ALCO
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LETTER OF TRANSMITTAL

TO: Ms. Eva Chu
Alameda County Health Care Services Agency
Division of Hazardous Materials
Department of Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94501

DATE: February 24, 1995
PROJECT Soil Investigation for Office Building Complex
SCI JOB NUMBER: 1345 - 1375 Grand Ave.

WE ARE SENDING YOU:
1 copies

- [ ] of our final report
- [ ] a draft of our report
- [ ] a Service Agreement
- [ ] a proposed scope of services
- [ ] specifications
- [ ] grading/foundation plans
- [ ] soil samples/groundwater samples
- [ ] an executed contract
- [XX] see below

- [ ] if you have any questions, please call
- [ ] for your review and comment
- [ ] please return an executed copy
- [ ] for geotechnical services
- [ ] with our comments
- [ ] with Chain of Custody documents
- [XX] for your use
- [ ]
- [ ]

REMARKS:

Copy of Hallenbeck & Associates report of 10/11/85

COPIES TO:

BY: Tom Echols
Thomas Echols

Subsurface Consultants, Inc.
171 12th Street • Suite 201 • Oakland, California 94607 • Telephone 510-268-0461 • FAX 510-268-0137

Job No. 4462-8508
October 11, 1985

SOIL INVESTIGATION FOR

OFFICE BUILDING COMPLEX

Grand Avenue

Piedmont, California

Prepared for:

Grand Avenue Developers
c/o Patrick Ellwood
670 Vernon Street, No. 402
Oakland, California 94610

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Office Building Complex
Grand Avenue - Piedmont, California
Job No. 4462-8508

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Director of Business Development

October 11, 1985
Job No. 4462-8508

Grand Avenue Developers
c/o Patrick Ellwood
670 Vernon Street, No. 402
Oakland, California 94610-

As authorized, we have made a study of the soil and groundwater conditions at the site of your proposed development on Grand Avenue in Piedmont. The accompanying report presents our recommendations for the project, along with the results of the field and laboratory work on which the recommendations were based.

We have discussed the design criteria with Tom Christian, structural engineer for the project. We will be happy to review the report with you and your other consultants at your convenience.

Very truly yours,

HALLENBECK & ASSOCIATES

Geoffrey Van Lienden
C.E. #22514

cc: Tom Christian
David Elmore Arnold
KCA Engineers

SOIL INVESTIGATION FOR

OFFICE BUILDING COMPLEX

Grand Avenue

Piedmont, California

SCOPE

This report covers a study of the soil and groundwater conditions at the site of a proposed office building development on Grand Avenue in Piedmont, California. The purpose of the study was to determine the soil and groundwater conditions underlying the site so that recommendations could be given for the project. This report includes recommendations for grading and site preparation, guide specifications for fill, subdrains, and pavements, design criteria for building foundations and retaining walls, and a discussion of other geotechnical conditions affecting the project.

DESCRIPTION OF PROJECT

The property is located on the north side of Grand Avenue between Linda and Sunnyside Avenues in Piedmont. The site is presently occupied by two gas stations, one of which has been abandoned. Both gas stations, along with their associated tank storage and pumping facilities will be removed in connection with the proposed project. The portion of the site not occupied by the gas stations is presently paved with asphalt. There are existing retaining walls at the base of a slope that extends up from the west side of the site. Most of these walls will also be removed in connection with the presently planned project.

The project involves the construction of two buildings. The southernmost building will be a two story office structure with a garage at the upper level. Access to the garage will be from Sunnyside Avenue at the south side of the site. The second building will be located at the north end of the site. The approximate locations of the buildings are shown on the attached site plan, Figure 1. Both buildings will be steel frame structures with slab-on-grade floors.

Some grading will be required in connection with the project. The grading will primarily involve making excavations and the construction of retaining walls at the base of the slope on the west side of the property and the placement of up to 4 feet of fill along Grand Avenue at the east side of the site. Portions of the site not occupied by the buildings will be landscaped or paved for parking or traffic circulation.

FIELD AND LABORATORY INVESTIGATION

In order to study the site, we made a total of seven test borings at the approximate locations shown on the site plan, Figure 1. The depths of the borings ranged between 6 and 21.5 feet. The drilling was done under the direct supervision of Jim Lott, a staff engineer with our firm. The soil conditions encountered in the borings were classified in the field by the staff engineer, and boring logs were prepared on the basis of these classifications. The final boring logs are shown as Figures 2 through 8, with occasional editing on the basis of laboratory tests and a closer examination of the samples by the engineering staff.

Reasonably undisturbed samples of the underlying soil was taken from the borings using a Modified California Drive Sampler. The samples were brought to our laboratory for testing and inspection. The reuslts of unconfined compression strength tests, moisture content, and dry density determinations are shown, along with the resistance to penetration of the sampler, at the corresponding sample locations on the logs of borings.

We performed plasticity tests on selected samples of soil to evaluate the potential for expansion of these soils. The test results are shown on the plasticity chart, Figure 9.

A consolidation test was performed on a sample of the underlying soil that was judged to be potentially compressible; this result is presented on the attached Figure 10 and was used for settlement calculations.

Additionally, our study included a review of information in our file and published geologic literature regarding the soil and geologic conditions at this site.

SUBSURFACE CONDITIONS

1. Geology

The site is mapped to be underlain by undivided Quaternary deposits, which consist predominantly of the Temescal Formation and possibly includes covered or unrecognized San Antonio Formation deposits. The Temescal Formation consists of irregular deposits of clay, silt, sand, and gravel. These deposits are suspected of being made up of several contemporaneous alluvial units of different origin and lithology. The test borings revealed textural deposits of material that appear to be consistent with the mapping of this area.

The nearest mapped active earthquake fault to the site is the Hayward Fault, located a distance of approximately 1.8 miles northeast of the property. The site is not located in an Alquist-Priolo Special Studies Zone. There are no active faults mapped through the site, and chances of direct ground rupture on the property due to a seismic event are unlikely. The subsurface conditions consist generally of medium stiff to stiff cohesive soils or well compacted engineered fill. These conditions would not be subject to secondary seismic hazards, such as liquefaction, ground lurching, or seismic differential settlement. The slope on the west side of the site is composed of strong silty and sandy clays which have a high factor of safety against landsliding under both static and seismic conditions.

2. Soil Conditions

The soil conditions encountered by the test borings consisted typically of very stiff silty and sandy clays underlying the southwest corner of the site and medium stiff to stiff silty clays underlying the east and northern portions of the site. In general, the on-site soils have reasonably high densities and adequate strength and have a moderate potential for expansion. Very stiff soils were encountered at a depth of about 15 to 20 feet on the east side of the site. These conditions extended to the bottom of the deepest boring at a depth of 21.5 feet. A medium stiff, potentially compresible topsoil layer of black silty clay was encountered over the eastern and northern approximately two thirds of the site.

GROUNDWATER

Groundwater was encountered at a depth of 3 to 4 feet below the ground surface in all of the test borings, except Borings 1 and 7, which were made at the base of the slope at the southwest corner of the property. Borings 1 and 7 were dry at the time of drilling and when remeasured several days after the drilling had been completed. A summary of the groundwater levels are presented in Table I.

Water samples were taken using a teflon bailer from each of the borings in which groundwater was encountered. We did not observe any free product in any of the samples. A gasoline odor was detected in water samples taken from Borings 4 and 5. As mentioned in our August 1, 1985 proposal to you, samples of the groundwater in the areas where the excavations to remove the old tanks are made will have to be taken. Evaluation of the hydrocarbon concentrations in these samples by a testing laboratory is necessary in order to comply with State requirements for evaluating groundwater contamination.

A complete description of the soil conditions at each test boring location are presented on the logs of borings, Figures 2 through 8.

