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**Geotechnical Engineering Report
Northern/Orangewood Storm Drain Project
Phase III
83rd Avenue - Glendale To Orangewood
Orangewood Avenue - 83rd Avenue to Grand Avenue
Glendale, Arizona
R.A.M. Project No. G01522
Report No. 3**



**Geotechnical Engineering Report
Northern/Orangewood Storm Drain Project
Phase III
83rd Avenue - Glendale To Orangewood
Orangewood Avenue - 83rd Avenue to Grand Avenue
Glendale, Arizona
R.A.M. Project No. G01522
Report No. 3**

For:
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Geotechnical Engineering • Construction Materials Testing

Wood, Patel & Associates
1550 E. Missouri, Suite 203
Phoenix, Arizona 85014

July 15, 1997

Attention: Ashok Patel, P.E.

Subject: Geotechnical Engineering Report
Northern/Orangewood Storm Drain Project
Phase III
83rd Avenue - Glendale to Orangewood
Orangewood Avenue - 83rd Avenue to Grand Avenue
Glendale, Arizona

R.A.M. Project No. G01522
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Attached to this letter is the Geotechnical Engineering Report for the proposed Northern/Orangewood Storm Drain Project Phase III to be located in Glendale, Arizona.

The proposed project will include two basins, 1/2 mile of storm drain along 83rd Avenue and approximately 2 1/4 miles of storm drain around and connecting to the West Basin along Orangewood Avenue, 1/2 mile of storm drain along Northern Avenue and 1/2 mile of storm drain around and connecting to the East Basin. The results of our field exploration, laboratory testing, and engineering analysis, evaluation and recommendations are presented in the report.

The following is a brief summary of selected recommendations.

A. Foundations:

- Mat foundations or spread footings may be used for inlet/outlet storm structures.
- Support on native site soils as recommended herein.
- See report for allowable bearing capacities for various foundation depths and types.

B. Site Soils:

- Use as fill in pavement, basin and storm drain areas.
- Do not use as backfill against inlet/outlet structures.

C. Replacement Pavement:

- If existing pavements are to be replaced in kind, then the minimum section is shown in the report.
- If based on City of Glendale design procedure, a pavement section is shown in the report.

The attached report was prepared based on project and site data available at this time and was prepared in a manner and to the standards of the local geotechnical engineering practice. Our services did not include evaluations for the presence of hazardous materials, for area subsidence resulting from groundwater withdrawal or other geologic hazards.

Respectfully submitted,

RICKER, ATKINSON, MCBEE & ASSOCIATES, INC.



By: Kenneth L. Ricker, P.E.

/nk

Copies to: Addressee (5)

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REPORT



R·A·M

INTRODUCTION

This report presents the results of our geotechnical engineering services for the proposed Northern/Orangewood Storm Drain Project Phase III in Glendale, Arizona. The scope of our services included performing a field exploration program, laboratory analysis and geotechnical engineering evaluation, analysis and recommendations. The geotechnical recommendations presented herein consist of foundation design, pavement design, site development, material suitability and requirements, site preparation and grading procedures. We would be pleased to discuss with you any additional recommendations you may require. In addition, we are available to review project specifications and plans for conformance with our recommendations at no charge to you.

This firm should be notified for additional evaluation and recommendations should the facility design parameters (location, type, size, structural loads), site use or conditions encountered during construction differ from those presented herein.

PROPOSED CONSTRUCTION

The Northern/Orangewood Storm Drain, Phase III project will include a 72-inch diameter storm drain along 83rd Avenue from Glendale Avenue to Orangewood Avenue; a 48- to 66-inch diameter storm drain along Orangewood Avenue from 83rd Avenue to the West Basin at the northwest corner of Orangewood Avenue and 69th Avenue; a 48- to 78-inch diameter storm drain along Orangewood Avenue from the West Basin to 66th Avenue (future) then north along 66th Avenue (future) to Frier Drive (future), then east on Frier Drive (future) to AT&S Railroad/Grand Avenue where the storm drain will be jacked under the railroad and Grand Avenue and terminate in the East Basin located at the northeast corner of 65th Avenue (future) and Grand Avenue; a 48-inch diameter storm drain along 65th Avenue (future) (west side of East Basin) from Grand Avenue to Northern Avenue; a 36- to 54-inch diameter storm drain along Northern Avenue from Grande Avenue to 63rd Avenue; an East Basin which will be 15-feet deep; and a West Basin which will be 12-feet deep. The storm drains will be 7 to 20 feet deep and located in paved roadways except along the future road area which are presently dirt field roads. The basins will have side slopes of 5H:1V and mostly cut to

grade with some minor berms. The East Basin will have two inlet structures and an outlet structure. The West Basin will have one inlet structure and one outlet structure. Replacement pavement will be required along 83rd Avenue, Orangewood Avenue and Northern Avenue.

SITE CONDITIONS

The storm drain is along a two lane paved road on 83rd Avenue and Orangewood Avenue, along farm roads on the future roadway at 66th Avenue, Friar Drive and 65th Avenue, and along a five lane paved road on Northern Avenue. The adjacent areas to the road are agricultural and residential with some commercial areas at both ends of the project. A majority of the project is in Glendale, Arizona with some areas in an unincorporated portion of Maricopa County, Arizona.

FIELD EXPLORATIONS

Subsurface conditions at the basins were explored by drilling four test borings (41 to 43) in the East Basin and two test borings (44 to 45) in the West Basin to depths of 16.5 to 25.5 feet, the storm drain was explored by drilling 37 test borings (1 to 30 and 34 to 40)) to depths of 11.5 to 22.5 feet as shown on the Site Plans in Appendix A. Test Borings 31, 32 and 33 are on private property and will be completed when the right-of-entry is received. The test borings were drilled with a CME 55 drill rig using 7-inch diameter, hollow-stem augers. The drilling equipment and crew were provided by D & S Drilling, Inc. The test boring locations were determined in the field by a technician from our firm who also directed the drill crew. During the field explorations, representative disturbed and undisturbed samples were obtained, the test borings logged and soils field classified by our technician. The relatively undisturbed samples were obtained by driving a 3-inch diameter, ring-lined, open-end sampler into the soil with a 140-pound hammer dropping 30 inches. In addition, standard penetration tests were performed at selected depths. The results of the field explorations are presented in Appendix A.

LABORATORY ANALYSIS

Representative samples obtained during the field exploration were subjected to the following laboratory tests.

<u>Type of Test</u>	<u>Type of Sample</u>	<u>Number of Samples Tested</u>
Sieve Analysis and Atterberg Limits (ASTM C136, D1140, D4318)	Representative	44
Standard Proctor (ASTM D698)	Representative	4
pH/Minimum Resistivity (ADOT 236A)	Representative	4
R-Value (ASTM D2844)*	Representative	6
Moisture Content/Dry Density**	Undisturbed (Ring)	90
Moisture Content**	Split-Spoon	90

* Tests performed by Maxim Technologies

**Reported on the test boring logs

The results of the laboratory testing are presented in Appendix B.

SUBSURFACE CONDITIONS

The subsurface conditions encountered at test boring locations were somewhat variable. The logs of the test borings are attached in Appendix A. In general, in Test Borings 1 to 20 the near surface soils were clayey gravelly sand underlain by sandy clays of medium to high plasticity and layers of sand/silty sand and clayey gravelly sand. The upper material contained some zones of sandy clay. In Test Borings 20 to 45 the near surface materials were sandy clays underlain by clayey gravelly sands and some layers of sandy clay, clayey sand and gravel and sand/silty sand. All the deposits contained some layers or zones containing cobbles. In Test Borings 1 to 7 the surface soils were overlain by 3 to 6 inches of asphalt concrete on 0 to 7 inches of base material on 6 to 12 inches of Portland cement concrete pavement. In Test Borings 9 to 15, 17, 19, 20 and 25 the surface soils were overlain by 1.5 to 3.5 inches of asphalt concrete. In Test Borings 8, 16, 18, 21 to 24, 26 to 29, 30 to 37 and 39 the surface soils were overlain by 1.5 to 8 inches of asphalt concrete on 2 to 18 inches of base material. Refusal to auger penetration occurred in Test Boring 39 at a depth of 6 feet. The soil moisture was described as nearly dry to moist. At the time of field explorations for the project no groundwater was encountered in our test borings. Groundwater in the project area is

relatively deep and will not influence construction.

FOUNDATION DESIGN RECOMMENDATIONS

Foundations:

The proposed inlet and outlet structures may be supported on shallow spread footings and/or mat foundations founded on native undisturbed site soils. Foundations thus founded may be designed using the following allowable bearing pressures:

Foundation Depth Below			
Existing Grade (feet)	Finished Grade* (feet)	Bearing Material	Allowable Bearing Pressure (psf)
0-2	0	Undisturbed	1000
2-20	1.0	Undisturbed	1500

*Lowest adjacent finished grade within 5 feet of the facility.

All foundation excavations should be reviewed by the geotechnical engineer prior to placing reinforcement steel. Foundation bearing surfaces should not contain fills, loose or soft soils or debris. Where encountered these materials must be removed and replaced with compacted fill or lean concrete. Structural loads for the above footings should not exceed 5 kips per linear foot for walls and 70 kips for columns. A modulus of subgrade reaction of 150 pci for sandy clay soils and 250 pci for clayey sand and silty sand soils may be used in design of mat foundations.

The allowable bearing capacity should be applied to maximum, design dead plus live loads and may be increased by one-third when considering temporary loads such as transient wind or seismic loads. A one-third increase may also be used for toe pressures due to eccentric or lateral loadings, assuming the entire footing bearing surface remains in compression. The weight of the footing concrete below grade may be neglected in dead load computations. The recommended minimum footing widths are 2.0 and 1.33 feet for isolated columns and continuous wall footings, respectively.

The estimated total and differential foundation settlements for the loading conditions described above are less than 1/2 inch if soils below footing level remain at or below the construction moisture content. Some additional post-construction, differential settlement could occur if bearing soils become wet after construction. Therefore, continuous footings and stem walls should be reinforced and masonry walls constructed with properly designed reinforcement and with frequent expansion/contraction joints. Positive drainage away from the perimeter of the facility is essential to minimize the potential for moisture infiltration into bearing soils.

Lateral Earth Pressures:

The following tabulation presents the recommended lateral earth pressures and base friction values which should be used in the lateral design of footings and retaining walls. The lateral pressures are equivalent fluid pressures for average anticipated conditions.

Backfill Pressures:	
Unrestrained walls-----	30 psf/ft
Restrained walls-----	55 psf/ft
Passive Pressures:	
Continuous-----	250 psf/ft
Coefficient of Base Friction:	
Concrete to soil-----	0.40

The above equivalent fluid pressures are for vertical walls with horizontal backfills and do not include temporary loads imposed by compaction equipment or permanent loads resulting from backfill swell pressures or surcharge loads. All retaining walls should contain weep holes to reduce the potential for the buildup of hydrostatic pressures.

PAVEMENT DESIGN RECOMMENDATIONS

Replacement Pavements:

The City of Glendale design criteria was used in developing a pavement section for replacement pavements. Two options are available for the pavement replacement areas.

1. Replace in kind: Based on the existing sections, minimum thickness should be 3.0 inches of asphalt concrete on 11.0 inches of base material along 83rd Avenue, 2.0 inches of asphalt concrete on subgrade for Orangewood Avenue from 83rd Avenue to 73rd Avenue, 3.0 inches of asphalt concrete on 10.0 inches of base material for Orangewood from 73rd Avenue to 66th Avenue, 8.0 inches of asphalt concrete on 10.0 of base material for Grand Avenue and 5.5 inches of asphalt concrete on 10.0 inches of base material for Northern Avenue.

2. Design section: Based on the City of Glendale procedures for section and half section streets, the thickness should be as follows.

<u>Street</u>	<u>Pavement Section (inches)</u>	
	<u>Asphalt Concrete</u>	<u>Base Material</u>
83rd Avenue	4.0	8.0
Orangewood Avenue	2.0	12.0
Northern Avenue	5.0	10.0

It is recommended that the City of Glendale select the best opinion based on the current roadway conditions, projected traffic and planned future improvements.

For asphalt pavements the asphalt concrete mix used shall be MAG (1998) 19mm (Arterial). The upper 4 inches of base material shall be MAG Aggregate Base and the remainder may be MAG Select. All pavement sections should be constructed in accordance with MAG Specifications as modified by the City of Glendale.

The above sections are minimal and should function well with periodic maintenance (seal coats, overlays or patching) where proper drainage is provided and maintained. Should moisture penetrate the subgrade soils or ponding occur on or adjacent to the pavement section, increased maintenance and a significant reduction in pavement life could occur. Therefore, good surface drainage on and adjacent to the pavement is essential for achieving the desired pavement life.

SITE DEVELOPMENT RECOMMENDATIONS

Subsurface Wall Backfills:

On-site clay soils should not be used as backfill against retaining walls and subsurface walls. However, granular soils with plasticity indexes less than 10 may be used. All fill placed against the subsurface walls should be mechanically compacted to the densities described in the "Site Preparation and Grading Procedures" part of this report. Water jetting or flooding of backfill zones must be avoided.

Sidewalks, stairways, retaining walls, fences, planters, pavements, underground utilities and other elements founded on or in the backfill zone may undergo some differential movements with respect to the structures and undisturbed areas. The amount of movement can be limited by properly placing and compacting the backfill zone. However, even properly placed backfill may undergo post-compaction settlement equivalent to 1/4 to 1/2 percent of the backfill height. Therefore, those elements which are on or in the backfill zone should be structurally supported on the facility wall and the nearby undisturbed soils or an allowance made for differential movements of the elements in the backfill zone.

Surface Drainage:

Most soils will undergo some degree of volume change as the result of wetting. The degree of volume change will depend on the type of soil, swell potential, natural soils structure or degree of compaction (if a fill). These volume changes could result in movements in overlying facilities and non-structure elements including sidewalks, planters, retaining walls, floor slabs, etc. Therefore, good site and surface drainage away from these elements is required. In addition, water should not be allowed to pond within 10 feet of the facilities or other elements which are sensitive to movements. The exterior footing excavation backfill must be well compacted to minimize the possibility of moisture infiltration through this zone.

Excavatability:

The excavatability of site materials is difficult to evaluate based only on the exploration equipment

used during this design report. Therefore, we recommend that the contractor evaluate the excavatability of site materials by performing test excavations with the size and type of equipment the contractor plans on using at the site. For design purposes the following paragraph presents our best analysis as to the excavatability of site soils.

The near surface soils can probably be removed with conventional excavating equipment. Excavations penetrating the granular deposits containing large amounts of gravel and various amounts of cobbles will be slower and more difficult to accomplish. OSHA requires all excavations over five feet in depth, in which personnel are to enter, be either braced or sloped in accordance with OSHA regulations.

