED	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP			Poorly-graded gravels or gravel-sand mixtures, little or no fines
		GM		YELLOW	Silty gravels, gravel-sand-silt mixtures
		GC			Clayey gravels, gravel-sand-clay mixtures
	SAND AND SANDY SOILS	SW		RED	Well-graded sands or gravelly sands, little or no fines
		SP			Poorly-graded sands or gravelly sands, little or no fines
		SM		YELLOW	Silty sands, sand-silt mixtures
		SC			Clayey sands, sand-clay mixtures
FINE GRAINED SOILS	SILTS AND CLAYS LL <50	ML		GREEN	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL			Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL			Organic silts and organic silt-clays of low plasticity
	SILTS AND CLAYS LL >50	MH		BLUE	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH			Inorganic clays of high plasticity, fat clays
		OH			Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS		Pt		ORANGE	Peat and other highly organic soils

TERMS CHARACTERIZING SOIL STRUCTURE (2)

SLICKENSIDED – having inclined planes of weakness that are slick and glossy in appearance

FISSURED – containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.

LAMINATED (VARVED) – composed of thin layers of varying color and texture, usually grading from sand or silt at the bottom to clay at the top.

CRUMBLY – cohesive soils which break into small blocks or crumble on drying.

CALCAREOUS – containing appreciable quantities of calcium carbonate, generally nodular.

WELL GRADED – having wide range in grain sizes and substantial amounts of all intermediate particle sizes.

POORLY GRADED – predominantly of one grain size (uniformly graded) or having a range of sizes with some intermediate size missing (gap or skip graded).

SYMBOLS FOR TEST DATA

M/C=15 – Natural moisture content in percent.

γ =95 – Dry unit weight in lbs/cu ft.

Qu=1.23 – Unconfined compression strength in tons/sq ft.

Qc=1.68 (21 psi) – Confined compression strength at indicated lateral pressure.

51-21-30 – Liquid limit, Plastic limit, and Plasticity Index.

30% FINER – Percent finer than No. 200 mesh sieve.

30 B/F – Blows per foot, standard penetration test.

∇ – Ground water table.

TERMS DESCRIBING CONSISTENCY OF SOIL (2)

COARSE GRAINED SOILS		FINE GRAINED SOILS		
DESCRIPTIVE TERM	NO. BLOWS/FT. STANDARD PEN. TEST	DESCRIPTIVE TERM	NO. BLOWS/FT. STANDARD PEN. TEST	UNCONFINED COMPRESSION TONS PER SQ. FT.
Very loose	0-4	Very Soft	< 2	< 0.25
Loose	4-10	Soft	2-4	0.25-0.50
Firm (medium)	10-30	Plastic (med. stiff)	4-8	0.50-1.00
Dense	30-90	Stiff	8-15	1.00-2.00
Very Dense	over 90	Very Stiff	15-30	2.00-4.00
		Hard	over 30	over 4.00

Field classification for "Consistency" is determined with a 0.25" diam. penetrometer.

1-From Waterways Experiment Station Technical Memorandum No. 3-357
2-From "Soil Mechanics in Engineering Practice" by Terzaghi and Peck

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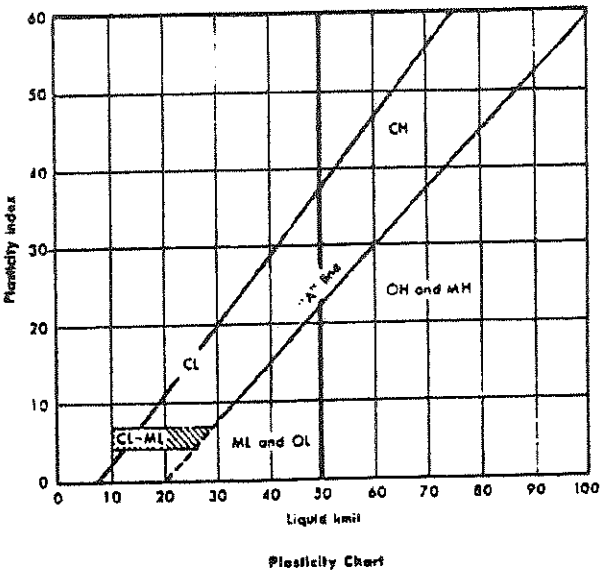
10205 ROCKWOOD ROAD, LITTLE ROCK, ARKANSAS 72204