CONCLUSIONS

In our opinion, the soils, with the exception of the medium stiff surface soil layer of black silty clay, are resonably stiff and should capable of supporting the proposed buildings on shallow foundations without danger of shear failure or excessive settlement. Conventional spread footing type foundations are being recommended for all of the structures that are planned. Higher allowable bearing pressures are recommended for the planned retaining walls in the southwest corner of the site to take advantage of the high strength soils that occur in this area. Overexcavation and recompaction of the medium stiff black surface soil layer will be recommended in building areas where it will not be removed by planned cuts.

RECOMMENDATIONS

1. Grading

All of the grading work should be done under our direct observation and in accordance with the attached Guide Specifications for Engineered Fill. Prior to commencing the grading, areas to be graded should be stripped to remove existing asphalt, any debris or foundations that remain from the demolition operation, and the existing gas storage tanks. The gas tanks should be removed by a contractor under the authorization of the appropriate governmental authorities and with observation by qualified personnel. The existing asphalt can be reused in the engineered fill, provided that it is broken down to meet the size requirements presented in the attached Guide Specifications for Engineered Fill.

When the stripping has been completed, excavations should be made to the required subgrade elevations. Additional excavations should be made in the building areas plus 5 feet beyond the edges of the footings to remove any existing fill and the upper 1½ feet of the black silty clay layer that was found to overlie the eastern two thirds of the site. Prior to placing any fill, the exposed surface should be scarified to a minimum depth of 6 inches, watered or aerated as required to produce a moisture content that will permit proper compaction, and compacted to a minimum degree of compaction of 90% (ASTM D1557).

Special procedures will be required in the areas where existing gas tanks are to be removed. It is recommended that the Alameda County Division of Environmental Health be contacted regarding their requirements and any special permits that may be needed prior to making the excavations. It is anticipated that some water samples will have to be taken from the excvation to evaluate groundwater pollution concerns. The method of excavating the tanks and testing the groundwater should be coordinated with the excavating contractor and the appropriate governmental agencies.

Fills can then be placed on the prepared subgrade. All of the materials excavated from the site can be used for fills except for material that is contaminated with organic material or debris from the demolition. It is generally recommended that where overexcavation of the site requires cuts to near the natural groundwater level, the stiff dry material excavated from the western portion of the site be used for the initial lifts of fill. The fill should be spread out in thin layers (6 to 8 inches in uncompacted thickness), brought to a moisture content that will permit proper compaction, and compacted to a minimum degree of compaction of 90% (ASTM D1557). These procedures can be used until the finished grades are achieved.

Excavations to remove existing gas tanks will extend in some cases below the groundwater table, and spongy soil conditions may occur at this level. In these cases, it will be necessary to dewater the excavation by pumping prior to placing any fill, and it will probably be necessary to import a granular fill material (such as a well graded mixture of sandy soil and rock) with a thickness of 1½ feet to "bridge" over the saturated soil in the bottom of the excavation. The more granular bridging lift of material has the advantage that it can be compacted more easily and will also provide a reasonably stable surface for the compaction equipment. This same operation may be required in some areas if spongy conditions are observed at the excavated subgrade level. When the surface of the bridging lift has been properly compacted, on-site fill can be placed in layers and compacted as described above.

2. Foundations

We recommend that the building be supported on spread footing type foundations. The footings should extend for a minimum depth of 2 feet below the lowest adjacent finished grade. Footings constructed at this depth can be designed for 1750 psf for dead load, 2500 psf for dead plus live loads, and 3250 for all loads, including wind or seismic.

As mentioned in the Soil Conditions section, the soil conditions consist of very stiff and dense soils on the southwest side of the site and somewhat less stiff soils on the east side. Due to the different soil conditions and the fact that a minor amount of fill will be placed in addition to the loads from the building on the east side of the site, it is anticipated that minor differential settlement could occur due to these conditions. We predict that total settlements will not exceed 1/2 inch from the west to the east side of the site, and of this, more than 50% should occur within two or three months after the fill has been completed.

3. Retaining Walls

Significant retaining walls will be constructed in the southwest corner of the project. The retaining wall should be supported on spread footing foundations. The footings should be constructed at a depth of at least 2 feet below the lowest adjacent finished grade. Footings at this depth can be designed for dead loads of 3000 psf, dead plus live loads of 4000 psf, and 5000 psf can be used for all loads, including wind or seismic. These higher pressures reflect the excellent soil conditions that were encountered in this area of the site. In other areas of the site, the lower bearing pressures recommended above should be used.

The retaining walls will generally support the moderately steep slopes that will extend up toward the west. The walls should be designed for an equivalent fluid pressure of 55 pcf in the upper 5 feet of soil and 45 pcf below a depth of 5 feet. Subdrains should be provided behind the walls to prevent the buildup of hydrostatic pressure. The subdrains should be constructed in accordance with the attached Guide Specifications for Subdrains behind Retaining Walls, Figure 11.

Walls that are constructed as part of the building should be provided with waterproofing as well. For design purposes, a coefficient of friction between the bottom of the footing and the soil can be assumed to be 0.5. An allowable passive resistance of 350 pcf can be used, although the top 1 foot of soil should not be counted on in the passive pressure calculation. A factor of safety against sliding of 1.5 should be incorporated into the design. Factors of safety for other aspects of the design should be determined at the discretion of the structural engineer.

4. Slab-on-Grade Construction

The soils at the site have moderate expansion potential; therefore, we recommend that the top 1 foot of soil beneath floor slabs conform to the select fill requirements outlined in the Guide Specifications for Engineered Fills.

There is a relatively high groundwater table at this site. It is therefore recommended that some type of moisture prevention treatment be used beneath the slabs in areas where moisture migration and the resulting dampness would be a problem. This would generally include all interior offices and lobby areas. There are a variety of types of moisture prevention on the market today, varying considerably in effectiveness and expense. The final decision regarding the type of moisture prevention treatment to be used should be made by the owner or architect. A commonly used section is presented on the attached Figure 12.

5. Pavements

If the grading is properly done, a pavement section providing adequate support for automobile traffic can consist of 2 inches of asphaltic concrete underlain by 4 inches of Class 2 rock base. The upper 6 inches of subgrade and the rock base layer should both be compacted to a minimum degree of compaction of 95% (ASTM D1557).

It has been our experience that moisture migration into the baserock layer from adjoining landscape surfaces is a common cause of pavement failure. Typically, this occurs when the landscape mound is higher than the pavement area, and water tends to flow down, below the bottom of the curb, and into the baserock below the asphalt. This problem can be mitigated to some degree by either installing subdrains around the curbs in these areas or extending the concrete curb down to the clay subgrade to act as a barrier against moisture infiltration. Concrete curbs extruded directly on the asphalt pavement are completely ineffective. If subdrains are used, they should be constructed in accordance with the attached Guide Specifications for Subsurface Drains.

6. Review of Plans and Construction Observation

It is important that our firm be retained to review the site grading and foundation plans in order to verify that they conform to our recommendations. In addition, it is recommended that our firm be retained to observe the grading operations and all footing excavations. The purpose of our observations is to ensure that the intent of our recommendations is understood and to provide on-site supplemental recommendations if necessary. In addition, during excavation of the gasoline tanks, special observations and testing will be needed as required by the State guidelines.