Earthwork Factors:

Earthwork losses due to ground height losses and shrinkage were estimated based on past experiences in the area and limited test data. The materials encountered at the site were of low to medium density. The estimated ground height losses due to subgrade compaction are as follows for previously ungraded areas:

*Ground Height Loss at Given Percent Compaction

<u>95%</u>	<u>100%</u>
1.0" to 2.0"	1.5" to 2.5"

* Based on maximum dry density obtained by ASTM D698, dry densities obtained from samples, and achieving an 8-inch deep compacted zone without stripping natural surface zones. These values do not include recompaction of zone disturbed by demolition or previous site usage.

The estimated shrinkage losses from cut to fill zones are as follows for naturally occurring soils. Where existing fills are reconditioned considerable shrinkage to some gain in material is expected:

*Estimated Percent Shrinkage at Given Percent Compaction

<u>Depth of Excavation</u>	<u>95%</u>	<u>100%</u>	<u>105%</u>
0 to 10 feet	17%± 2%	22% ± 2%	28% ± 2%
10 to 20 feet	15%± 2%	20% ± 2%	25% ± 2%

*Based on maximum dry density obtained by ASTM D698 and dry densities obtained from samples for natural undisturbed soils from the near surface zone, and local experience.

Our experience with earthwork losses has generally indicated that subgrades and fill zones compacted to a minimum value of 95% of maximum dry density (ASTM D698) result in losses comparable to 100% compaction (similarly for 90% minimum use 95% and for 100% minimum use 105%). These estimates do not include compaction to greater depths than assumed, losses due to wind or wastage, overexcavation, etc. These values do not include recompaction of zones disturbed by demolition or previous site usage.

Workability:

Wetting site soils such that moisture contents are at or above optimum could result in some soil pumping under dynamic loadings such as heavy construction equipment driving over the area. In building areas, some pumping is not detrimental to foundation or floor slabs provided the specified percent compaction is achieved. However, in flexible pavement areas where pumping has occurred, and in building areas where severe pumping has damaged subgrade conditions, the area should be allowed to dry until soils are workable without pumping, or the wetted areas removed and replaced with drier site soils.

Construction Excavation:

At the time of our field exploration and to the depth explored, no groundwater was observed in the test borings.

1. In excavations, unbraced temporary slopes in the surface soils should stand at slopes of

1/2H:1V. Locally, it may be necessary to flatten slopes to 1H:1V if very clean, loose sand zones (SP/SM) of significant thickness are encountered. Excavations into the deeper granular soils (SP/SM) may be constructed at a slope of 1H:1V. As an alternative, localized bracing or shoring may be required in areas of caving and lenses.

2. Surface areas behind the crest of excavations should be graded so that surface waters do not pond within 10 feet of the crest, or drain into the excavation.
3. Heavy material stockpiles should not be placed within 10 feet of the crest. Similarly, heavy construction equipment should not pass or be parked within 10 feet of the crest.
4. The crest of slopes should be monitored daily for evidence of movement or potential problems.

The design of any bracing systems should be reviewed by a qualified geotechnical engineer. Also, observations should be made by the geotechnical engineer during excavating to evaluate site conditions and determine if modifications are necessary in excavation procedures. If unbraced slopes are utilized, some surface raveling, erosion, and spalling should be expected unless measures are taken to stabilize exposed cut surfaces.

MATERIALS SUITABILITY AND REQUIREMENTS

Site Soils:

The soils exhibit medium to high plasticity. These soils may be used as fill in pavement and basin areas or as storm drain backfill. These soils must be mechanically compacted to required densities.

Imported Soils:

Fill and backfill required around the facilities or in exterior slab areas or for use as retaining wall backfills should be imported soils meeting the following requirements:

Maximum Particle Size	6 inches
Maximum Swell Potential	1.5%*

*Based on a sample which is remolded to 95% of the ASTM D698 maximum dry density at a moisture content of 2 percent below optimum, placed under a surcharge load of 100 psf and wetted.

Base Material:

Base material used below concrete slab and pavement areas should conform to the requirements of Maricopa Association of Governments (MAG) Specifications for Aggregate Base (Section 702). Existing asphalt concrete pavement which is milled may be used as base and select materials provided the material meets the requirements of MAG Section 702.

Asphalt Concrete Pavement:

Asphalt concrete pavement materials should conform to the requirements of MAG (1998) Specifications as modified by the City of Glendale (Superpave Mixes).

Pipe Bedding:

Material used as pipe bedding should be granular soils which meet the requirements of MAG Specifications as modified by the City of Glendale.

Corrosion Potential:

Based on laboratory resistivity tests, site soils which are at high moisture content or which become wetted will exhibit some potential for corrosion.

SITE PREPARATION AND GRADING PROCEDURES

Facility and Pavement Areas:

Recommendations presented in the previous sections of this report are based upon the following site preparation and grading procedures. Therefore, all earthwork should be accomplished with observation and testing by a qualified technician under the direction of a registered geotechnical/

materials engineer. The following apply to the areas within and extending 5 feet beyond the footprint of facilities, exterior slabs and pavement areas.

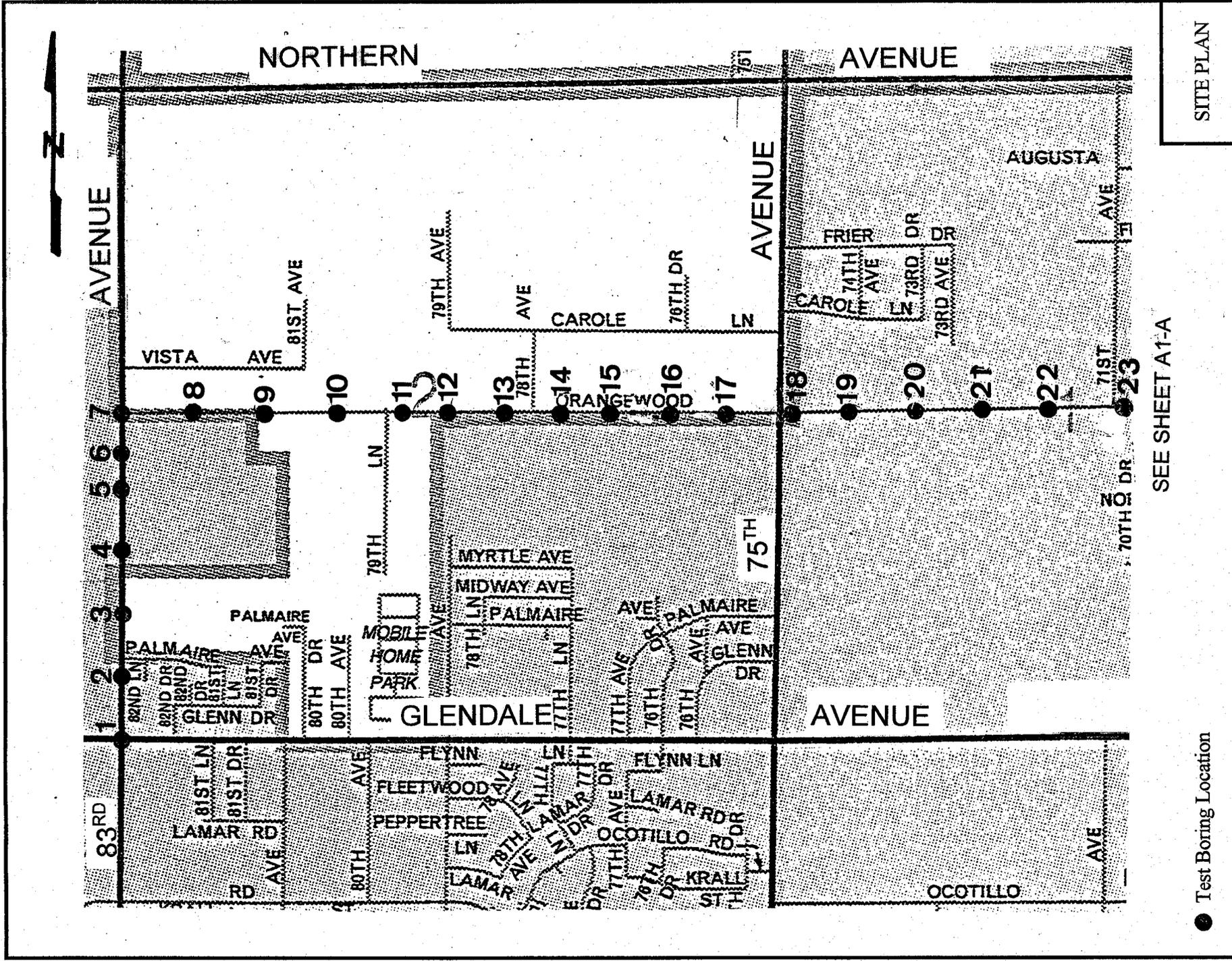
1. Clear and grub the site by removing and disposing of all vegetation, debris, rubble and remnants of former developments.
2. Strip the site of any existing fill zones, backfill zones and unstable soils. During stripping observe the surface for evidence of buried debris, vegetation or disturbed materials which will require additional removal. If encountered, these materials should be removed. Areas steeper than 5H to 1V should be benched and any depressions widened to accommodate compaction equipment.
3. Prepare the ground surface in fill areas and in areas cut to grade by scarifying, moisture conditioning and compacting the exposed surface soils to a depth of 8 inches.
4. Moisture condition and place all fill and backfill materials required to achieve specified grades. Fill materials should be moisture conditioned, placed and compacted in horizontal lifts of thicknesses compatible with the compaction equipment being used.
5. Compact subgrade, fill, backfill, subbase fill or base material to the following minimum percent compaction of the ASTM D698 maximum dry density for each lift.

<u>Material</u>	<u>Minimum Percent Compaction</u>
Soil:	
Below foundation sections	
(fill thickness less than 5 feet)-----	95
Below foundation sections	
(fill thickness greater than 5 feet)-----	100
Below concrete floor slabs (above footings)-----	90

**APPENDIX A
FIELD EXPLORATIONS**



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● Test Boring Location

SEE SHEET A1-A

SITE PLAN

LEGEND

CLASSIFICATION OF SOILS

ASTM Designation: D2487-83
(Based on Unified Soil Classification System)

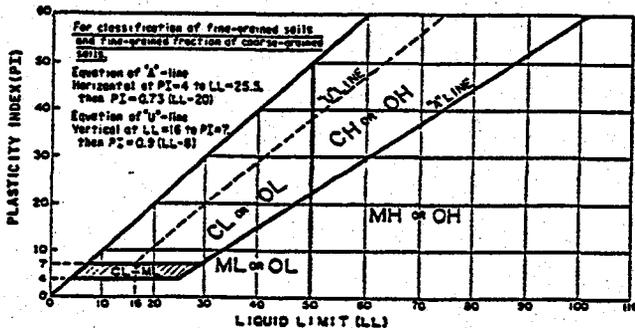
Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests				Soil Classification		
				Group Symbol	Name	
COARSE-GRAINED SOILS More than 50% retained on No. 200 Sieve	Gravels More than 50% coarse fraction retained on No. 4 Sieve	Clean Gravels Less than 5% fines	$Cu \geq 4$ and $1 < Cc \leq 3$	GW	Well graded gravel	
			$Cu < 4$ and/or $1 > Cc > 3$	GP	Poorly graded gravel	
		Gravels with Fines More than 12% fines	Fines classify as ML or MH	GM	Silty gravel	
		Fines classify as CL or CH	GC	Clayey gravel		
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines	$Cu \geq 6$ and $1 < Cc \leq 3$	SW	Well-graded sand	
				$Cu < 6$ and/or $1 > Cc > 3$	SP	Poorly graded sand
Sands with Fines More than 12% fines			Fines classify as ML or MH	SM	Silty sand	
		Fines classify as CL or CH	SC	Clayey sand		
FINE-GRAINED SOILS 50% or more passes the No. 200 Sieve		Silt and Clays Liquid limit less than 50	Inorganic	$PI > 7$ and plots on or above "A" line	CL	Lean clay
				$PI < 4$ or plots below "A" line	ML	Silt
	Liquid Limit - oven dried < 0.75 Liquid limit - not dried			OL	Organic clay Organic silt	
	Silt and Clays Liquid limit 50 or more		Inorganic	PI plots on or above "A" line	CH	Fat clay
				PI plots below "A" line	MH	Elastic silt Organic clay
				Liquid limit - oven dried < 0.75 Liquid limit - not dried	OH	Organic silt
	HIGHLY ORGANIC SOILS Primarily organic matter, dark in color, and organic odor				PT	Peat

TEST BORING LOG DEFINITIONS

Blows per foot using 140 pound hammer with 30 inch free-fall.

Depth, feet	Blows/Foot		Sample Type	Dry Density pcf	Water Content, %	Unified Classification	Description
	C	N/R					

C = Continuous Penetration Resistance (2 inch diameter rod)
N = Standard Penetration Resistance (ASTM D1586)
R = Penetration Resistance (3 inch diameter ring line sampler)



SILTS & CLAYS DISTINGUISHED ON BASIS OF PLASTICITY	U.S. STANDARD SERIES SIEVE			GRAIN SIZES		CLEAR SQUARE SIEVE OPENINGS		
	200	40	10	4	3/4"	3"	12"	
	SAND			GRAVEL		COBBLES	BOULDERS	
	FINE	MEDIUM	COARSE	FINE	COARSE			
MOISTURE CONDITION (INCREASING MOISTURE →)								
DRY	SLIGHTLY DAMP		DAMP	MOIST	VERY MOIST	WELL (SATURATED)		
			(Plastic Limit)					(Liquid Limit)

CONSISTENCY CORRELATION		RELATIVE DENSITY CORRELATION	
CLAYS & SILTS	BLOWS/FOOT*	SANDS & GRAVELS	BLOWS/FOOT*
VERY SOFT	0-2	VERY LOOSE	0-4
SOFT	2-4	LOOSE	4-10
FIRM	4-8	MEDIUM DENSE	10-30
STIFF	8-16	DENSE	30-50
VERY STIFF	16-32	VERY DENSE	OVER 50
HARD	OVER 32		

*Number of blows of 140 lb. hammer falling 30" to drive a 2" O.D. (1-3/8" I.D.) split-spoon sampler (ASTM D1586).

TEST BORING LOG

Project: Storm Drain, Sta. 101+00, 6'E Centerline 83rd Ave.
 Elevation: 1096 Datum: ---

TEST BORING: 1
 Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		5	N		9	SC	3" Asphalt Concrete on 9" Portland Cement Concrete. Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
10		6	R	101	13		
15		6	N		9		
20		16	R	98	22	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
25							Stopped drilling at 16 feet. No Groundwater Observed.