UNIFIED SOILS CLASSIFICATION SYSTEM
(ASTM D-2487)

Major divisions			Group symbols	Typical names	Laboratory classification criteria	
Coarse-grained soils (More than half of material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 per cent ... GW, GP, SW, SP. More than 12 per cent ... GM, GC, SM, SC. 5 to 12 per cent ... Borderline cases requiring dual symbols[a]	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW
		Gravels with fines (Appreciable amount of fines)	GM[b] d	Silty gravels, gravel-sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4 — Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of d of symbols
			GC	Clayey gravels, gravel-sand-clay mixtures		Atterberg limits above "A" line with P.I. greater than 7
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines		$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP	Poorly graded sands, gravelly sands, little or no fines		Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM[b] d	Silty sands, sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4 — Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures		Atterberg limits above "A" line with P.I. greater than 7
Fine-grained soils (More than half of material is smaller than No. 200 sieve)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity		
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, loam clays		
			OL	Organic silts and organic silty clays of low plasticity		
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts		
			CH	Inorganic clays of high plasticity, fat clays		
			OH	Organic clays of medium to high plasticity, organic silts		
	Highly organic soils		Pt	Peat and other highly organic soils		



Plasticity Chart

[a] Division of GM and SM groups into subdivisions of d and u are for roads and airfields only. Subdivision is based on Atterberg limits; suffix d used when L.L. is 28 or less and the P.I. is 6 or less; the suffix u used when L.L. is greater than 28.
[b] Borderline classifications, used for soils possessing characteristics of two groups, are designated by combinations of group symbols. For example GW-GC, well-graded gravel-sand mixture with clay binder.

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Design Calculations for Conventional Footings

PROJECT: PROPOSED FIRE STATION
PROJECT NO.: 6620 DATE: 11/17/98
BORING NO.: AVG N TESTED BY: AETC SAFETY FACTOR: 2.00

Df ft	DEPTH - ft from	to	STRATA H - ft	N B/F	Qu KSF	Qu/2 KSF	1.25Qu KSF	.125Df KSF	Qa KSF
1.5	0.0	1.5	1.5	7	1.9	0.9	2.3	0.188	1.3
4.0	1.5	4.0	2.5	7	1.9	0.9	2.3	0.500	1.4
6.5	4.0	6.5	2.5	13	3.4	1.7	4.3	0.813	2.6
9.0	6.5	9.0	2.5	13	3.4	1.7	4.3	1.125	2.7
11.5	9.0	11.5	2.5	10	2.7	1.3	3.3	1.438	2.3
16.5	11.5	16.5	5.0	3	0.8	0.4	1.0	2.063	1.3

WATER TABLE LEVEL: 8 ft.