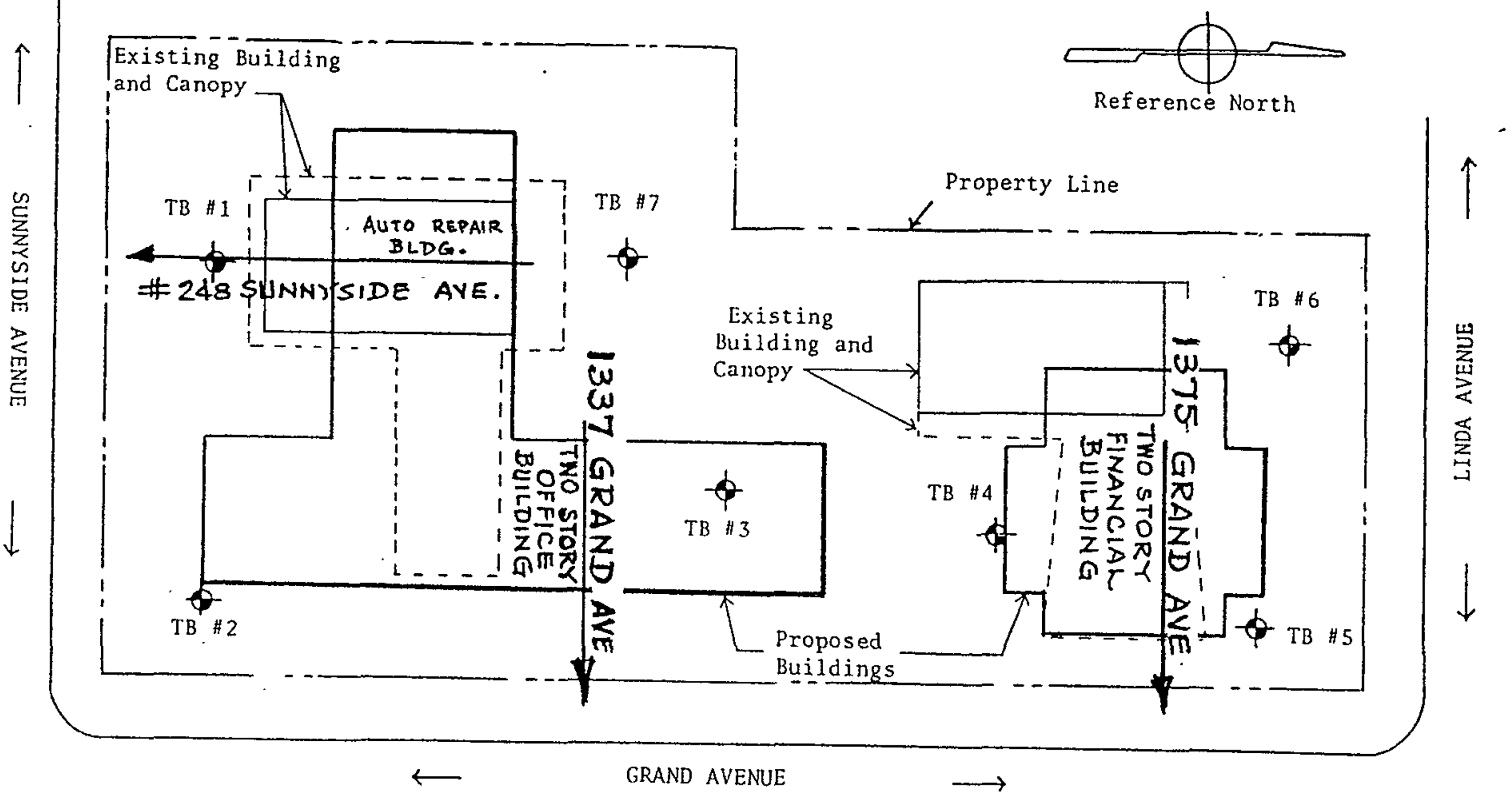
LIMITATIONS

The conclusions and opinions in this report are based on the test borings that were made on the site, spaced as shown on the site plan, Figure 1. While in our opinion these borings adequately disclose the soil conditions across the site, the possibility exists that anomalies or changes in the soil conditions which were not discovered by this investigation could occur between borings. Should such items be discovered during construction, our office should be notified immediately so that any necessary supplemental recommendations can be made.

This study was not intended to disclose the locations of any existing utilities, septic tanks, leaching fields, or other buried structures. The contractor or other people working on the project should locate these items, if any.

This report was prepared to provide engineering opinions and recommendations only. It should not be construed to be any type of guarantee or insurance.

SITE PLAN Proposed Office Building Complex
GRAND AVENUE - PIEDMONT, CALIFORNIA



GW contamination noted

Indicates Test Boring Location

Approximate Scale: 1"=32'

4462-8508

HALLENBECK & ASSOCIATES

Figure 1

PROJECT	BORING NO:
KRAFT BUILDING - GRAND AVENUE PIEDMONT	1

DATE OF BORING August 22, 1985

TYPE OF BORING 6" Auger

SURFACE ELEVATION Approx. 52.7'

HAMMER WEIGHT 140 lbs/30" Drop

SAMPLES

DESCRIPTION OF MATERIALS:	DEPTH IN FT.	SAMPLE	NUMBER – DIAMETER	BLOWS/FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSION STRENGTH, P.S.F.	OTHER TESTS
3" Asphalt.								
Dense grey brown sandy base rock.			1) 2"	22	109	12	-	
Very stiff red brown with orange-brown mottling sandy clay with rock fragments.			2) 2"	50/6"	126	13	18,600	
	5		3) 2"	46/6"	118	16	16,600	
Bottom of Boring								
	10							
	15							
	20							
	25							
	30							

TABLE I

GRAND AVENUE - PIEDMONT, CA

TEST BORING #	SURFACE ELEVATION (Ft.)	GROUND WATER ELEVATION (Ft.) - DATE
1	52.7	DRY - (8/23/85) Backfilled
2	48.0	44.0 - (8/23/85) 44.8 - (8/25/85) 44.5 - (8/26/85)
3	53.3	49.7 - (8/23/85) 50.3 - (8/25/85) 50.3 - (8/26/85)
4	54.0	48.8 - (8/23/85) 50.4 - (8/25/85) 50.2 - (8/26/85)
5	54.2	50.4 - (8/23/85) 50.1 - (8/25/85) 50.7 - (8/26/85)
6	55.2	51.7 - (8/25/85) 51.6 - (8/26/85)
7	52.8	DRY - (8/25/85) Backfilled

Job No. 4462-8508

PROJECT	KRAFT BUILDING - GRAND AVENUE PIEDMONT	BORING NO: 2

DATE OF BORING August 22, 1985

TYPE OF BORING 6" Auger

SURFACE ELEVATION Approx. 48.0'

HAMMER WEIGHT 140 lbs/30" Drop

DESCRIPTION OF MATERIALS:	DEPTH IN FT.	SAMPLE NUMBER – DIAMETER	BLOWS/FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSION STRENGTH, P.S.F.	OTHER TESTS
3" Asphalt.							
Dense grey brown sandy base rock.		1) 2"	19	112	15	-	
Stiff black silty clay with small pebbles.		2) 2"	15	112	17	4,980	
Stiff grey mottled orange-brown silty and sandy clays with rock fragments.	5	3) 2"	16	115	15	3,900	
Very stiff tan with orange-brown mottling sandy clay with rock fragments.		4) 2"	23	128	11	4,140	
	10						
Hard red brown silty clay with sand and rock fragments.		5) 2"	48	136	18	1,440	
Bottom of Boring							
	15						
	20						
	25						
	30						

PROJECT KRAFT BUILDING - GRAND AVENUE- PIEDMONT

BORING NO: 3

DATE OF BORING August 22, 1985

TYPE OF BORING 6" Auger

SURFACE ELEVATION Approx. 53.3'

HAMMER WEIGHT 140#/30" Drop

DESCRIPTION OF MATERIALS:

- 4" Asphalt
- Dense grey brown sandy base rock.
- Very stiff black with speces of orange brown silty clay.
- Stiff grey brown with orange brown and black mottling sandy clay with rock fragments.
- Medium stiff tan with orange brown mottling fine sandy clay.
- Medium dense grey with orange-brown mottling clayey sand with rock fragments.
- Medium dense orange-brown silty sand.
- Medium dense grey with orange-brown mottling fine clayey sand with rock fragments.
- Very stiff to hard brown with orange-brown mottling silty clay with sand and rock fragments.