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 105+00, 6'E Centerline 83rd Ave.
 Elevation: 1098 Datum: ---

TEST BORING: 2
 Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		34	R	124	6	SC	6" Asphalt Concrete on 6" Base Material on 8" Portland Cement Concrete.
10		15	N		9		Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
15		16	R	118	6		
20		27	N		5	SP/SM	Sand/Silty Sand; brown, nearly dry, medium dense, no to low plasticity fines.
25							Stopped drilling at 16.5 feet. No Groundwater Observed.

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 110+00, 6'E Centerline 83rd Ave.
 Elevation: 1099.6 Datum: ---

TEST BORING: 3
 Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		7	N		8	SC	6" Asphalt Concrete on 6" Base Material on 6" Portland Cement Concrete. Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		50/8"	R	116	13		
10		50/3"	N		16	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
15		50/6"	R	114	3	SP/ SM	Sand/Silty Sand; brown, nearly dry, medium dense, no to low plasticity fines.
20							Stopped drilling at 16 feet. No Groundwater Observed.
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 115+00, 6'E Centerline 83rd Ave.
 Elevation: 1103 Datum: ---

TEST BORING: 4
 Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							5" Asphalt Concrete on 7" Base Material on 8" Portland Cement Concrete.
10	36		N		11	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
15	50/6"		R	94	19	CH/CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
20	14		N		6		
25	50/8"		R	*	2	SP/SM	Sand/Silty Sand; brown, nearly dry, medium dense, no to low plasticity fines.
							Stopped drilling at 19 feet. No Groundwater Observed. *= Sample too disturbed to determine density.

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 120+00, 6'E Centerline 83rd Ave.
 Elevation: 1104.6 Datum: ---

TEST BORING: 5
 Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		16	N		7	SC	4" Asphalt Concrete on 6" Base Material on 8" Portland Cement Concrete. Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		38	R	111	12		
10		40	N		14		
15		50/5"	R	118	12	CH/CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		32	N		3	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
20							Stopped drilling at 19.5 feet. No Groundwater Observed.
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta.124+40, On Centerline 83rd Ave.
 Elevation: 1105.5 Datum: ---

TEST BORING: 6
 Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		16	R	111	9	SC	3" Asphalt Concrete on 2" Base Material on 10" Portland Cement Concrete. Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
10		20	N		3		Occasional Cobbles.
15		50/5"	R	NR		CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
20		20	N		7	SP/ SM	Sand/Silty Sand; brown, nearly dry, medium dense, no to low plasticity fines.
25							Stopped drilling at 17 feet. No Groundwater Observed. NR = No Recovery.

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta.127+40, On Centerline 83rd Ave.
 Elevation: 1106 Datum: ---

TEST BORING: 7
 Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							3" Asphalt Concrete on 12" Portland Cement Concrete.
		7	N		12	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		15	R	114	6		Some Cobbles 6' to 9'.
10							
		26	N		4	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
15							
		27	R	133	10	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
20							Stopped drilling at 17.5 feet. No Groundwater Observed.
25							
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 105+00, 10' S Centerline Orangewood Ave. TEST BORING: 8
 Elevation: 1108 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		10	R	110	9	SC	1.5" Asphalt Concrete on 3" Base Material. Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		25	N		5		
10		50	R	123	12		
15		35	N		9	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
20							Stopped drilling at 17 feet. No Groundwater Observed.
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 110+00, 10' S Centerline Orangewood Ave. TEST BORING: 9
 Elevation: 1109 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		6	N		8	SC	1.5" Asphalt Concrete on Subgrade.
10		33	R	124	4		Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
15		21	N		8	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
20		31	R	110	13		
25							Stopped drilling at 17 feet. No Groundwater Observed.
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 115+00, 10' S Centerline Orangewood Ave. TEST BORING: 10
 Elevation: 1111.4 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		14	R	100	14	SC	1.5" Asphalt Concrete on Subgrade. Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		26	N		9		
10		36	R	108	15	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		24	N		12		
20		36	R	122	7		
25							Stopped drilling at 20 feet. No Groundwater Observed.
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 120+00, 10' S Centerline Orangewood Ave. TEST BORING: 11
 Elevation: 1112.8 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		9	N		13	CH/ CL	1.5" Asphalt Concrete on Subgrade. Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
10		29	R	106	10	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
15		12	N		11		
15		35	R	NR			
20		28	N		14	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
25							Stopped drilling at 20.5 feet. No Groundwater Observed. NR= No Recovery.
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 125+00, 10' S Centerline Orangewood Ave. TEST BORING: 12
 Elevation: 1113.4 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		5	R	98	14	SC	3.5" Asphalt Concrete on Subgrade. Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
10		29	N		8		
15		50/9"	R	100	15		
20		20	N		11	CH/CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
25		50/8"	R	102	15		Stopped drilling at 20 feet. No Groundwater Observed.
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 130+00, 10' S Centerline Orangewood Ave. TEST BORING: 13
 Elevation: 1114.9 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		5	N		7	SC	2.0" Asphalt Concrete on Subgrade. Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		16	R	116	12		
10		34	N		16	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
15		27	R	119	3		
20		18	N		8	SP/ SM	Sand/Silty Sand; brown, nearly dry, medium dense, no to low plasticity fines.
25							Stopped drilling at 19.5 feet. No Groundwater Observed.
This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.							

TEST BORING LOG

Project: Storm Drain, Sta. 135+00, 8.5' S Centerline Orangewood Ave. TEST BORING: 14
 Elevation: 1114.7 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		18	R	123	7	SC	2.0" Asphalt Concrete on Subgrade. Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		16	N		12		
10		50/9"	R	109	15	CH/CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
15		50	N		12	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		50/6"	R	108	20		
20							Stopped drilling at 18.5 feet. No Groundwater Observed.
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 140+00, 8.5' S Centerline Orangewood Ave. TEST BORING: 15
 Elevation: 1116.7 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		8	N		9	SC	2.0" Asphalt Concrete on Subgrade. Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
10		34	R	108	12		
15		20	N		14		
20						CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
25						SP/ SM	Sand/Silty Sand; brown, nearly dry, medium dense, no to low plasticity fines.
		17	N		14		Stopped drilling at 21.5 feet. No Groundwater Observed.
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 145+00, 6.5' S Centerline Orangewood Ave. TEST BORING: 16
 Elevation: 1119.7 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							4.0" Asphalt Concrete on 2.0" Base Material.
		10	R	93	10	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		23	N		6		Some Cobbles
10		44	N		6	SP/SM	Sand/Silty Sand; brown, nearly dry, medium dense, no to low plasticity fines.
15		17	N		12		
						SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
20		43	R	103	16		
25							Stopped drilling at 21 feet. No Groundwater Observed.
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 150+00, 6.5' S Centerline Orangewood Ave. TEST BORING: 17
 Elevation: 1120.2 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		10	N		12	CH/ CL	4.0" Asphalt Concrete on Subgrade. Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
10		29	R	111	11	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines. Some Cobbles
15		29	N		14		
15		50/9"	R	115	15	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
20		17	N		17	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
25							Stopped drilling at 21.5 feet. No Groundwater Observed.
This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.							

TEST BORING LOG

Project: Storm Drain, Sta. 153+50, 5' S Centerline Orangewood Ave. TEST BORING: 18
 Elevation: 1121.2 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		14	R	112	9	SC	2.0" Asphalt Concrete on 5.0" Base Material. Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
10		25	N		10		
15		50/8"	R	*	3	GC	Clayey Sand and Gravel; brown, nearly dry, medium dense to dense, medium plasticity fines.
20		22	N		18	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
25		50	R	99	27		Stopped drilling at 21 feet. No Groundwater Observed. * = Sample too disturbed to determine density.
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 158+00, 8' S Centerline Orangewood Ave. TEST BORING: 19
 Elevation: 1121.8 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		7	N		9	SC	2.0" Asphalt Concrete on Subgrade. Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
10		32	R	112	11		Gravelly Layer 5' to 8'.
15		29	N		20		
20		50	R	109	16		
25		21	N		21		Stopped drilling at 21.5 feet. No Groundwater Observed.
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 163+00, 6' S Centerline Orangewood Ave. TEST BORING: 20
 Elevation: 1123.6 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		16	R	102	11	SC	2.0" Asphalt Concrete on Subgrade. Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
10		14	N		11		
		50	R	106	14		
15		24	N		13	CH/ CL	Sand Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
20		50/8"	R	108	18		
25							Stopped drilling at 21 feet. No Groundwater Observed.
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 168+00, 8' S Centerline Orangewood Ave. TEST BORING: 21
 Elevation: 1124.1 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
0							2.0" Asphalt Concrete on 18.0" Base Material.
1		16	N		1		
2						SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
3							
4		15	R	106	12		
5							
6							
7							
8							
9						CH/ CL	Sand Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
10		23	N		10		
11							
12							
13							
14							
15		50/4"	R	NR			
16							
17							
18							
19							
20		22	N		24		
21							
22							
23							
24							
25							Stopped drilling at 21.5 feet. No Groundwater Observed. NR = No Recovery.
26							
27							
28							
29							
30							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 173+00, 8' S Centerline Orangewood Ave. TEST BORING: 22
 Elevation: 1124.8 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							1.5" Asphalt Concrete on 12.0" Base Material.
		30	R	123	10	CH/ CL	Sand Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
10		18	N		16		
		28	R	102	15		
15		27	N		17		
20		50/6"	R	112	12	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
25							Stopped drilling at 20.5 feet. No Groundwater Observed.
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 180+00, Centerline Orangewood Ave. TEST BORING: 23
 Elevation: 1127 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
0							2.0" Asphalt Concrete on 14.0" Base Material.
5		9	N		17	GC	Clayey Sand and Gravel; brown, nearly dry, medium dense to dense, medium plasticity fines.
5		26	R	107	10	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
10		45	N	NR			
15		50/2"	R	NR			Some Cobbles.
20		21	N		2	SP/SM	Sand/Silty Sand; brown, nearly dry, medium dense, no to low plasticity.
25		50/6"	R	92	14	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
25							Stopped drilling at 22.5 feet. No Groundwater Observed. NR= No Recovery.
							<small>This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.</small>

TEST BORING LOG

Project: Storm Drain, Sta.184 +00, Centerline Orangewood Ave. TEST BORING: 24
 Elevation: 1127.6 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							2.0" Asphalt Concrete on 10.0" Base Material.
		8	R	96	19	CL/ CH	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		12	N		12		
10		25	R	118	12	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
15		18	N		1	SP/ SM	Sand/Silty Sand; brown, nearly dry, medium dense, no to low plasticity.
20		50/6"	R	NR			Stopped drilling at 20.5 feet. No Groundwater Observed. NR= No Recovery.
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta.194+00, 4' S Centerline Orangewood Ave. TEST BORING: 25
 Elevation: 1130.7 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							<u>3.0" Asphalt Concrete on 6.0" Base Material.</u>
		10	N		18	CL/ CH	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		7	R	111	12	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
10							
		17	N		13		
15							
		31	R	120	6		
20							
		18	N		3		
25							Stopped drilling at 21.5 feet. No Groundwater Observed.
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 199+00, 5' S Centerline Orangewood Ave. TEST BORING: 26
 Elevation: 1132 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							5.0" Asphalt Concrete on 10.0" Base Material.
		17	R	104	18	CL/ CH	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		48	N		17		
10						SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		50/6"	R	103	14		
15							
		18	N		4	SP/ SM	Sand/Silty Sand; brown, nearly dry, medium dense, no to low plasticity fines.
20							
		50/5"	R	NR			
25							Stopped drilling at 20.5 feet. No Groundwater Observed. NR = No Recovery.
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 204+00, 5' S Centerline Orangewood Ave. TEST BORING: 27
 Elevation: 1133.8 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							5.0" Asphalt Concrete on 7.0" Base Material.
		9	N		14	CL/ CH	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		22	R	107	14		
10							
		23	N		14		
15							
		50/1"	R	*	2	SP/ SM	Sand/Silty Sand; brown, nearly dry, medium dense, no to low plasticity fines.
20							
		50/2"	N		5		Stopped drilling at 20.5 feet. No Groundwater Observed. *= Sample too disturbed to determine density.
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta.206+50, 5' S Centerline Orangewood Ave. TEST BORING: 28
 Elevation: 1135 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							2.0" Asphalt Concrete on 11.0" Base Material.
		13	R	100	21	CL/ CH	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		18	N		10		
10						SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		42	R	105	16		
15							
		21	N	NR			
20						SP/ SM	Sand/Silty Sand; brown, nearly dry, medium dense, no to low plasticity fines.
		31	R	NR			
25							Stopped drilling at 21 feet. No Groundwater Observed. NR = No Recovery.
							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta.211+75, 5' S Centerline Orangewood Ave. TEST BORING: 29
 Elevation: 1136.8 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							2.5" Asphalt Concrete on 10.0" Base Material.
		8	N		13	CL/ CH	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		17	R	108	14		
10						SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		6	N		10		
15							
		38	R	125	6		
20							
		50/2"	N	NR			Stopped drilling at 20.5 feet. No Groundwater Observed. NR = No Recovery.
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta.216+50, Centerline 67th Ave. Alignment TEST BORING: 30
 Elevation: 1138.2 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		19	R	96	18	CL/CH	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		18	N		15		
10		50/9"	R	111	17		
		24	N		4		
15							Stopped drilling at 21 feet. No Groundwater Observed. * = Sample too disturbed to determine density.
		50/2"	R	*	5		
20							
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta.235+00, 24' NE Centerline Grand Ave. TEST BORING: 34
 Elevation: 1142.3 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							8.0" Asphalt Concrete on 10.0" Base Material.
		12	R	107	14	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
10		15	N		16	CL/CH	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		24	R	103	16		
15		64	N		6	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
20							Stopped drilling at 17 feet. No Groundwater Observed.
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta.0+00, 30' E Centerline 67th Ave

TEST BORING: 35

Elevation: 1142.5

Datum: ---

Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							5.0" Asphalt Concrete on 10.0" Base Material.
		20	N		18	CL/ CH	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		14	R	111	14		
10		38	N		7		
15							Stopped drilling at 11.5 feet. No Groundwater Observed.
20							
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 5+00, 5' S Centerline Northern Ave.