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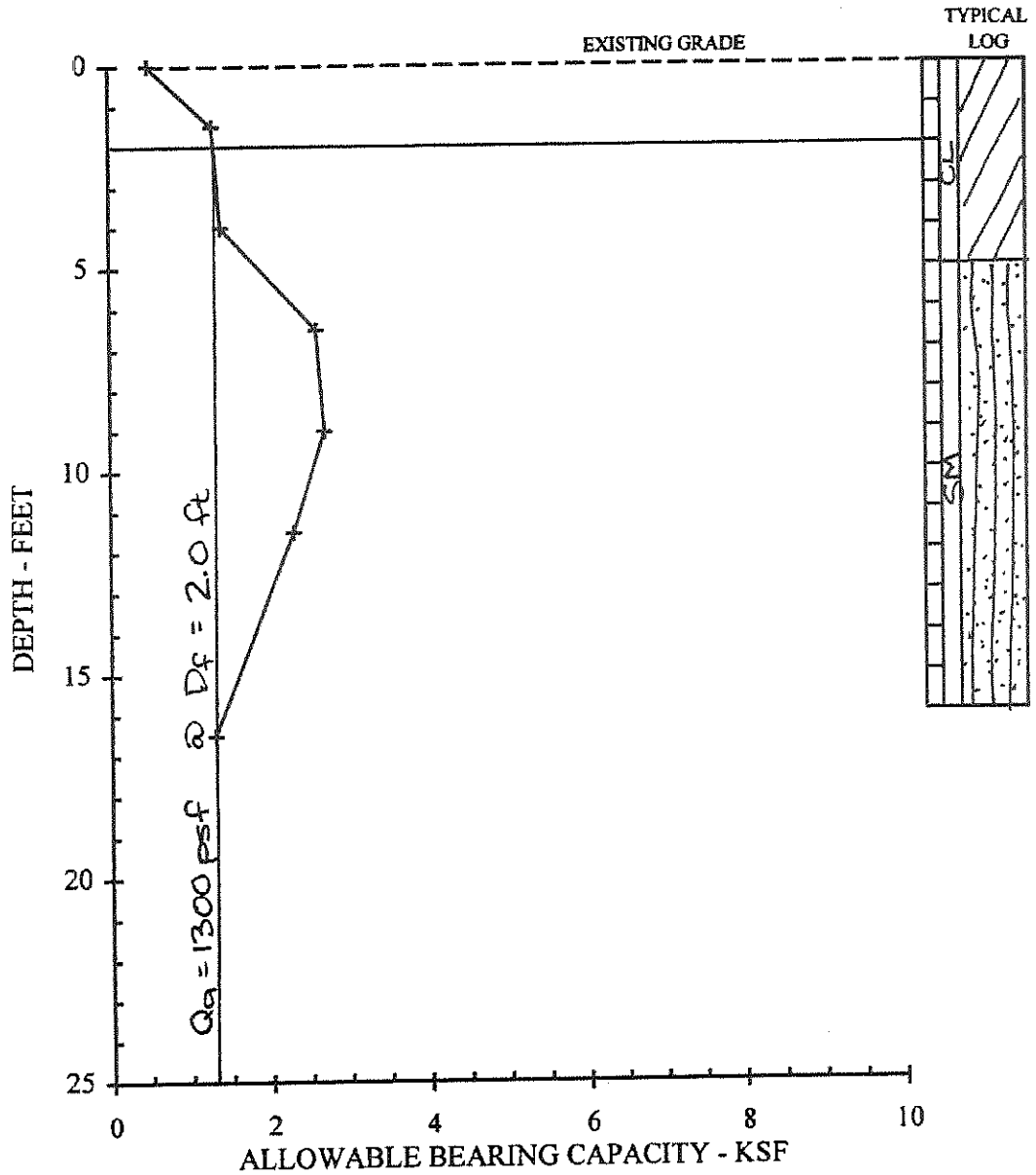
CONVENTIONAL FOOTINGS

PROJECT: **Proposed Fire Station**
Truman, Arkansas

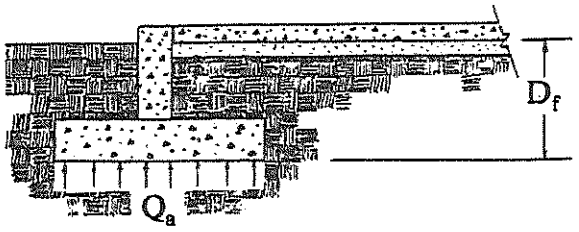
BORING NO.: AVG N

PROJECT NO.: **6620** WATER TABLE: **8.0 Feet** SAFETY FACTOR: **2.0**

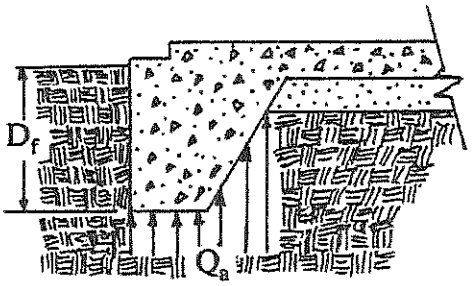


DEPTH - BEARING CAPACITY CURVE

CONVENTIONAL FOOTINGS



MONOLITHIC SLAB



EXPLANATION OF CALCULATIONS SHOWN IN TABLES

D_f = depth from ground surface to bottom of footing, ft.