Bottom of Boring

DEPTH IN FT.: 5, 10, 15, 20, 25, 30

SAMPLES

SAMPLE NUMBER – DIAMETER	BLOWS/FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSION STRENGTH, P.S.F.	OTHER TESTS
1) 2"	23	109	19	10,300	
2) 2"	14	108	19	5,170	
3) 2"	20	107	21	4,900	
4) 2"	9	103	21	-	
5) 2"	10	-	22	-	
6) 2"	21	121	14	-	
7) 2"	15	110	20	-	
8) 2"	35/6"	126	13	-	

PROJECT KRAFT BUILDING - GRAND AVENUE PIEDMONT

BORING NO: 4

DATE OF BORING August 22, 1985

TYPE OF BORING 6" Auger

SURFACE ELEVATION Approx. 54.0'

HAMMER WEIGHT 140 lbs/30" Drop

SAMPLES

DESCRIPTION OF MATERIALS:	DEPTH IN FT.	SAMPLE NUMBER - DIAMETER	BLOWS/FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSION STRENGTH, P.S.F.	OTHER TESTS
4" Asphalt.							
Dense grey brown sandy base rock.							
Stiff black silty clay.		1) 2"	9	104	22	2,620	
Stiff blue-grey silty clay with rock fragments.	5	2) 2"	12	100	24	3,640	
Stiff grey brown with orange-brown mottling silty clay with sand and rock fragments.		3) 2"	13	110	20	3,800	
Medium stiff tan with orange-brown mottling sandy clay with sand lenses.	10	4) 2"	10	107	21	-	
Medium dense brown silty sand.		5) 2"	17	-	-	-	
Dense brown with orange-brown mottling silty sand with rock fragments.	15	6) 2"	50	122	13	-	
Bottom of Boring							
	20						
	25						
	30						

PROJECT	KRAFT BUILDING - GRAND AVENUE PIEDMONT	BORING NO: 5

DATE OF BORING	August 22, 1985
TYPE OF BORING	6" Auger
SURFACE ELEVATION	Approx. 54.2'
HAMMER WEIGHT	140 lbs/30" Drop

DESCRIPTION OF MATERIALS:

- 4" Asphalt.
- Dense grey brown sandy base rock.
- Medium stiff black silty clay.
- Stiff blue-grey silty clay with sand and rock fragments.
- Stiff grey with orange-brown mottling silty and sandy clays with rock fragments.
- Stiff grey brown fine sandy clay.
- Medium dense brown with orange-brown mottling clayey sand with rock fragments.
- Medium stiff to stiff brown with orange-brown mottling fine sandy clay.
- Medium dense brown silty sand.

Bottom of Boring

Depth in ft.: 5, 10, 15, 20, 25, 30

SAMPLES

Sample Number – Diameter	Blows/Ft.	Dry Density P.C.F.	Moisture Content %	Unconfined Compression Strength, P.S.F.	Other Tests
1) 2"	8	97	26	2,340	
2) 2"	12	107	21	3,040	
3) 2"	23	116	18	5,140	
4) 2"	12	125	11	-	
5) 2"	7	113	19	-	
6) 2"	23	-	-	-	
7) 2"	29	112	17	-	

PROJECT KRAFT BUILDING - GRAND AVENUE-PIEDMONT

BORING NO: 6

DATE OF BORING August 22, 1985

TYPE OF BORING 6" Auger

SURFACE ELEVATION Approx. 55.2'

HAMMER WEIGHT 140#/30" Drop

SAMPLES

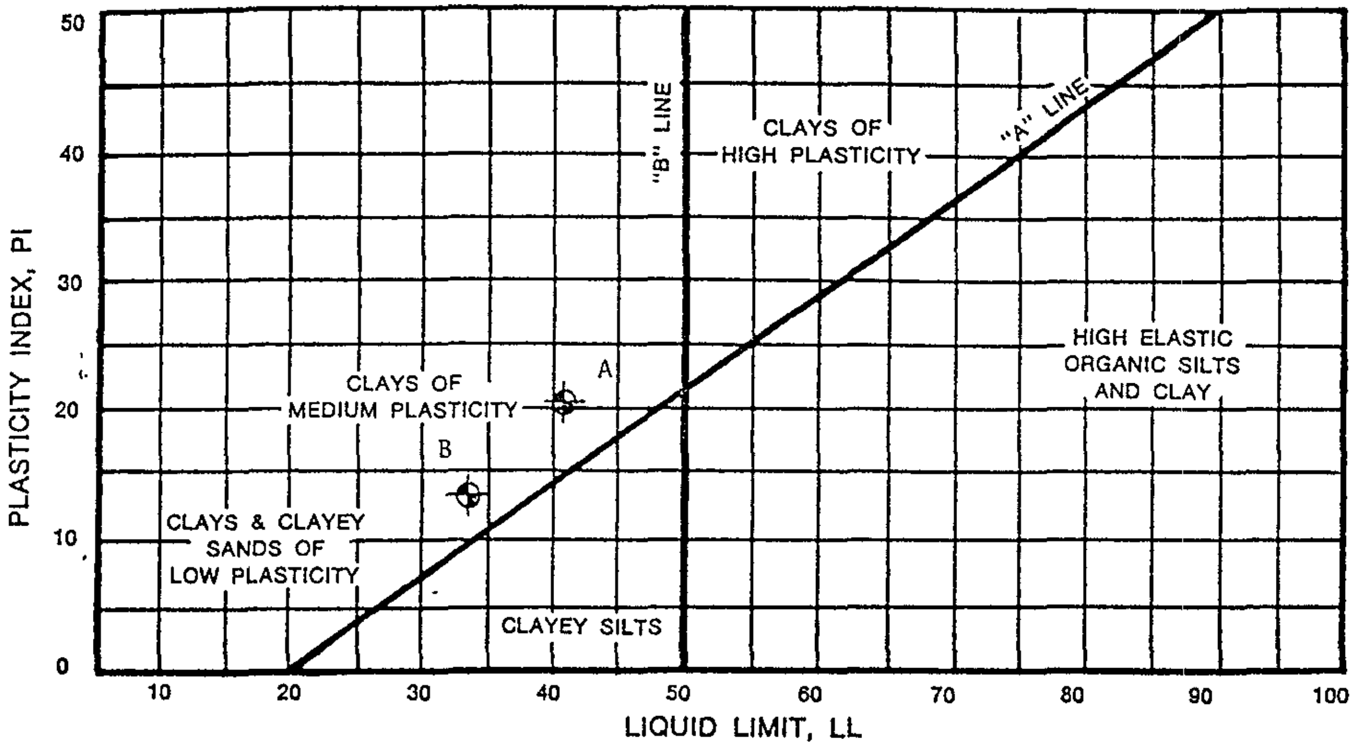
DESCRIPTION OF MATERIALS:	DEPTH IN FT.	SAMPLE NUMBER - DIAMETER	BLOWS/FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSION STRENGTH, P.S.F.	OTHER TESTS
3" Asphalt							
Dense grey brown sandy base rock.		1) 2"	13	105	21	2,720	
Stiff black silty clay with small pebbles.		2) 2"	15	91	31	2,020	
Stiff blue-grey silty clay.	5						
Stiff grey with blue grey mottling silty clay with sand.		3) 2"	12	99	24	3,960	
Medium dense orange-brown fine clayey sand.		4) 2"	13	114	18	3,800	
Medium stiff to stiff grey brown with orange brown mottling silty clay with sand and rock fragments.	10	5) 2"	6	101	24	-	
Medium dense orange brown fine clayey sand with rock fragments.	15	6) 2"	12	-	-	-	
Dense brown with orange brown mottling sand and gravel with clayey pockets.	20	7) 2"	48	133	8	-	
Bottom of Boring	25						
	30						

PROJECT	KRAFT BUILDING - GRAND AVENUE-PIEDMONT	BORING NO: 7

DATE OF BORING	August 22, 1985
TYPE OF BORING	6" Auger
SURFACE ELEVATION	Approx. 52.8'
HAMMER WEIGHT	140#/30" Drop