TEST BORING: 36

Elevation: 1143.4

Datum: ---

Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							6.0" Asphalt Concrete on 8.5" Base Material.
		12	R	97	18	CL/ CH	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		24	N		16		
10							
		50/8"	R	118	7	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		21	N		18		
15							
							Stopped drilling at 14.5 feet. No Groundwater Observed.
20							
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta. 10+00, 10' S Centerline Northern Ave.
 Elevation: 1143.8 Datum: ---

TEST BORING: 37
 Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							5.5" Asphalt Concrete on 10.0" Base Material.
		16	N		12	CL/ CH	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		27	R	113	14		
10		31	N		13		
15		50/2"	R	NR			Stopped drilling at 15 feet. No Groundwater Observed. NR = No Recovery.
20							
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta.21+40, 55' S Centerline Northern Ave. TEST BORING: 38
 Elevation: 1147 Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		20	R	103	12	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		23	N		13		
10		21	R	*	14		
15		27	N		3	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
20		50/2"	R	NR			Stopped drilling at 18 feet. No Groundwater Observed. NR = No Recovery. * = Sample too disturbed to determine density.
25							This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain, Sta.26+40, Centerline 63rd Ave.

TEST BORING: 39

Elevation: 1148.5

Datum: ---

Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5							4.0" Asphalt Concrete on 10.0" Base Material.
		6	N		12	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
10		21	R	108	13		
		57	N		16		
15						SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		50/5"	R	*	3	GC	Clayey Sand and Gravel; brown, nearly dry, medium dense to dense, medium plasticity fines.
20							Refusal at 16 feet. No Groundwater Observed. *= Sample too disturbed to determine density
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain Basin

TEST BORING: 40

Elevation: _____ Datum: ---

Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		19	R	98	18	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		27	R	103	19		
10		37	R	113	15		
15		50/9"	R	*	3	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines. Some Cobbles
20		50/6"	R	NR			
25		50/6"	R	110	16	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		50/6"	R	110	16		
	<p style="font-size: small;">This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.</p>						<p>Stopped drilling at 25.5 feet. No Groundwater Observed. NR = No Recovery.</p>

TEST BORING LOG

Project: Storm Drain Basin TEST BORING: 41
 Elevation: _____ Datum: --- Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		16	R	106	17	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		11	R	115	14		
10		50/6"	R	116	11	CH/CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
15		50/6"	R	NR		GC	Clayey Sand and Gravel; brown, nearly dry, medium dense to dense, medium plasticity fines. Some Cobbles.
20		50/6"	R	*	11	CH/CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
25		50/7"	R	100	18		Stopped drilling at 25.5 feet. No Groundwater Observed. NR = No Recovery. * = Sample too disturbed to determine density.

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain Basin
 Elevation: _____ Datum: ---

TEST BORING: 42
 Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		13	R	99	8	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
		42	R	116	9	CH/CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
10		50/7"	R	108	18	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
15		50/6"	R	118	10		
						CH/CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
20		50/3"	R	*	5	GC	Clayey Sand and Gravel; brown, nearly dry, medium dense to dense, medium plasticity fines.
25		50/6"	R	96	20	CH/CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.							Stopped drilling at 25.5 feet. No Groundwater Observed. *= Sample too disturbed to determine density.

TEST BORING LOG

Project: Storm Drain Basin

TEST BORING: 43

Elevation: _____ Datum: ---

Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		12	R	108	14	CH/CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		42	R	109	16		
10		43	R	111	17		
		50/4"	R	NR		SP/SM	Sand/Silty Sand; brown, nearly dry, medium dense, no to low plasticity fines.
20						CH/CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		41	R	102	18	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
25		50/7"	R	96	24		Stopped drilling at 25.5 feet. No Groundwater Observed. NR= No Recovery.
This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.							

TEST BORING LOG

Project: Storm Drain Basin
 Elevation: _____ Datum: ---

TEST BORING: 44
 Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		11	R	107	16	CH/CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		6	N		16		
10		23	R	103	19		
15		24	N		5	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
20							Stopped drilling at 16.5 feet. No Groundwater Observed.
25							

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

TEST BORING LOG

Project: Storm Drain Basin

TEST BORING: 45

Elevation: _____ Datum: ---

Date: 5-4-98

Depth, feet	Blows/Foot		Sample Type	Dry Density, pcf	Water Content, %	Unified Classification	Description
	C	N/R					
5		5	N		16	CH/ CL	Sandy Clay, Trace to Some Gravel; brown, damp, stiff to very stiff, high to medium plasticity.
		15	R	104	15		
10		12	N		15	SC	Clayey Gravelly Sand; brown, slightly damp to moist, medium dense, medium plasticity fines.
15		38	R	116	6		
20		5	N		17		
25							Stopped drilling at 21.5 feet. No Groundwater Observed.

This boring log represents the conditions encountered on the date of drilling at this particular location. No other warranty is expressed or implied to the actual conditions which may exist within the vicinity of this boring location.

APPENDIX B
LABORATORY ANALYSIS



R·A·M

LABORATORY TEST RESULTS

Date: 10-Jul-98

SAMPLE SOURCE: 34 @ 10'-11'

TESTING PERFORMED: Direct Shear (ASTM D3080) - Driven Ring Sample

SAMPLED BY: RAM/Miller

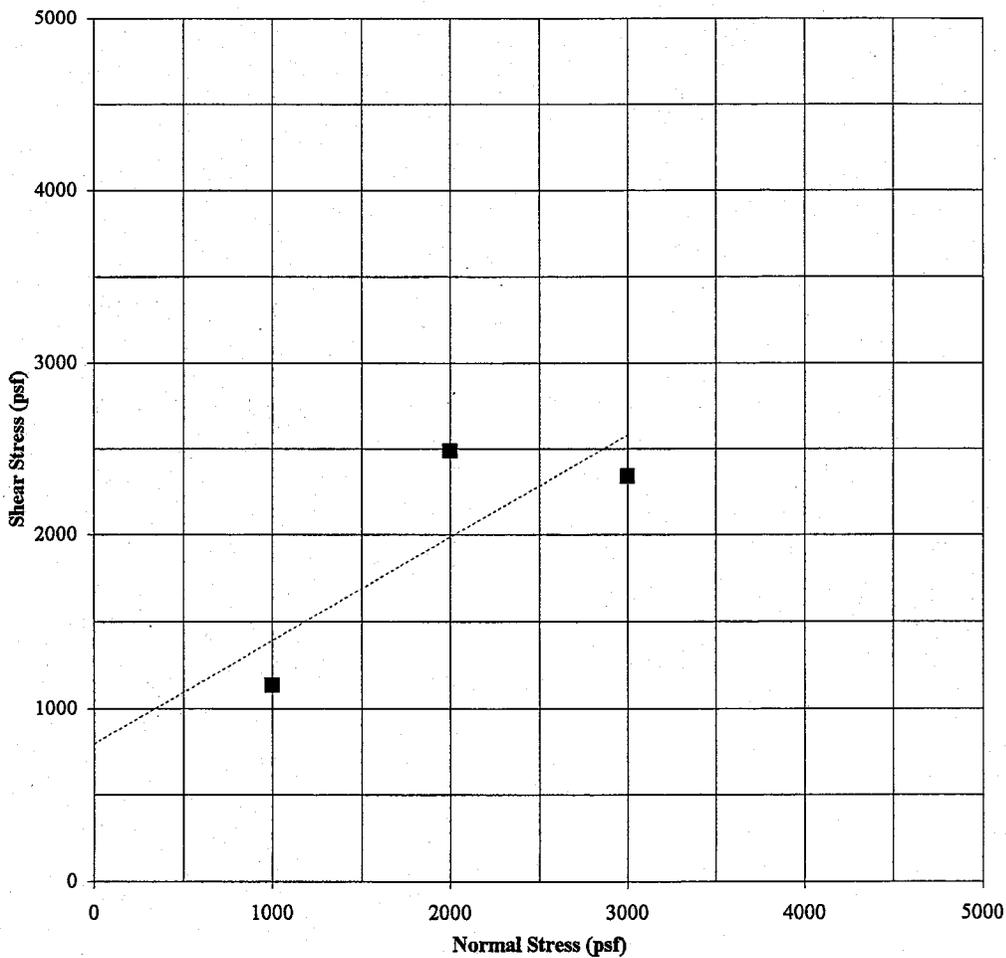
RESULTS:

Dry Density (pcf): 103

Moisture Content (%): 16

Cohesion (psf) = 800

Friction Angle (phi) = 31



REMARKS: Samples submerged prior to testing.

LABORATORY TEST RESULTS

Date: 10-Jul-98

SAMPLE SOURCE: 40 @ 10'-11'

TESTING PERFORMED: Direct Shear (ASTM D3080) - Driven Ring Sample

SAMPLED BY: RAM/Miller

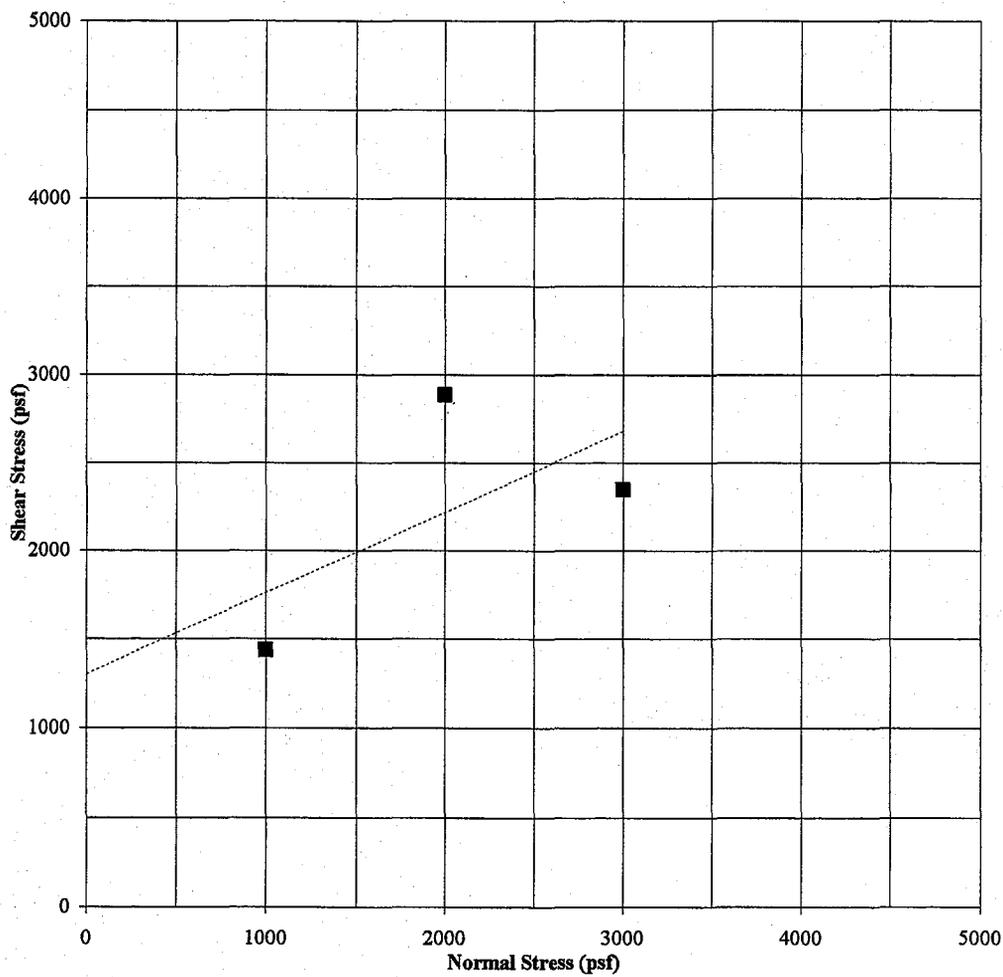
RESULTS:

Dry Density (pcf): 113

Moisture Content (%): 15

Cohesion (psf) = 1300

Friction Angle (phi) = 25



REMARKS: Samples submerged prior to testing.

LABORATORY TEST RESULTS

Date: 13-Jul-98

SAMPLE SOURCE: 41 @ 5'-6'

TESTING PERFORMED: Direct Shear (ASTM D3080) - Driven Ring Sample

SAMPLED BY: RAM/Miller

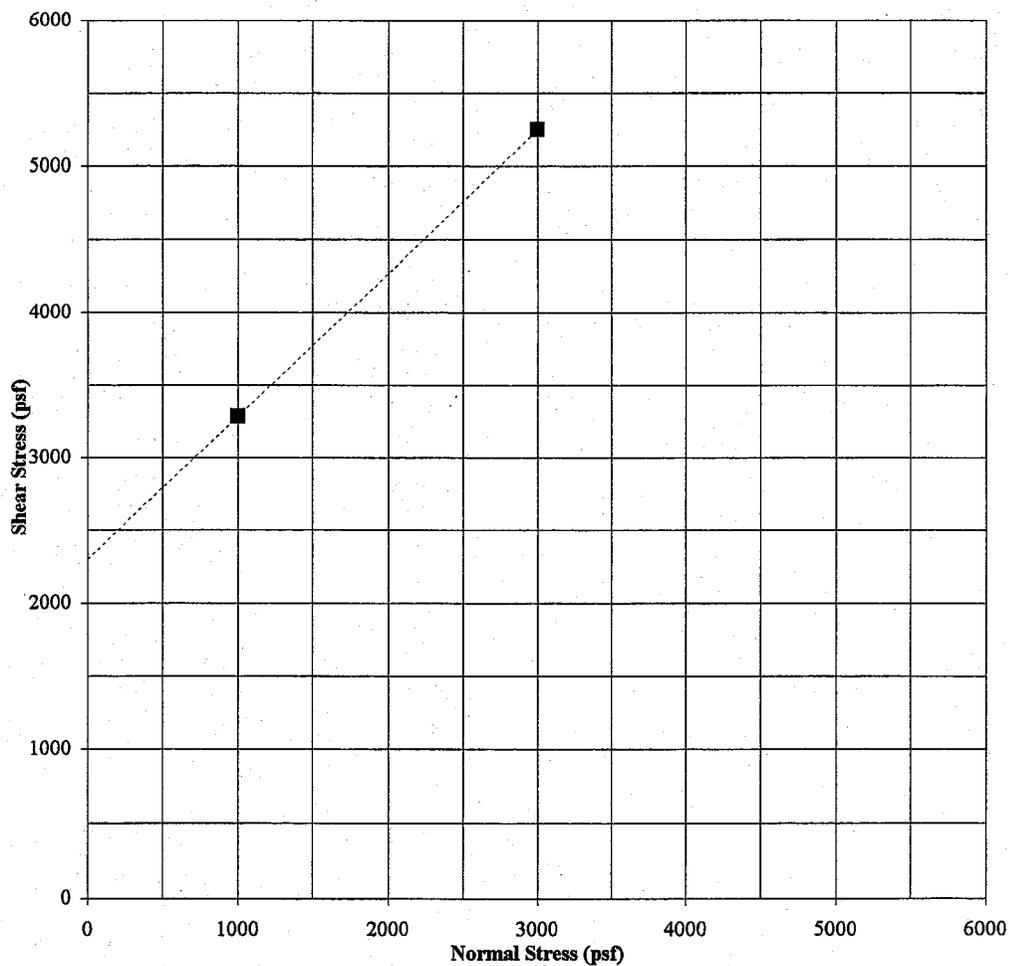
RESULTS:

Dry Density (pcf): 115

Moisture Content (%): 14

Cohesion (psf) = 2300

Friction Angle (phi) = 44



REMARKS: Samples submerged prior to testing.

