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October 8, 1998

Work Order: 1572-1-6A/28
Log Number: 19203

Mr. Stewart Hall
Dunhill Homes, Inc.
5201 Bridgetown Place
Thousand Oaks, California 91362

Subject: **GEOTECHNICAL UPDATE REPORT FOR PROPOSED RESIDENTIAL CONSTRUCTION, LOT 6A, TRACT 4115, OXLEY PLACE, NORTH RANCH, CITY OF THOUSAND OAKS, COUNTY OF VENTURA, CALIFORNIA.**

INTRODUCTION

Presented herein are the results of our geotechnical update evaluation for the proposed residential development of Lot 6A, Tract 4115 within the North Ranch area of the city of Thousand Oaks. This update is based wholly on geotechnical information contained in the referenced reports (see attached reference list) and observations made during a recent site visit by an engineer from this office. The site visit was performed to visually evaluate changes in the surface condition of the lot subsequent to the referenced report, Gorian 1992. This report contains geotechnical recommendations for design and construction of the proposed residence described below. The proposed construction is acceptable from a geotechnical standpoint.

PROPOSED DEVELOPMENT

The proposed construction will consist of a single family residence complimented with an anticipated swimming pool and hardscaping including patios, walkways, and a driveway. Minor cut and fill grading and retaining wall construction may be required to achieve design grades.

LOCATION AND SITE CONDITIONS

Lot 6A is on the south side of Oxley Place west of Crown Ridge Court in the North Ranch area of the city of Thousand Oaks. The North Ranch Country Club borders the lot on the south side. Tract 4115 was rough graded in 1989 with geotechnical observations and testing services provided by Gorian and Associates, Inc. (June 4, 1989). The tract was redesigned and regraded in 1992 with geotechnical observations and testing services provided by Gorian and Associates, Inc. (October 13, 1992). A Callegus Water District easement containing a 42-inch water line crosses the pad in an east-west direction at the toe of the fill slope at the southern end of the building pad.

A recent site visit by an engineer from our office found the surface configuration of Lot 6A to be similar to the 1992 grading. However, the building pad surface is weathered and rutted significantly. Stockpiles of soil and construction debris are present within the pad. An access road was cut down

from the pad roughly in the middle of the slope descending from the pad. Non-engineered fill was extended out over the lower pad for the access road. Vehicles have also been driven down the slope that ascends to the west from the building pad causing a depression on the slope. Weeds are present on the slopes and the lower pad is covered with native grasses and weeds.

SUBSURFACE CONDITIONS

The building pad in its current configuration was constructed of engineered compacted fill over native alluvial soils. The previously placed engineered compacted fill varied from roughly 7 to 8 feet thick. The slopes surrounding the building pad were constructed originally of engineered compacted fill.

FAULTING AND SEISMICITY

No active or potentially active faults are shown on or adjacent the property on regional geologic maps, nor is the site in an Alquist-Priolo Special Earthquake Fault Zone. However, the property is in the Transverse Ranges Geomorphic Province, a seismically active area. This site, like any other in the City of Thousand Oaks, can be expected to experience strong ground motion from earthquakes generated on regional faults, as evidenced by the 1994 Northridge Earthquake.

Current design standards for seismically induced ground shaking resistant construction are addressed in the Uniform and Thousand Oaks Building Codes. The site is within UBC seismic zone 4. For minimum seismic design based upon the 1994 UBC, the site Seismic Zone Factor ("Z" Factor) is 0.40 and the Site Coefficient is considered type S_2 with the "S Factor" of 1.2. The UBC "Z" Factor approximates the effective peak ground acceleration exceeded at the site, on the average, only once in 475 years (i.e., 10 percent chance of being exceeded in 50 years). The "Z" Factor is limited to 0.40 in the UBC for a number of reasons (see ATC, 1978 for discussion). These values are based on 1994 UBC seismic standards as adopted in the current city of Thousand Oaks Building Code. The current Building Code Standards are the minimum design standard and are not intended to prevent damage to a structure during an earthquake. Rather, they are intended to prevent total collapse of the structure thus enabling the occupants to exit. Therefore, cracking of walls or other damage may occur during strong ground shaking. We suggest that the project's structural engineer and developer balance the benefits and costs of increasing the "Z" factor by 25 to 50 percent for static design.

GROUNDWATER

No groundwater was encountered during our previous or present investigation of the tract. However, we have observed surface water seeps in adjacent tracts that appear to be the result of excessive irrigation and redirected storm runoff.

CONCLUSIONS AND RECOMMENDATIONS

GENERAL

Lot 6A was evaluated from a geotechnical standpoint for the proposed single family residential development. The proposed construction described herein is considered feasible provided the following geotechnical recommendations are incorporated into the design and construction of the project. Use of this report in any form constitutes the project owner and parties using this report have fully read and understand the contents of this report. These recommendations should be reviewed and revised as necessary. Remedial grading will be necessary to removed softened and desiccated near surface soils on Lot 6A as described in the following Site Preparation and Grading section of this report.