SAMPLES

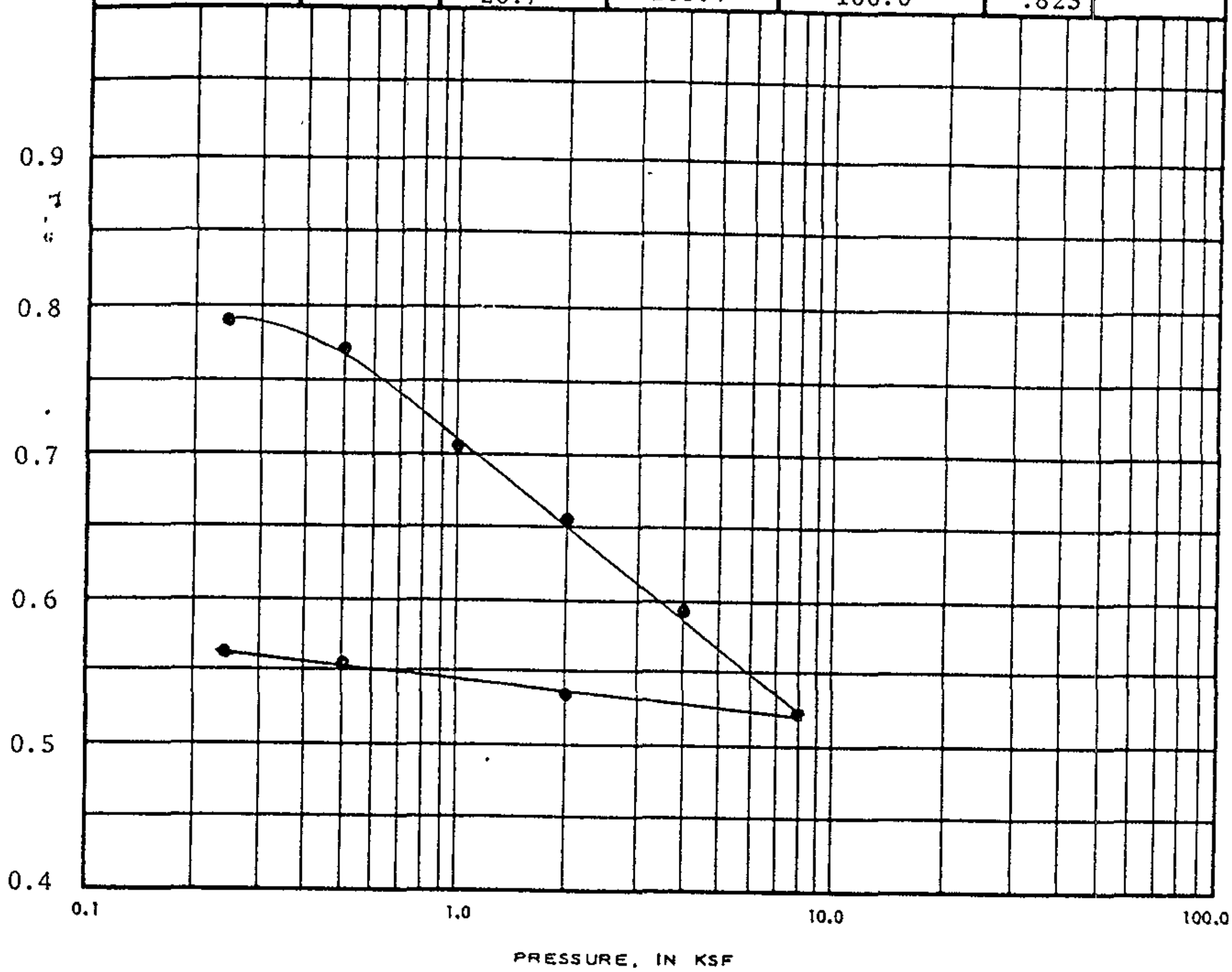
DESCRIPTION OF MATERIALS:	DEPTH IN FT.	SAMPLE	NUMBER – DIAMETER	BLOWS/FT.	DRY DENSITY P.C.F.	MOISTURE CONTENT %	UNCONFINED COMPRESSION STRENGTH, P.S.F.	OTHER TESTS
4" Asphalt								
Dense grey brown sandy base rock.			1) 2"	59	124	14	15,400	
Hard red brown sandy clay with rock fragments.			2) 2"	58	118	16	14,900	
Hard grey with orange brown mottling silty clay with sand and rock fragments.	5		3) 2"	51	121	15	11,000	
Bottom of Boring								
	10							
	15							
	20							
	25							
	30							

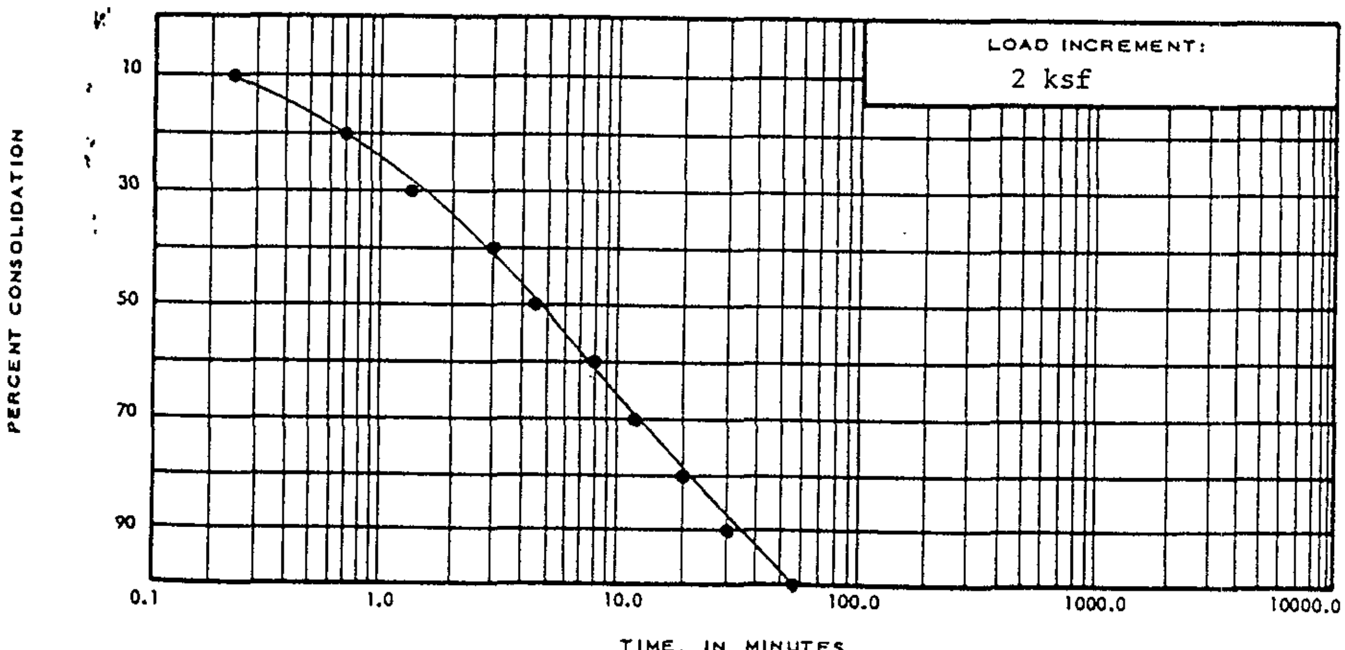


CLASSIFICATION TEST RESULTS										
SAMPLE IDENTIFICATION			ATTERBERG LIMITS			GRAIN SIZES % DRY WT.				
SAMPLE	LETTER DESIGNATION	DESCRIPTION	LIQUID LIMIT	PLASTICITY INDEX	SHRINKAGE LIMIT	SAND	SILT	CLAY	COLLOIDAL
5-1	A	Black Silty Clay	40.8	25.5	-	-	-	-	-
5-2	B	Blue-Grey Silty Clay	33.6	13.6	-	-	-	-	-