LABORATORY TEST RESULTS

Date: 10-Jul-98

SAMPLE SOURCE: 42 @ 10'-11'

TESTING PERFORMED: Direct Shear (ASTM D3080) - Driven Ring Sample

SAMPLED BY: RAM/Miller

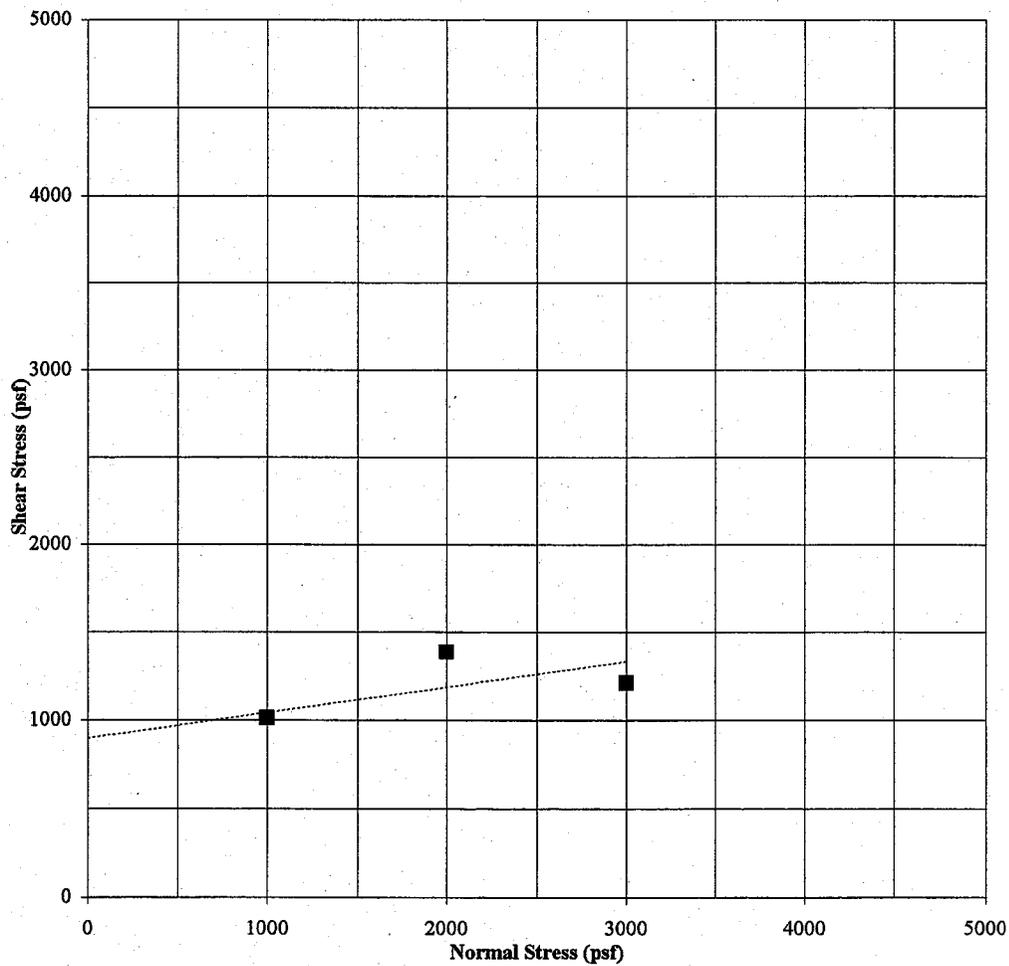
RESULTS:

Dry Density (pcf): 108

Moisture Content (%): 18

Cohesion (psf) = 900

Friction Angle (phi) = 8



REMARKS: Samples submerged prior to testing.

LABORATORY TEST RESULTS

Date: 10-Jul-98

SAMPLE SOURCE: 43 @ 1.5'-2.5'

TESTING PERFORMED: Direct Shear (ASTM D3080) - Driven Ring Sample

SAMPLED BY: RAM/Miller

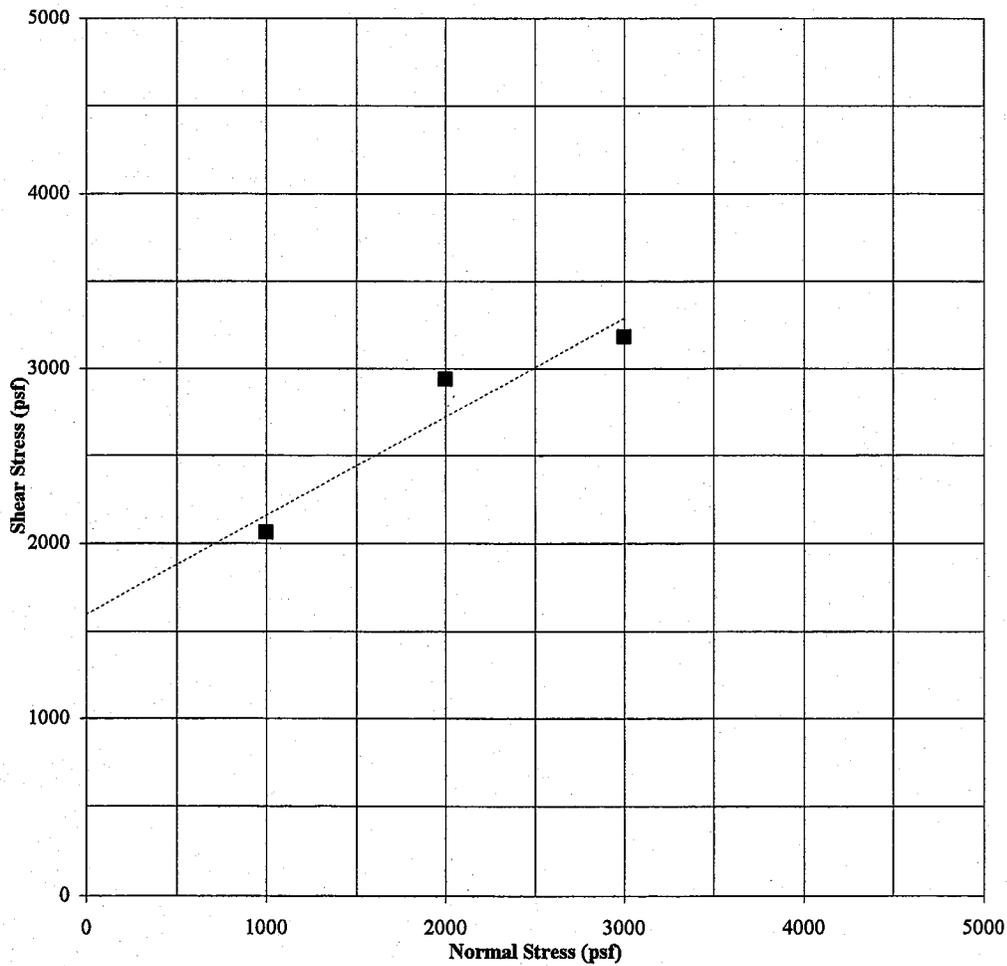
RESULTS:

Dry Density (pcf): 108

Moisture Content (%): 14

Cohesion (psf) = 1600

Friction Angle (phi) = 29



REMARKS: Samples submerged prior to testing.

LABORATORY TEST RESULTS

Date: 10-Jul-98

SAMPLE SOURCE: 44 @ 1'-2'

TESTING PERFORMED: Direct Shear (ASTM D3080) - Driven Ring Sample

SAMPLED BY: RAM/Miller

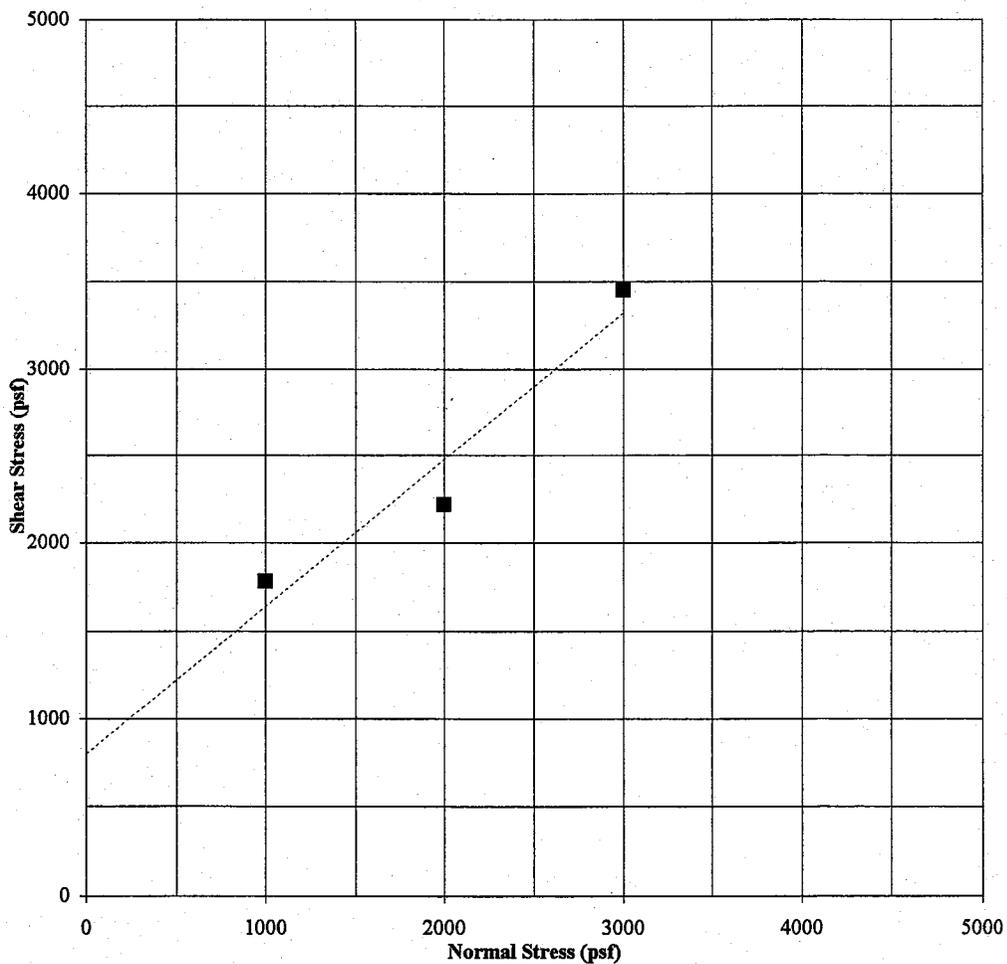
RESULTS:

Dry Density (pcf): 107

Moisture Content (%): 16

Cohesion (psf) = 800

Friction Angle (phi) = 40



REMARKS: Samples submerged prior to testing.

LABORATORY TEST RESULTS

Date: 10-Jul-98

SAMPLE SOURCE: 45 @ 5'-6'

TESTING PERFORMED: Direct Shear (ASTM D3080) - Driven Ring Sample

SAMPLED BY: RAM/Miller

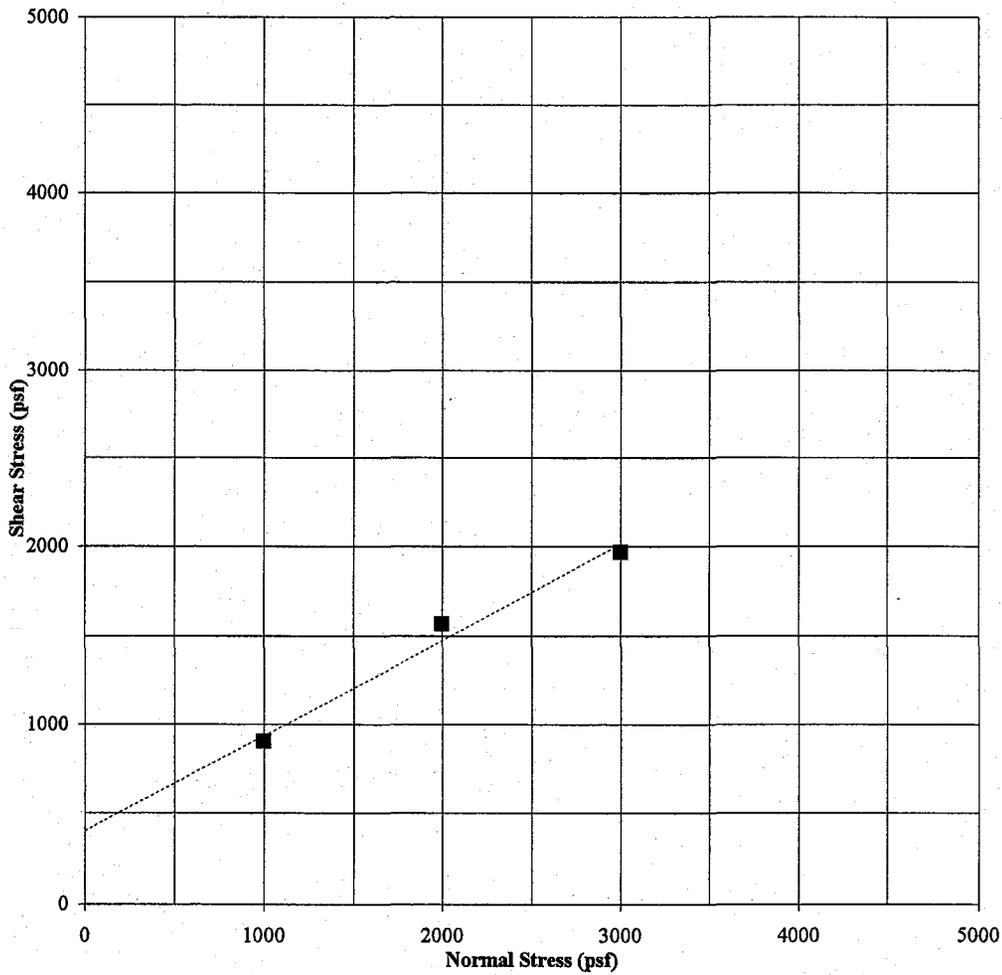
RESULTS:

Dry Density (pcf): 104

Moisture Content (%): 15

Cohesion (psf) = 400

Friction Angle (phi) = 28



REMARKS: Samples submerged prior to testing.