Depth = depth from top to bottom of soil strata, ft.

Strata H = thickness of soil strata, ft.

N = standard penetration N-value, blows/ft.

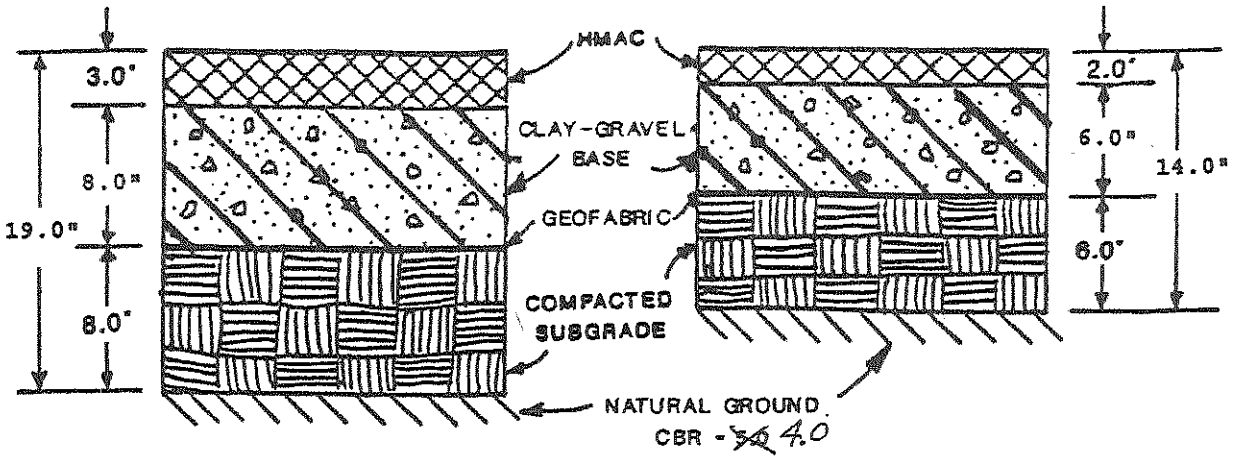
Qu = ultimate soil strength, ksf

1.25 Qu = soil strength parameter, ksf

0.125 D_f = depth factor, ksf

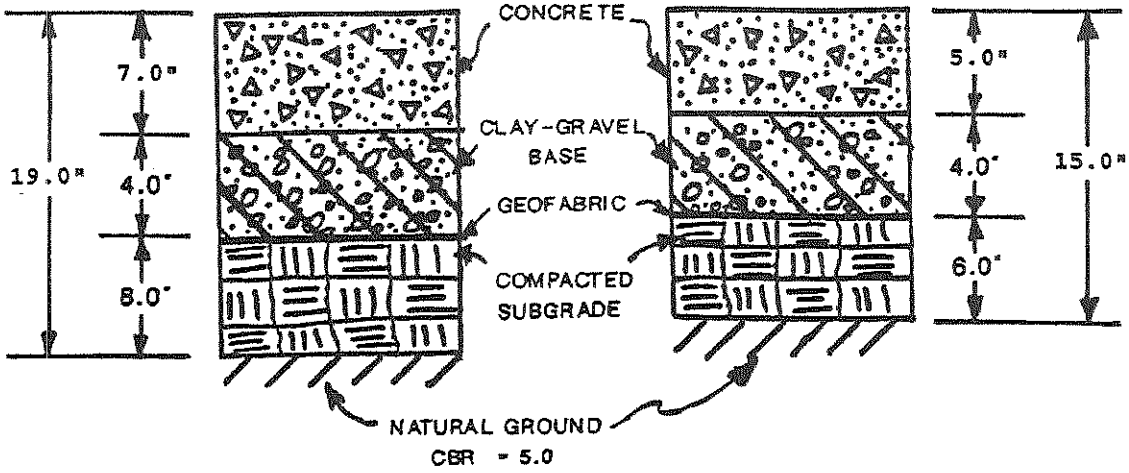
Q_a = allowable bearing capacity = (1.25 Qu + 0.125 D_f) ÷ S.F., ksf