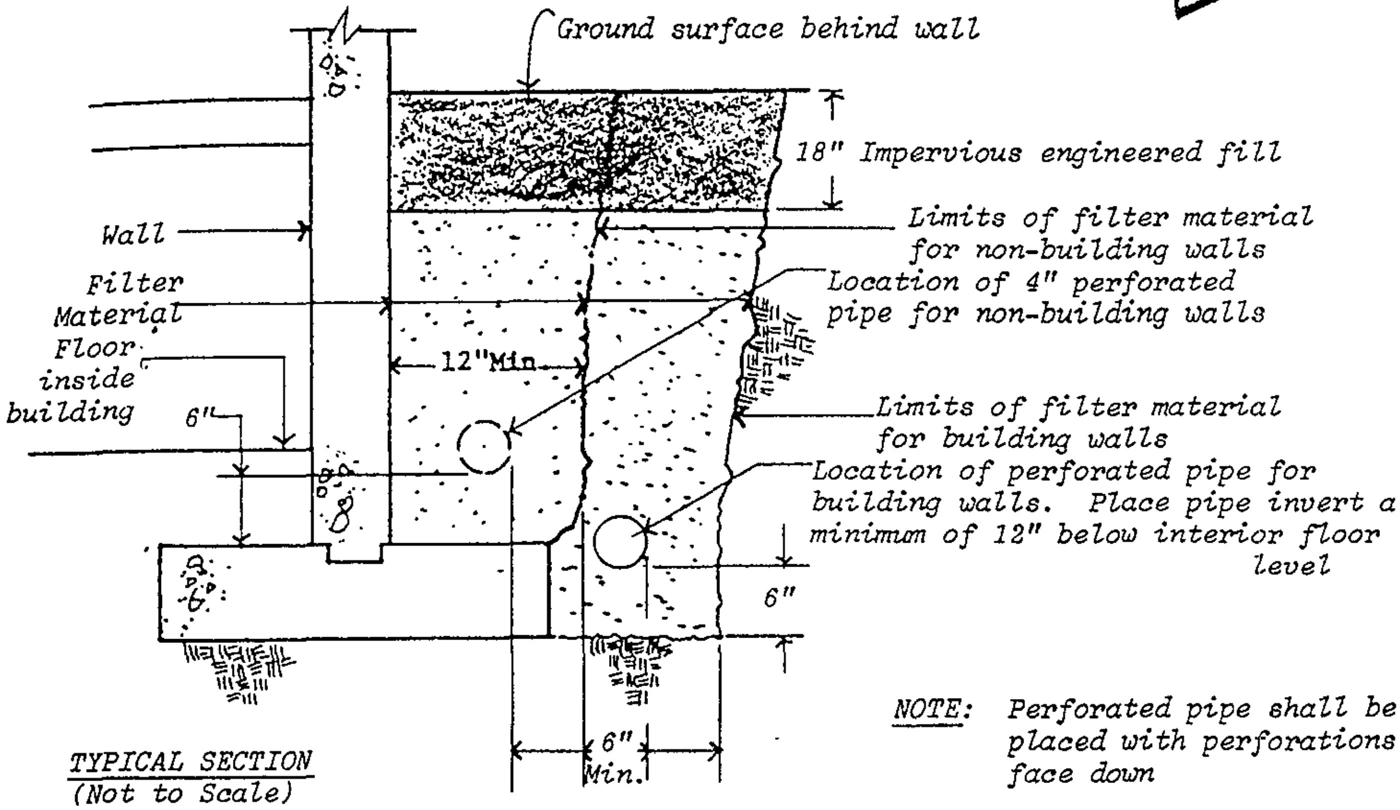
PLASTICITY CLASSIFICATION

SAMPLE NO.	CONSOLIDATION TEST RESULTS					
5-1	SPECIFIC GRAVITY	MOISTURE CONTENT, (%)	DRY DENSITY, (PCF)	PERCENT OF SATURATION, (%)	HEIGHT (IN.)	DIAMETER (IN.)
INITIAL	2.71	24.8	93.9	83.7	.952	1.93
FINAL		20.7	108.4	100.0	.825	





4462-8508	HALLENBECK & ASSOCIATES	Figure 10



TYPICAL SECTION
(Not to Scale)

DRAIN PIPE

Subdrain Pipe shall be manufactured in accordance with one of the following requirements:

1. Perforated corrugated metal pipe shall conform to the Specifications of AASHTO Designation M-36.

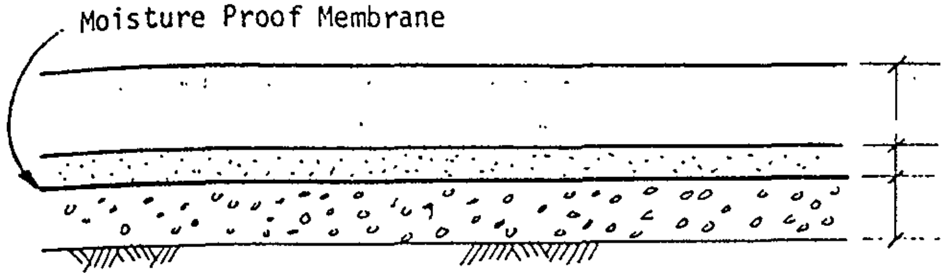
2. Perforated clay pipe shall conform to the specifications for extra-strength perforated clay pipe of AASHTO Designation M-65.

3. ABS 1000 lb. crush plastic perforated pipe shall conform to U.S. Department of Commerce Commercial Standard CS-228-61 and FHA UM-26B.

FILTER MATERIAL

Filter material for use in backfilling trenches around and over subdrains and behind retaining walls shall consist of clean, coarse sand and gravel or crushed stone conforming to the following grading requirements:

Sieve Size	Percentage Passing Sieve
2"	100
3/4"	70-100
3/8"	40-100
#4	25-50
#8	15-45
#30	5-25
#50	0-20
#200	0-3



A. MATERIALS

The mineral aggregate for use under floor slabs shall consist of clean rounded gravel and sand. The aggregate shall be free from clay, vegetable matter, loam, volcanic tuff, and other deleterious substances.

B. GRADATION

The mineral aggregate shall be of such size that the percentage composition by dry weight as determined by laboratory sieve (U. S. Series), will conform to the following grading:

	Percent Passing	
Sieve Size	Gravel	Sand
1"	100	
3/4"	90-100	
No. 4	0-5	100
No. 50		0-30

NOTES:

1. The moisture proof membrane should be adequately thick so that it will not be easily damaged during construction. It should be adequately detailed so that there are little or no openings around plumbing and conduit points and near foundations. The membrane sheet should be adequately lapped.

2. The sand covering is not a part of the moisture proofing treatment. It is a normally used optional component that lends some protection to the membrane and also aids in curing the concrete.

MOISTURE PREVENTION BENEATH SLAB-ON-GRADE FLOORS

A. GENERAL

1. Definition of Terms

FILL...is all soil or soil/rock materials placed to raise the grade of the site or to backfill excavations.

ON-SITE MATERIAL...is that which is obtained from the required excavations on the site.

IMPORT MATERIAL...is that hauled in from off-site areas.

SELECT MATERIAL...is a soil material meeting the requirements set forth in "C(2)" below.

ENGINEERED FILL...is a fill upon which the Soil Engineer has made sufficient tests and observations to enable him to issue a written statement that in his opinion the fill has been placed and compacted in accordance with the specification requirements.

AASHTO SPECIFICATIONS...are the Standard Specifications of the American Association of State Highway Officials, latest revision.

ASTM SPECIFICATIONS...are the Annual Book of ASTM Standards (Part 19), American Society for Testing and Materials, latest revision.

MAXIMUM LABORATORY DENSITY...is the maximum density for a given fill material that can be produced in the laboratory by the Standard procedure ASTM D1557, "Moisture-Density Relations of Soils Using a 10-Pound (4.5 kg) Rammer and an 18-Inch (457 mm) Drop" (AASHTO Test T-180, "Moisture-Density Relations of Soils Using a 10-Pound Hammer and an 18-Inch Drop").