LABORATORY TEST RESULTS

Date: 13-Jul-98

SAMPLE SOURCE: As noted below

TESTING PERFORMED: Sieve Analysis, Percent Passing No. 200 Sieve, Atterberg Limits (ASTM C136, D1140, D4318)

SAMPLED BY: RAM/Miller

RESULTS:

Sample Source	Atterberg Limits		Sieve Size - Accumulative Percent Passing										Soil Class.*	
	LL	PI	200	100	50	30	16	8	4	3/4"	1"	2"		3"
1 @ 0'-5'	25	7	41	43	46	50	56	67	82	95	100			SC
1 @ 10'-15'	30	13	19	23	30	38	48	61	75	99	100			SC
2 @ 0'-5'	38	17	34	42	49	55	62	70	79	95	100			SC
2 @ 10'-15'	45	25	21	25	28	32	39	50	68	100				SC
3 @ 0'-5'	30	13	34	41	48	54	61	69	78	100				SC
3 @ 10'-15'	60	40	64	72	79	85	90	95	98	100				CH
4 @ 0'-5'	28	10	30	36	43	50	59	67	79	100				SC
4 @ 10'-15'	65	42	62	74	80	84	88	93	96	100				CH
5 @ 0'-5'	35	15	37	44	49	55	59	65	74	100				SC
5 @ 15'-18'	47	30	45	54	59	64	67	70	74	100				SC
6 @ 0'-5'	38	17	34	43	49	55	62	70	79	98	100			SC
6 @ 10'-15'	54	33	52	58	63	69	76	84	91	100				CH
7 @ 0'-5'	30	10	36	45	52	60	67	74	80	97	100			SC
7 @ 10'-15'	62	41	53	57	61	66	73	80	90	100				CH
8 @ 0'-5'	36	17	43	50	54	60	67	76	84	100				SC
8 @ 5'-10'	36	21	28	32	35	39	44	54	68	95	100			SC
9 @ 0'-5'	34	18	39	45	51	58	65	74	81	98	100			SC
9 @ 10'-17'	50	29	51	58	64	69	75	81	89	100				CH
10 @ 0'-5'	39	18	49	53	57	62	68	77	86	100				SC
10 @ 15'-19'	52	34	51	56	62	67	72	79	87	100				CH
11 @ 0'-5'	39	20	51	57	62	67	74	81	87	100				CL
11 @ 5'-10'	36	18	43	49	53	59	67	76	86	98	100			SC
12 @ 0'-5'	39	18	37	43	47	50	56	64	75	100				SC
12 @ 15'-19'	50	30	55	63	70	76	82	88	95	100				CH
13 @ 0'-5'	29	13	34	41	47	57	66	72	78	91	95	100		SC
13 @ 10'-15'	50	28	66	73	79	84	89	94	98	100				CH
14 @ 0'-5'	34	17	53	63	69	75	82	86	89	94	100			CL
14 @ 5'-10'	48	29	72	82	87	91	94	96	98	100				CL

NP = Non-Plastic

* Unified Soil Classification System

LABORATORY TEST RESULTS

Date: 13-Jul-98

SAMPLE SOURCE: As noted below

TESTING PERFORMED: Sieve Analysis, Percent Passing No. 200 Sieve, Atterberg Limits (ASTM C136, D1140, D4318)

SAMPLED BY: RAM/Miller

RESULTS:

Sample Source	Atterberg Limits		Sieve Size - Accumulative Percent Passing											Soil Class.*
	LL	PI	200	100	50	30	16	8	4	3/4"	1"	2"	3"	
15 @ 0'-5'	36	17	49	58	65	72	81	88	94	100				SC
15 @ 10'-15'	50	30	63	73	80	85	89	91	94	98	100			CH
16 @ 0'-5'	36	19	43	48	52	57	63	71	80	97	100			SC
16 @ 15'-21'	44	26	43	47	50	55	64	83	100					SC
17 @ 0'-5'	41	23	54	62	67	74	80	87	92	100				CL
17 @ 10'-15'	56	36	46	51	56	63	70	80	90	100				SC
18 @ 0'-5'	31	14	47	54	60	66	74	82	90	100				SC
18 @ 10'-15'	36	18	21	22	25	28	32	39	48	79	86	100		GC
19 @ 0'-5'	34	17	50	58	64	70	77	84	91	98	100			CL
19 @ 15'-20'	50	32	77	85	91	94	96	98	99	100				CH
20 @ 0'-5'	41	24	49	57	61	66	72	80	89	98	100			SC
20 @ 5'-10'	43	24	39	44	48	52	57	64	73	89	94	100		SC
21 @ 0'-5'	30	15	45	54	61	68	75	81	86	96	100			SC
21 @ 15'-20'	44	25	79	85	90	93	96	98	99	100				CL
22 @ 0'-5'	32	16	51	60	70	77	84	89	93	99	100			CL
22 @ 10'-15'	41	21	66	76	83	89	94	97	99	100				CL
23 @ 0'-5'	30	14	24	28	34	41	49	55	59	79	81	88	100	GC
23 @ 15'-20'	35	18	38	42	47	53	60	67	77	97	98	100		SC
24 @ 0'-5'	35	19	59	67	73	79	84	87	91	100				CL
24 @ 10'-15'	36	18	44	49	55	62	68	75	83	98	100			SC
25 @ 0'-5'	36	17	59	65	70	77	82	87	90	100				CL
25 @ 15'-20'	50	30	41	46	51	55	60	67	75	98	100			SC
26 @ 0'-5'	39	21	66	74	80	85	89	93	95	100				CL
26 @ 15'-20'	41	21	42	50	56	61	66	73	82	100				SC
27 @ 0'-5'	37	20	56	64	71	76	77	85	89	100				CL
27 @ 10'-15'	50	31	54	60	65	69	73	77	84	100				CH
28 @ 0'-5'	39	19	62	68	72	77	81	85	89	98	100			CL
28 @ 15'-20'	39	22	32	37	43	50	59	68	79	98	100			SC

NP = Non-Plastic

* Unified Soil Classification System

LABORATORY TEST RESULTS

Date: 13-Jul-98

SAMPLE SOURCE: As noted below

TESTING PERFORMED: Sieve Analysis, Percent Passing No. 200 Sieve, Atterberg Limits (ASTM C136, D1140, D4318)

SAMPLED BY: RAM/Miller

RESULTS:

Sample Source	Atterberg Limits		Sieve Size - Accumulative Percent Passing											Soil Class.*
	LL	PI	200	100	50	30	16	8	4	3/4"	1"	2"	3"	
29 @ 0'-5'	33	16	61	74	82	87	90	92	95	100				CL
29 @ 10'-15'	40	22	41	46	52	60	68	78	87	100				SC
30 @ 0'-5'	45	26	78	86	90	93	95	97	98	100				CL
30 @ 15'-21'	44	25	54	59	63	68	72	76	81	100				CL
34 @ 0'-5'	39	23	46	52	60	68	77	85	92	100				SC
34 @ 10'-15'	52	32	65	72	78	84	89	94	97	100				CH
35 @ 0'-5'	29	14	48	54	60	69	77	84	90	99	100			SC
35 @ 5'-10'	42	24	56	64	70	76	82	88	93	100				CL
36 @ 0'-5'	38	20	68	75	80	86	91	95	98	100				CL
37 @ 0'-5'	32	16	56	64	71	79	86	91	95	100				CL
37 @ 10'-15'	50	31	56	62	67	72	77	82	88	100				CH
38 @ 0'-5'	41	23	74	81	85	89	92	95	97	100				CL
38 @ 15'-18'	44	25	46	51	56	61	66	73	82	100				SC
39 @ 0'-3'	34	18	53	61	68	75	80	85	89	100				CL
39 @ 10'-15'	46	26	45	51	56	62	68	76	85	100				SC
40 @ 5'-10'	47	28	65	74	82	87	91	95	97	99	100			CL
41 @ 10'-15'	45	26	73	81	86	90	94	97	99	100				CL
42 @ 15'-20'	44	26	52	57	61	66	71	76	83	97	100			CL
43 @ 0'-5'	45	25	80	85	89	92	95	97	99	100				CL
44 @ 0'-5'	33	16	73	81	87	91	95	97	99	100				CL
45 @ 5'-10'	42	21	65	73	80	85	90	94	97	100				CL
45 @ 15'-20'	38	20	46	52	57	65	73	82	90	99	100			SC

NP = Non-Plastic

* Unified Soil Classification System

LABORATORY TEST RESULTS

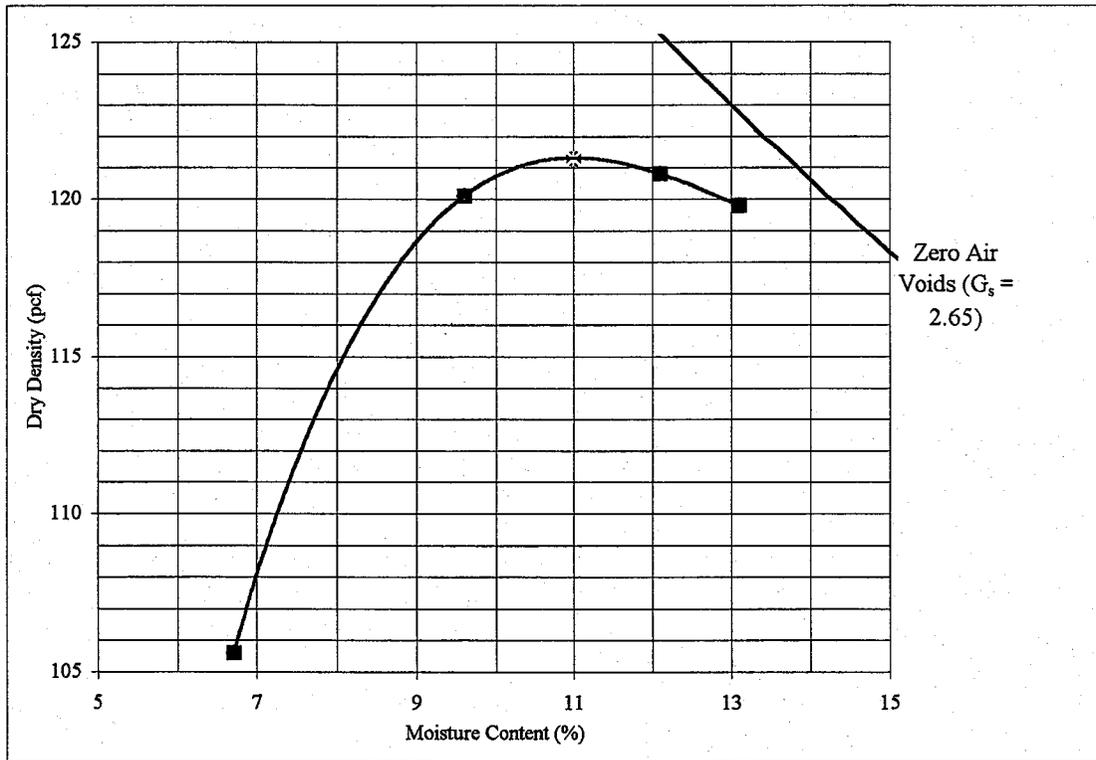
Date: 13-Jul-98

SAMPLE SOURCE: Composite: 8 @ 0' - 5' & 8 @ 5'-10'

TESTING PERFORMED Maximum Density-Optimum Moisture Determination (ASTM D698 Method A)

SAMPLED BY: RAM/Miller

RESULTS: Maximum Density (pcf) = 121.3 Optimum Moisture (%) = 11.0



LABORATORY TEST RESULTS

Date: 13-Jul-98

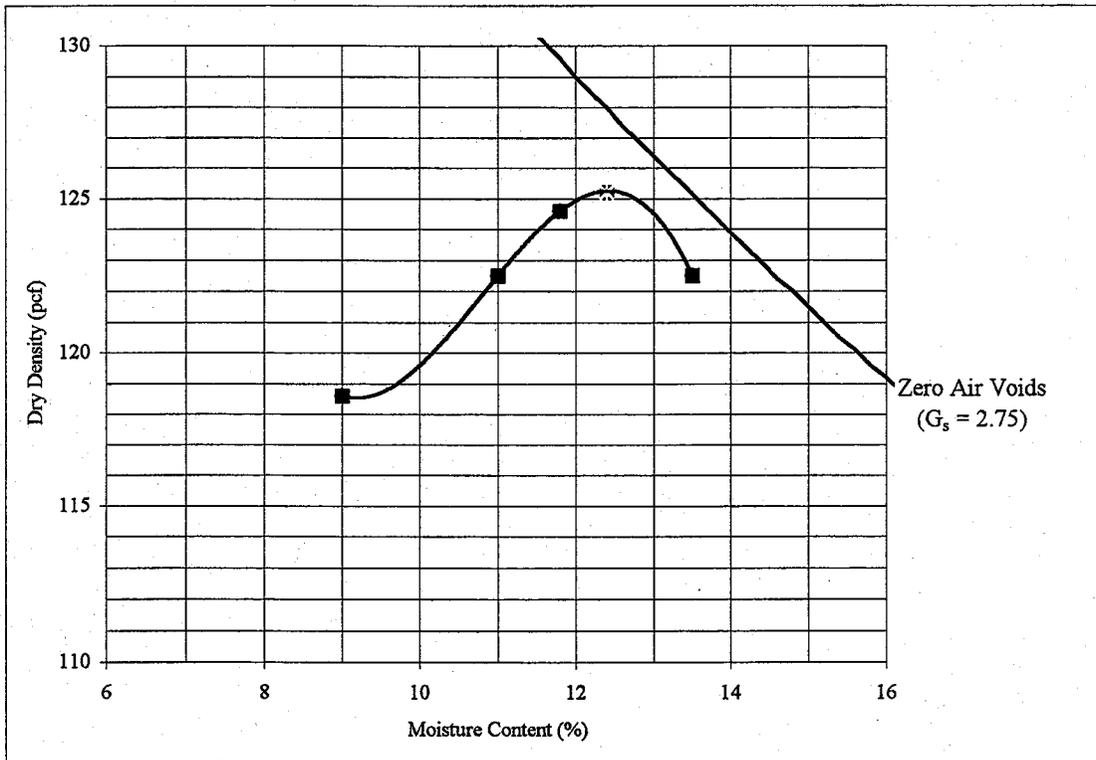
SAMPLE SOURCE: 16 @ 15' - 21'

TESTING PERFORMED Maximum Density-Optimum Moisture Determination (ASTM D698 Method A)

SAMPLED BY: RAM/Miller

RESULTS:

Maximum Density (pcf) = 125.2 Optimum Moisture (%) = 12.4



LABORATORY TEST RESULTS

Date:

13-Jul-98

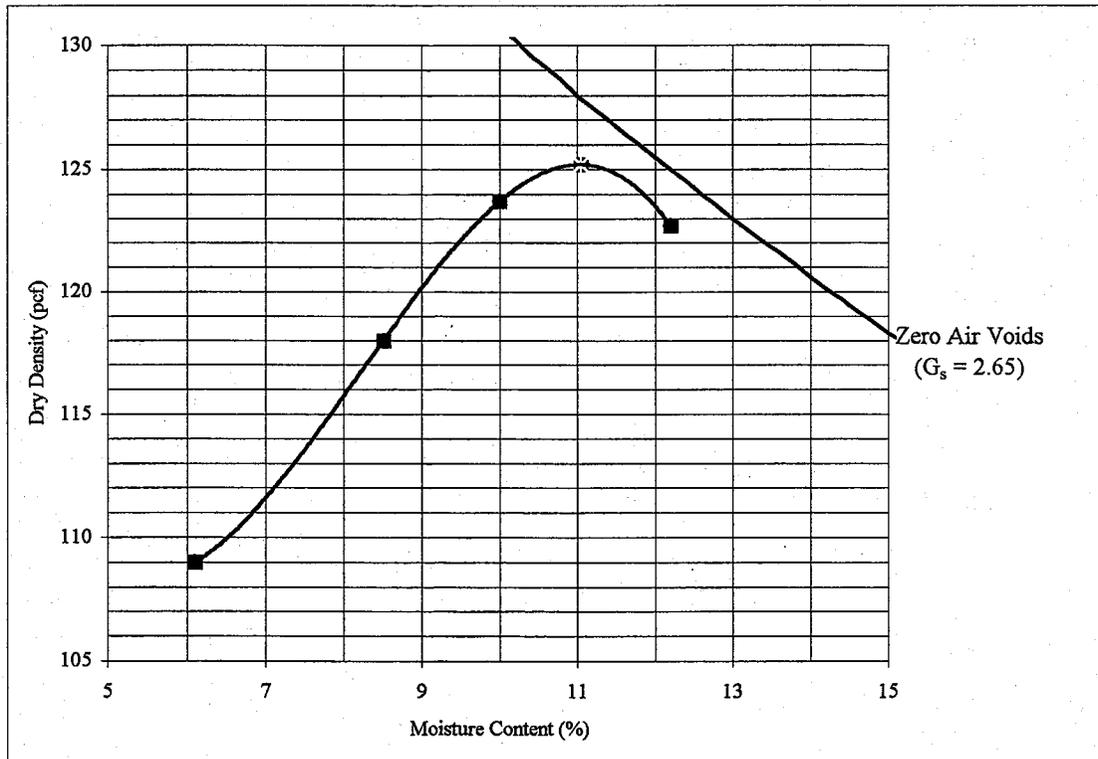
SAMPLE SOURCE: 23 @ 15' - 20'

TESTING PERFORMED Maximum Density-Optimum Moisture Determination (ASTM D698 Method A)

SAMPLED BY: RAM/Miller

RESULTS:

Maximum Density (pcf) = 125.2 Optimum Moisture (%) = 11.1



LABORATORY TEST RESULTS

Date: 13-Jul-98

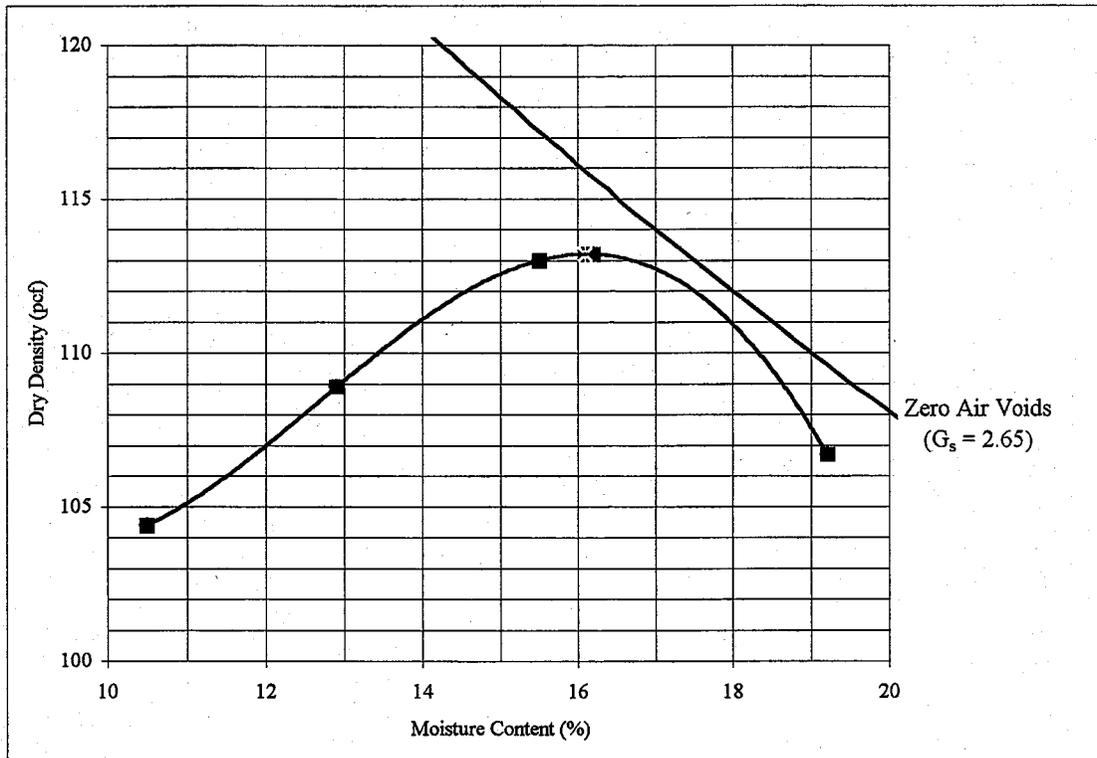
SAMPLE SOURCE: 27 @ 10' - 15'

TESTING PERFORMED Maximum Density-Optimum Moisture Determination (ASTM D698 Method A)

SAMPLED BY: RAM/Miller

RESULTS:

Maximum Density (pcf) = 113.2 Optimum Moisture (%) = 16.1



LABORATORY TEST RESULTS

Date: 13-Jul-98

SAMPLE SOURCE: As noted below

TESTING PERFORMED: pH, Minimum Resistivity (ADOT 236a)

SAMPLED BY: RAM/Miller

RESULTS:

<u>Sample Source</u>	<u>pH</u>	<u>Minimum Resistivity (ohm-cm)</u>
10 @ 15'-19'	9.0	1102
17 @ 10'-15'	8.5	1043
21 @ 15'-20'	8.0	936
26 @ 15'-20'	8.3	1886

REPORT ON R-VALUE TESTS

Project: Laboratory Materials Testing
 Ricker Atkinson McBee & Assoc.
 RAM #G01522

Report No.: 71788
 Project No: 9855584

Source: #9 @ 0-5'

Date: 04-Jun-98

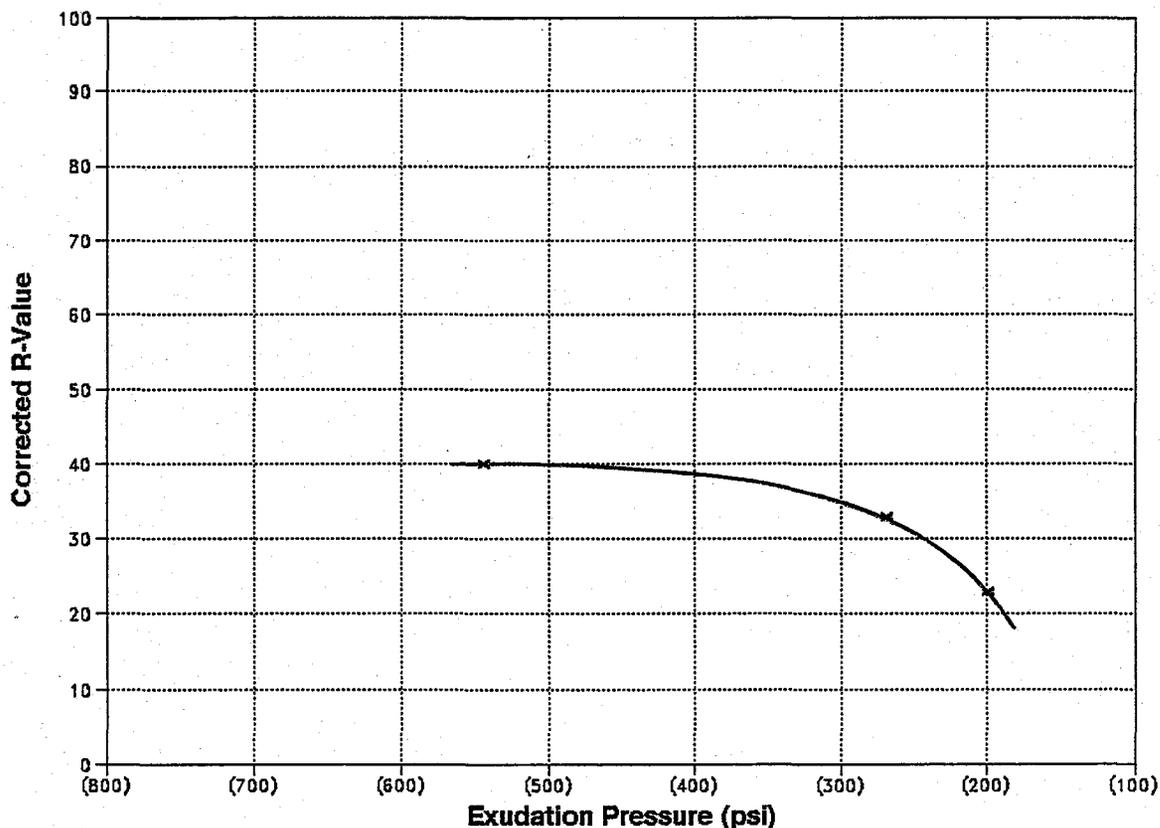
Sampled By: RAM

Submitted: 21-May-98

TEST METHOD: ASTM D2844

SAMPLE GRADING: MINUS 3/4

Moisture Content(%)	Dry Density(pcf)	Expansion Pressure(psi)	Exudation Pressure(psi)	Corrected R-Value
12.0	122.4	0.00	199	23
10.8	126.2	0.00	544	40
11.5	124.4	0.00	268	33



Corrected R-Value at 300 PSI = 34

REPORT ON R-VALUE TESTS

Project: Laboratory Materials Testing
 Ricker Atkinson McBee & Assoc.
 RAM #G01522

Report No.: 71788
Project No: 9855584

Source: 15, 16 & 17 @ 0-5'

Date: 04-Jun-98

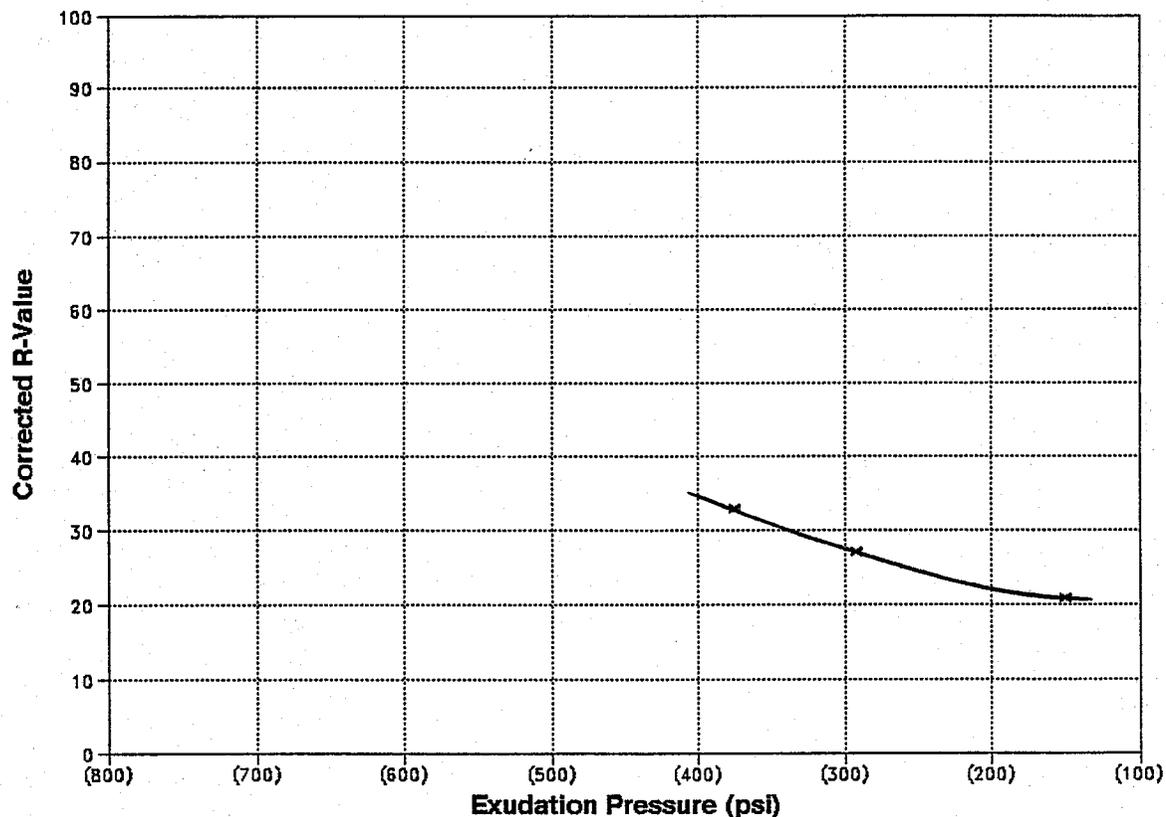
Sampled By: RAM

Submitted: 21-May-98

TEST METHOD: ASTM D2844

SAMPLE GRADING: MINUS 3/4

Moisture Content(%)	Dry Density(pcf)	Expansion Pressure(psi)	Exudation Pressure(psi)	Corrected R-Value
14.2	117.6	0.00	150	21
12.9	119.7	0.00	375	33
13.7	118.3	0.00	291	27



Corrected R-Value at 300 PSI = 28

REPORT ON R-VALUE TESTS

Project: Laboratory Materials Testing
 Ricker Atkinson McBee & Assoc.
 RAM #G01522

Report No.: 71788
 Project No: 9855584

Source: 20 & 21 @ 0-5'