EXPLANATION OF BEARING CAPACITY CALCULATIONS



HEAVY TRAFFIC LIGHT TRAFFIC

RECOMMENDED FLEXIBLE PAVEMENT STRUCTURE



HEAVY TRAFFIC LIGHT TRAFFIC

RECOMMENDED RIGID PAVEMENT STRUCTURE

SECTION 02050

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.01 SELECTION INCLUDES

A. This Section includes selective demolition, including but not limited to:
   1. Demolition and removal of slabs and other existing elements as required to execute the work.

B. Related Sections include the following:
   1. Division 1 Section "Temporary Construction Facilities and Controls" for temporary construction, protection facilities, and environmental-protection measures for demolition operations.
   2. Refer to Drawing for demolition and relocation of mechanical and electrical items.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition.

B. Comply with hauling and disposal regulations of authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 ITEMS

A. Items to be Removed: Except for items identified to be salvaged for the Owner or reused for this project, remove items from the site and legally dispose offsite.

B. Items Salvaged for Owner: Pack, label, and store as directed by Owner.

C. Items Reused for this Project: Store and protect removed items that will be reused.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Survey existing conditions and correlate with requirements indicated to determine extent of demolition required.

B. Review of Project Record Documents of existing construction provided by Owner does not guarantee that existing conditions are the same as those indicated in Project Record Documents.

C. When unanticipated mechanical, electrical, or structural elements are encountered, investigate, and measure the nature and extent of the element. Promptly submit a written report to Architect.

3.02 PREPARATION

A. Existing Utilities
   1. Arrange to shut off indicated utilities with utility companies.

3.03 PROTECTION

A. Existing Facilities: Protect site elements, including slabs and sidewalks, that are to remain.

B. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Division 1 Section "Temporary Facilities and Controls."
   1. Protect existing site improvements, appurtenances, and landscaping to remain.
   2. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   3. Provide protection to ensure safe passage of people around demolition area.

3.04 DEMOLITION, GENERAL

A. General: Demolish indicated existing items and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Do not use cutting torches until work area is cleared of flammable materials. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
   2. Maintain adequate ventilation when using cutting torches.
   3. Locate demolition equipment and remove debris and materials so as not to impose excessive loads on remaining work.
   4. The contractor shall furnish all labor and materials required to complete demolition.
   5. All work demolished shall be removed from the site daily, except items to be reused or returned to the owner.
   6. Patched or repaired areas shall be returned to "like new" condition prior to installing proposed work.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
   2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

3.05 EXPLOSIVE DEMOLITION

A. Explosives: Use of explosives is not permitted.

3.06 SITE RESTORATION

A. Site Grading: Repair all damage to the site due to the demolition, including, but not limited to: grade, grass, concrete walks and drives.

3.07 REPAIRS

A. General: Promptly repair damage to adjacent construction caused by demolition operations.

B. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

C. Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

3.08 RECYCLING DEMOLISHED MATERIALS

A. General: Separate recyclable demolished materials from other demolished materials to the maximum extent possible. Separate recyclable materials by type.
   1. Provide containers or other storage method approved by Architect for controlling recyclable materials until they are removed from Project site.
   2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
   3. Stockpile materials away from demolition area. Do not store within drip line of remaining trees.
   4. Store components off the ground and protect from the weather.
   5. Transport recyclable materials off Owner's property and legally dispose of them.

3.09 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them offsite.

B. Do not allow demolished materials to accumulate on-site.

C. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

3.10 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing before demolition operations began.

END OF SECTION