OPTIMUM MOISTURE CONTENT...is the moisture content at which the maximum laboratory density is achieved using the standard compaction procedure ASTM Test Designation D1557 (AASHTO Test T-180).

DEGREE OF COMPACTION...is the ratio, expressed as a percentage, of the dry density of the fill material as compacted in the field to the maximum dry density for the same material.

2. Responsibility of the Soil Engineer

The Soil Engineer shall be the Owner's representative to observe the grading operations, both during preparation of the site and compaction of any engineered fill. He shall make enough visits to the site to familiarize himself generally with the progress and quality of the work. He shall make a sufficient number of field observations and tests to enable him to form an opinion regarding the adequacy of the site preparation, the acceptability of the fill material, and the extent to which the degree of compaction meets the specification requirements. Any fill where the site preparation, type of material, or compaction is not approved by the Soil Engineer shall be removed and/or recompacted until the requirements are satisfied.

3. Soil Conditions

A soil investigation has been performed for the site by Hallenbeck & Associates and a report has been issued by them covering that investigation. The Contractor shall familiarize himself with the soil conditions on the site, whether covered in that report or not, and shall thoroughly understand all recommendations associated with the grading.

B. SITE PREPARATION

1. Stripping

Prior to any cutting or filling, the site shall be stripped to a sufficient depth to remove all grass, weeds, roots, and other vegetation, including trees and their root systems. The minimum stripping depth shall be 3 inches. The site shall be stripped to such greater depth as the Soil Engineer in the field may consider necessary to remove materials that in his opinion are unsatisfactory. The stripped material shall either be removed from the site or stockpiled for reuse later as topsoil, but none of this stripped material may be used for engineered fill.

Where trees are removed, the soils loosened by the roots shall be overexcavated at least to the bottom of the disturbed zone and to the width of the equipment. These excavations should then be backfilled with engineered fill.

2. Preparation for Filling

After stripping, the weak soils in areas to be filled shall be overexcavated to the minimum depth called for on the plans or that is required by the Soil Engineer in the field. The overexcavated soils that are clean and free from organic material can be used later as general engineered fill.

After stripping the surface vegetation and overexcavating the weak soils to the required depths, the exposed surface shall be scarified to a minimum depth of 6 inches, watered or aerated as necessary to bring the soil to a moisture content that will permit proper compaction, and recompacted to the requirements of engineered fill as specified in "D" below. Prior to placing fill, the Contractor shall obtain the Soil Engineer's approval of the site preparation in the area to be filled. The requirements of this section may be omitted only when approved in writing by the Soil Engineer.

Prior to placing fill, subdrains, if required shall be installed as directed by the Soil Engineer in the field. Subdrains shall be constructed as specified in the attached "Guide Specifications for Subsurface Drains", and the extent of the subdrains shall be as directed by the Soil Engineer.

C. MATERIAL USED FOR FILL

1. Requirements for General Engineered Fill

All fill material must be approved by the Soil Engineer. The material shall be a soil or soil/rock mixture that is free from organic matter or other deleterious substances. The fill material shall not contain rocks or lumps over 6 inches in greatest dimension, and not more than 15% by dry weight shall be larger than 2½ inches in greatest dimension. The soils from the site, except the surface strippings, shall be suitable for use as fill.

2. Requirements for Select Fill Material Beneath Floor Slabs

In addition to the requirements of "C(1)" above, select material, when called for on the plans and for use under floor slabs, must conform to the following minimum requirements:

Maximum Plasticity Index	15

In addition to the requirements of "C(1)" above, select material for use in buttress fills shall be non-plastic and shall have an "R" value of at least 30. Select material for buttress fills shall be approved by the Soil Engineer.

D. PLACING AND COMPACTING FILL MATERIAL

All fill material shall be compacted as specified below or by other methods, if approved by the Soil Engineer, so as to produce a minimum degree of compaction of 90%. Fill material shall be spread in uniform lifts not exceeding 8 inches in uncompacted thickness. Before compaction begins, the fill shall be brought to a water content that will permit proper compaction by either aerating the material if it is too wet or spraying the material with water if it is too dry. Each lift shall be thoroughly mixed before compaction to ensure a uniform distribution of water content. Where natural clayey soils are used within 3 feet of the finished ground surface, they shall be placed and compacted at a moisture content that is 1% to 3% above optimum.

E. EXCAVATION

All excavations shall be carefully made true to the grades and elevations shown on the plans. The excavated surfaces shall be properly graded to provide good drainage during construction and to prevent ponding of water.

F. SUBGRADE PREPARATION UNDER LIVING AREA FLOOR SLABS

The floor slab area shall be overexcavated to a sufficient depth to accommodate an 18-inch thickness of select fill. After overexcavating, the exposed surface shall be scarified, mixed with water if necessary, and compacted to a degree of compaction of 90% at a moisture content 1% to 3% above optimum. The select engineered fill shall be placed immediately to prevent drying up of the subgrade. The select fill shall be placed and compacted as in "D" above.

G. TREATMENT AFTER COMPLETION OF GRADING

After grading is completed and the Soil Engineer has finished his observation of the work, no further excavation or filling shall be done except with the approval of and under the observation of the Soil Engineer.

It shall be the responsibility of the Grading Contractor to prevent erosion of freshly-graded areas during construction and until such time as permanent drainage and erosion control measures have been installed.

GUIDE SPECIFICATIONS

FOR SUBSURFACE DRAINS

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Grand Avenue - Piedmont, California

A. DESCRIPTION

Subsurface drains are pipes installed beneath the ground surface and which collect and convey subsurface drainage water. Unless otherwise directed by the Soil Engineer in the field, the conduit shall be placed in a trench and the trench shall be backfilled with pervious material. The conduit and pervious material shall meet the requirements for the materials given in these specifications. The materials for the subsurface drain and the size of the trench shall be as shown on the plans or as determined by the Soil Engineer in the field.

B. MATERIALS

1. Subdrain Pipe

Subdrain pipe shall be manufactured in accordance with the following requirements:

a. Perforated corrugated metal pipe shall conform to the specifications of AASHTO Designation M-36. Corrugated steel sheet used in the fabrication of the pipe shall have a protective coating of zinc (galvanizing), aluminum, or aluminum-zinc alloy conforming to ASTM Designation A760.

b. Acrylonitrile-Butadiene-Styrene (ABS) plastic pipe shall conform to the specifications for ABS plastic pipe given in ASTM Designation D2282 and ASTM Designation D2751. ABS pipe shall have a minimum pipe stiffness of 45 psi at 5% deflection when measured in accordance with ASTM Method D2412.

c. Polyvinyl chloride (PVC) pipe shall conform to AASHTO Designation M278. PVC pipe shall have a minimum pipe stiffness of 50 psi at 5% deflection when measured in accordance with ASTM Method D2412. Schedule 40 PVC pipe shall be suitable.

2. Pervious Backfill Material

Pervious materials for use in backfilling trenches shall conform to the requirements of Paragraph C1 of these specifications. Pervious material conforming to the requirements of Paragraph C2 may be used, provided that the backfill is wrapped in a suitable geotextile ("filter fabric") meeting the requirements given in Section D.

C. BACKFILL MATERIAL

1. Filter Material

Filter material for use in backfilling trenches around and over subdrains pipes and behind retaining walls shall consist of clean coarse sand and gravel or crushed stone conforming to the following requirements:

Sieve Size	% Passing Sieve
2"	100
3/4"	70-100
3/8"	40-100
#4	25-50
#8	15-45
#30	5-25
#50	0-20
#200	0-3

Class 2 "permeable material" conforming to the State of California Department of Transportation Standard Specifications, latest edition, Section 68-1.025 shall be suitable.