Date: 04-Jun-98

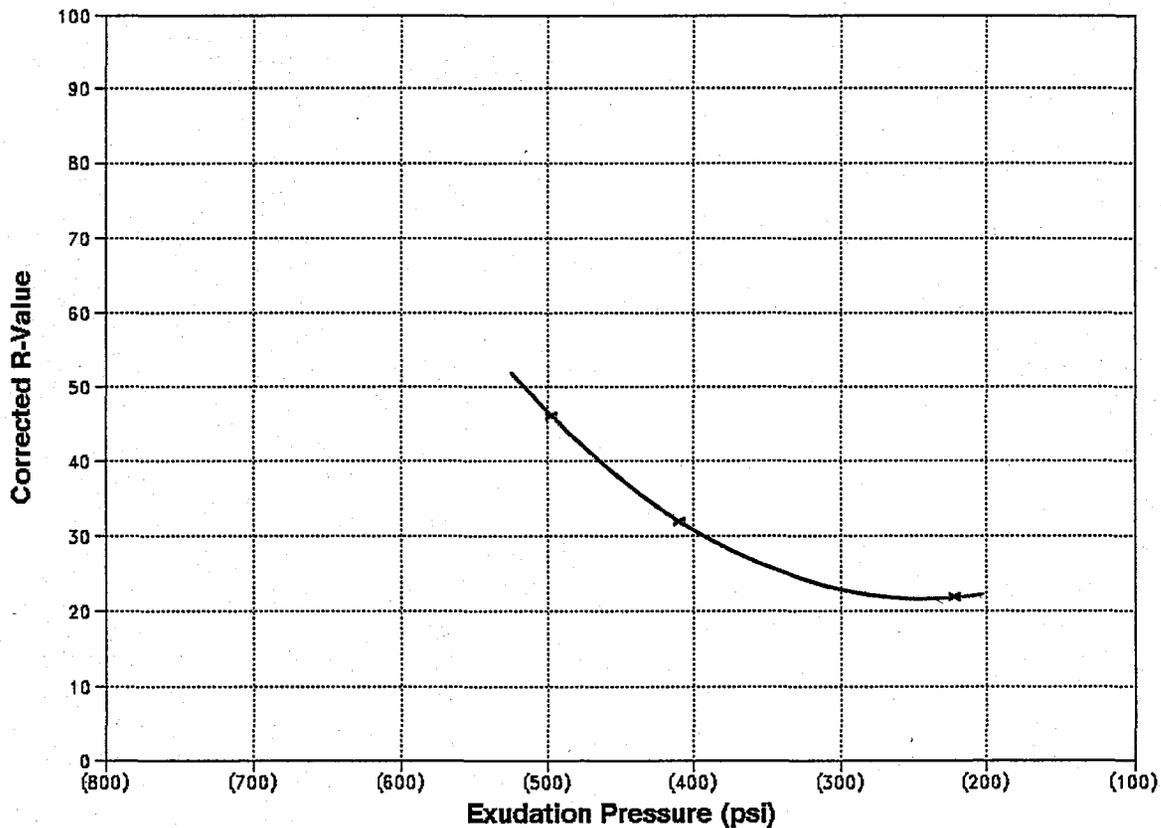
Sampled By: RAM

Submitted: 21-May-98

TEST METHOD: ASTM D2844

SAMPLE GRADING: MINUS 3/4

Moisture Content(%)	Dry Density(pcf)	Expansion Pressure(psi)	Exudation Pressure(psi)	Corrected R-Value
13.4	120.5	0.00	222	22
11.8	124.0	0.00	497	46
12.7	121.8	0.00	409	32



Corrected R-Value at 300 PSI = 24

REPORT ON R-VALUE TESTS

Project: Laboratory Materials Testing
 Ricker Atkinson McBee & Assoc.
 RAM #G01522

Report No.: 71788
 Project No: 9855584

Source: 24 & 26 @ 0-5'

Date: 04-Jun-98

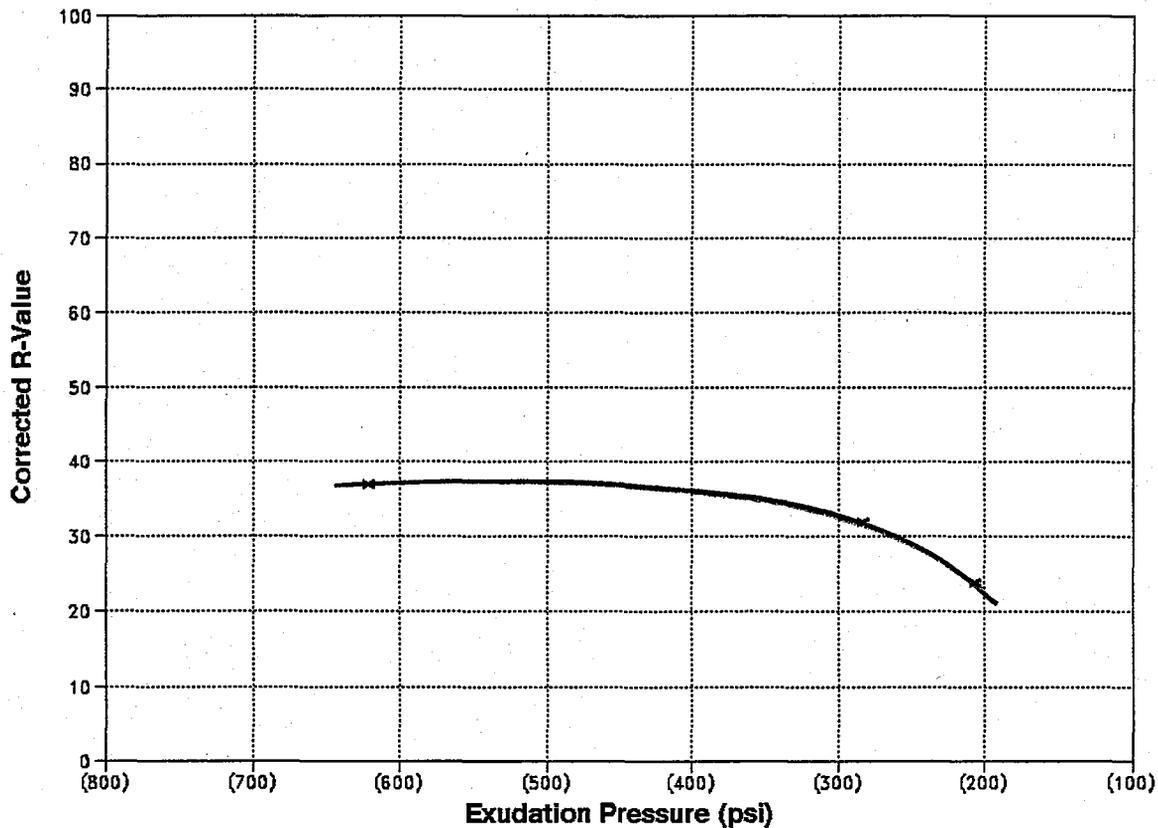
Sampled By: RAM

Submitted: 21-May-98

TEST METHOD: ASTM D2844

SAMPLE GRADING: MINUS 3/4

Moisture Content(%)	Dry Density(pcf)	Expansion Pressure(psi)	Exudation Pressure(psi)	Corrected R-Value
14.7	118.5	0.32	621	37
16.2	115.2	0.00	206	24
15.3	116.1	0.16	283	32



Corrected R-Value at 300 PSI = 33

REPORT ON R-VALUE TESTS

Project: Laboratory Materials Testing
 Ricker Atkinson McBee & Assoc.
 RAM #G01522

Report No.: 71788
 Project No: 9855584

Source: 28 & 29 @ 0-5'

Date: 04-Jun-98

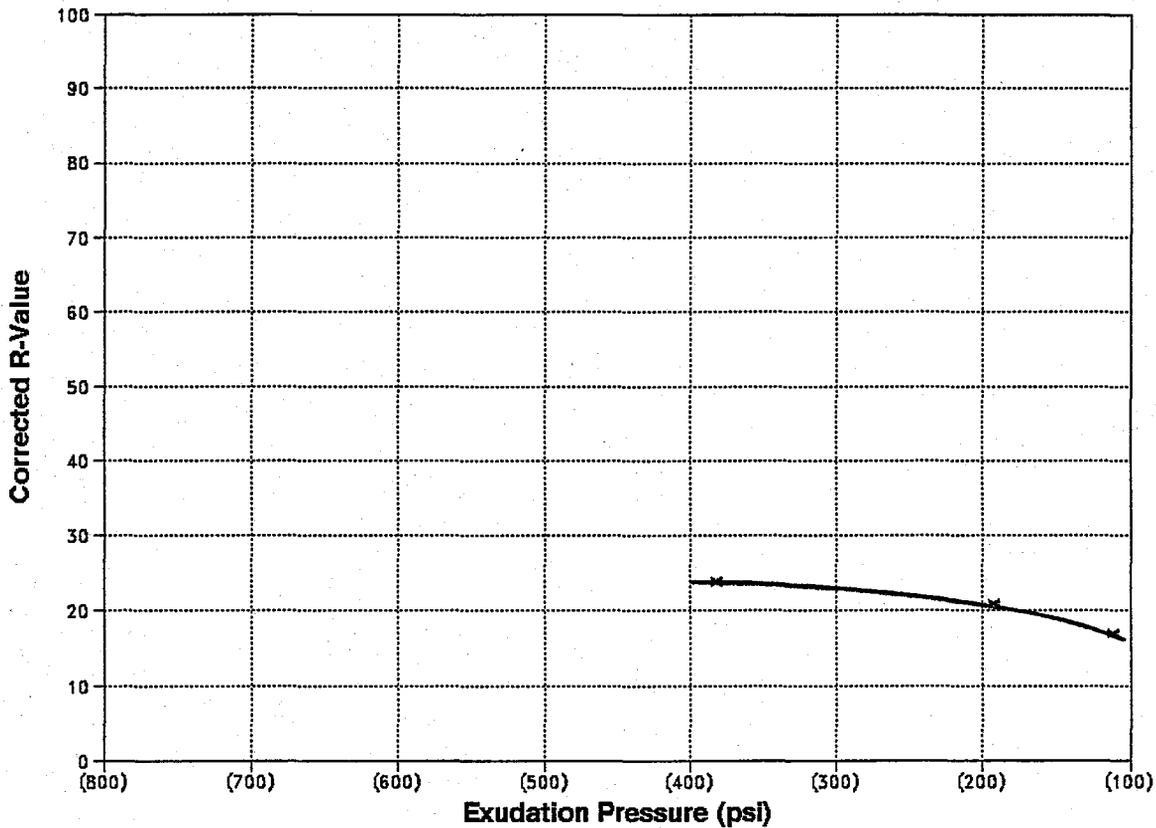
Sampled By: RAM

Submitted: 21-May-98

TEST METHOD: ASTM D2844

SAMPLE GRADING: MINUS 3/4

Moisture Content(%)	Dry Density(pcf)	Expansion Pressure(psi)	Exudation Pressure(psi)	Corrected R-Value
16.7	113.4	0.00	111	17
15.1	116.9	0.00	382	24
16.0	114.6	0.00	192	21



Corrected R-Value at 300 PSI = 23

REPORT ON R-VALUE TESTS

Project: Laboratory Materials Testing
 Ricker Atkinson McBee & Assoc.
 G01522

Report No.: 71912
 Project No: 9855584

Source: 35 @ 0-5'

Date: 17-Jun-98

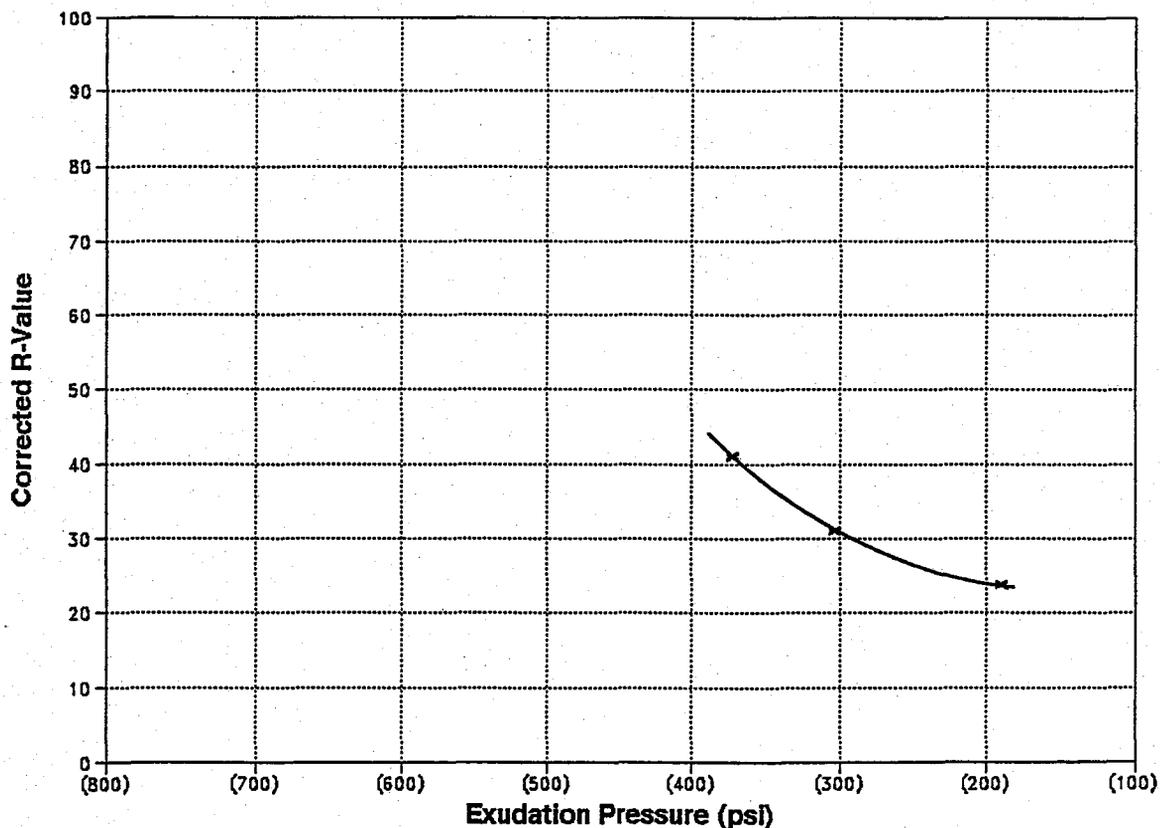
Sampled By: RAM

Submitted: 09-Jun-98

TEST METHOD: ASTM D2844

SAMPLE GRADING: MINUS 3/4

Moisture Content(%)	Dry Density(pcf)	Expansion Pressure(psi)	Exudation Pressure(psi)	Corrected R-Value
12.7	120.3	0.00	303	31
13.6	118.0	0.00	189	24
12.2	122.9	0.00	373	41



Corrected R-Value at 300 PSI = 31