2. Gravel

Gravel for use in pervious blankets and in backfilling trenches or wrapped in filter fabric meeting the requirements of Section D of these specifications shall consist of clean fresh stone conforming to the following grading requirements:

Sieve Size	% Passing Sieve
1"	100
1/2"	50-100
#4	40-100
#8	0-40
#30	0-40
#50	0-5
#200	0-3

Class 1 "permeable material" conforming to the State of California Department of Transportation Standard Specifications Section 68-1.025 shall be suitable.

D. GEOTEXTILE

Geotextiles for use in subdrains or as directed by the Soil Engineer shall be of nonwoven needlepunched construction and consist of long chain polymeric fibers composed of polypropylene, polyethylene, or polyamide. The fibers shall be oriented into a multi-directional stable network. The geotextile shall conform to the physical property requirements listed below:

Physical Property	Test Method	Acceptable Typical Test Results
Tensile Strength, wet, lbs	ASTM D-1682	90 (minimum)
Elongation, wet, %	ASTM D-1682	40 (minimum)
Coefficient of Water Permeability, cm/sec	Constant Head	0.10 (minimum)
Pore Size—EOS, U.S. Standard Sieve	Corps of Engineers CW-02215	40 (maximum)

The geotextile shall be furnished in a protective wrapping which shall protect the fabric from ultraviolet radiation and from abrasion due to shipping and handling.

E. LAYING AND PLACEMENT

The drain pipe and filter material shall be placed as shown on the plans or as determined by the Soil Engineer in the field. Unless otherwise directed by the Soil Engineer, perforated pipe shall be laid with the perforations at the bottom. Corrugated metal pipe sections shall be joined with couplers.

Subsurface drains shall be placed to the depths, lines, and grades shown on the plans and as directed by the Soil Engineer in the field. Subsurface drains shall discharge to a suitable outlet as defined in the field by the Soil Engineer or as shown on the plans.

After excavating the subsurface drain trench but before placing the drain pipe, a minimum of 3 inches of filter material shall be placed on the trench bottom.

The filter material shall be rounded to conform to the curvature of the pipe so that the pipe is carefully bedded. The trench shall then be backfilled to the top of the pipe, and the backfill should be tamped or hand-wedged into place to provide firm support at the sides of the pipe. In general, the installation shall follow the guidelines of ASTM Designation D2774, except that compaction of the filter material in the trench shall not be required.

The contractor shall, at his expense, replace pipes damaged during the installation or subsurface drains not placed at the lines and grades called for on the plans or as determined by the Soil Engineer in the field.

The geotextile shall be placed in the manner and at the locations shown on the plans. The surface to receive the fabric and/or the trench into which the fabric is to be placed shall be prepared to a smooth condition free of obstructions and debris.

The geotextile shall be covered with a permeable material within two weeks of its placement. Should the fabric be damaged during construction, the torn or punctured section shall be repaired by placing a piece of fabric that is large enough to cover the damaged area and to meet the overlap requirement. Adjacent borders of the geotextile shall be overlapped a minimum of twelve (12) inches or sewn. The preceding roll shall overlap the following roll in the direction the material is being placed.

F. <u>CLEANOUTS</u>

At the direction of the Soil Engineer, cleanouts shall be provided at the ends of pipes and at junctions and connections of pipelines. Junction angles should be no steeper than 45 degrees where cleanout pipes connect to the subdrain pipes. Cleanouts should be provided with caps.

A. GENERAL CONDITIONS

1. Definitions

PAVEMENT....shall include asphalt concrete surfacing, aggregate subbase, and untreated aggregate base or portland cement concrete.

SUBBASE....is that portion of the area on which surfacing, base, subbase, or concrete pavement is to be placed.

STANDARD SPECIFICATIONS....is the Standard Specifications, January 1975, of the State of California, Business and Transportation Agency, latest revision.

MATERIALS MANUAL....is the Materials Manual of Testing and Control Procedures, State of California, Business and Transportation Agency, latest revision.

DEGREE OF COMPACTION....is the field density expressed as a percentage of the maximum laboratory density as defined in the applicable tests outlined in the Materials Manual. The maximum laboratory density may be determined by the Soil Engineer, at his discretion, by ASTM Standard D1559.

ASTM STANDARDS....is the American Society for Testing and Materials Standards which include specifications for concrete pavements, latest revision.

2. Scope of Work

This portion of the work shall include all labor, materials, tools, and equipment necessary for and reasonably incidental to the completion of the pavement shown on the plans and as herein specified, except work specifically noted as "Work Not Included".

B. SUBGRADE PREPARATION

The Contractor shall prepare the surface of the various subgrades receiving subsequent pavement courses to the lines, grades, and dimensions given on the plans. The upper 6 inches of the soil subgrade beneath asphalt pavement sections shall be compacted to a minimum degree of compaction of 95%. The upper 6 inches of the soil subgrade beneath portland cement concrete pavement sections shall be compacted to a minimum degree of compaction of 90%. These requirements shall be waived only if approved in writing by the Soil Engineer. The finished subgrades shall be tested and approved by the Soil Engineer prior to the placement of additional pavement courses.

C. MATERIALS AND PLACEMENT

1. Aggregate Subbase

The aggregate subbase shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate subbase material shall conform to the requirements of the Standard Specifications for Class 2 material. The subbase material shall be compacted to a minimum degree of compaction of 95% and it shall be spread and compacted in accordance with Section 25 of the Standard Specifications. Each layer of subbase shall be tested and approved by the Soil Engineer prior to the placement of successive layers.

2. Untreated Aggregate Base

The aggregate base course shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate base material shall conform to the requirements of Section 26 of the Standard Specifications for Class 2 materials, 3/4 inches maximum size. The base course material shall be compacted to a minimum degree of compaction of 95%. The base material shall be spread and compacted in accordance with Section 26 of the Standard Specifications. The material shall be spread in layers not exceeding 6 inches, and each layer of base course shall be tested and approved by the Soil Engineer prior to the placement of successive layers.

3. Asphalt Concrete Surfacing

Asphalt concrete surfacing shall consist of a mixture of mineral aggregate and paving grade asphalt, mixed at a central plant, and spread and compacted on a prepared base in conformity with the lines, grades, and dimensions shown on the plans. The penetration of the asphalt shall be 60-70 or 85-100. The mineral aggregate shall be Type B, one half inch maximum size, medium grading, and shall conform to the requirements set forth in Section 39 of the Standard Specifications. The drying, proportioning, and mixing of the materials shall conform to Section 39.

The prime coat, spreading, and compacting equipment, and spreading and compacting the mixture shall conform to the applicable chapters of Section 39, with the exception that no surface course shall be placed when the atmospheric temperature is below 50 degrees F.

The surfacing shall be rolled with combination steel wheel and pneumatic rollers, as described in Section 39-6. The surface course shall be placed with an approved self-propelled mechanical spreading and finishing machine.

4. Portland Cement Concrete Pavement

The portland cement concrete pavement shall consist of a mixture of portland cement, fine aggregate, coarse aggregate, admixtures diffused, and water, portioned and mixed in accordance with the requirements for Class B concrete as specified in Section 90 of the Standard Specifications. Unless otherwise specified, the portland cement shall conform to ASTM Standard C150 Type 2 and the aggregate shall conform to ASTM Standard C33. Any admixtures used shall not increase drying and shrinkage of the concrete more than 10% when tested in accordance with Test 530C, Materials Manual.

The portland cement concrete shall be placed on a prepared subbase or subgrade in conformity with lines, grades, and dimensions shown on the plans. All work shall be in accordance with the applicable provisions of Section 40 of the Standard Specifications. The amount of water used in the concrete mix shall be regulated so that the consistency of the concrete is determined by Test No. 530, Materials Manual, as a maximum ball penetration of 1½ inches or, when tested in accordance with the Standard Slump Cone Test, for a maximum slump of 3 inches. An improved curing compound shall be applied to the finished surface of the freshly placed concrete immediately after the moisture sheen begins to disappear from the surface, but before any drying-shrinkage or cracks begin to appear.