SITE PREPARATION AND GRADING

General

The following site preparation and grading recommendations are presented for the construction of the building pad. All aspects of grading including site preparation, grading and fill placement, and keying and benching should be per the city of Thousand Oaks Building and Grading Codes.

Vegetation Removal

Vegetation or debris present on the pad and slopes should be removed from all areas of construction prior to the commencement of grading operations.

Soil Compaction

All soil compaction should be to a minimum of 90% relative compaction. Relative compaction is the ratio of the in-place (in-situ) dry soil density to the maximum dry soil density as determined per ASTM D 1557.

Soil Removals

The upper soils within the existing building pads are weathered to approximately 24 inches. Therefore, the upper 18 inches should be removed prior to processing the exposed surface. The removal should include all disturbed fill and any artificial non-engineered fill. The removed soil may be used for engineered compacted fill provided it is properly placed and free of deleterious material as discussed herein. The removal recommendations should be reviewed when the grading plan is available.

After the removals are completed as addressed above, the exposed surface should be observed by the project geotechnical consultant to evaluate if additional removals are needed. The undercut may need to be deepened if critically expansive materials or irregular masses are encountered during grading. No fill soils should be placed until the geotechnical observation of removal areas is completed.

Calleguas Water District Water Main

A 42 inch diameter Calleguas Water District water main is buried within a 20 foot easement within the lot at the toe of slope descending from the building pad. No soil removal should be performed within this area until the pipe is located and the safe cover determined per the requirements of the water district. No ripping should be performed over the pipe. Any added surcharge over the pipe should be per the requirements of the water district.

In-Place Processing and Fill Placement

After completing the soil removals, the upper 6 inches of exposed in-place suitable subgrade should be scarified; moisture conditioned to a minimum of 2% above the optimum moisture content, and compacted to 90% relative compaction. Fill soils should be free of significant vegetation, trash and debris, placed in maximum 8 inch uniform lifts, brought to slightly above optimum moisture content and compacted.

Slope Reconstruction

The fill slopes that have been disturbed should be reconstructed and rebuilt to the design grade. A keyway should be cut at the toe a minimum of 10 feet wide to a depth of at least 2 feet at the toe and 3 feet deep at the heel of the keyway. The slopes should be constructed of cohesive soils. The slopes should be compacted to a minimum of 90% relative compaction.

Utility Trenches
The backfill of all utility trenches within building areas, and parking and drive areas should be compacted to a minimum 90% relative compaction.

Excavations
During construction, the contractor is responsible for excavation and maintenance of safe and stable slope angles considering the subsurface conditions and the methods of operations. Temporary excavations should be made per the applicable requirements of the current Cal/OSHA excavation regulations. Surcharge loads should be setback from the top of temporary excavations a minimum horizontal distance of 10 feet or a distance equal to the depth of the excavation, whichever is more.

Utility Trenches and Interior Slab Subgrade
All utility trench and stem wall backfills should be compacted to at least 90% relative compaction. Also, the slab subgrade soils should be recompacted prior to placing the sand subbase, if the soils have been disturbed during footing construction, utility installation, or natural weathering.

Fill Slopes
The existing fill slopes have become weathered since the original construction and should be improved for increased erosion resistance. The minimum improvement would be to fill the rodent burrows with compacted fill and remove the outer loose soils from the slope. Also, the slope should be planted with closely spaced deep rooting vegetation. Further improvement to the slope should consist of recompacting the outer slope surface with a vibratory compactor. A higher level of remediation could be obtained by reconstructing the outer slope face where the slope is overfilled and trimmed back to provide for firm, well-compacted surface. Deep rooting vegetation should be immediately planted on the reworked slope surface to provide stability.

Slope Maintenance
All slopes require maintenance to reduce the risk of erosion and degradation with time due to natural or man-made conditions. Future performance of the slopes will depend on the control of burrowing animals and maintenance of drainage structures and the slope vegetation. All slopes should be maintained with dense, deep rooting (minimum 2± feet deep), drought resistant groundcover and shrubs or trees. Also, a reliable irrigation system should be installed on the slopes, adjusted so over-watering does not occur, and periodically checked for leakage. Excess watering of the slopes can cause erosion and surficial failures. Care should be taken to maintain a uniform, near optimum moisture content in the slopes, and to avoid over drying, or excess irrigation. Slopes should not be watered before forecasted rain.

All drainage structures (including those at the surface and buried) and earth berms should be kept in good condition and clean the entire length to the outlet in an approved drainage course. Final grading of the site should provide positive drainage away from slopes. Burrowing animals, particularly ground squirrels, can destroy slopes; therefore, where present, immediate measures should be taken to remove them.

SOIL EXPANSIVENESS
The on-site soils should be considered to be in the 51-90 soil expansion index range based on a previous expansion of 83 determined at the conclusion of prior grading (Gorian, May 1992). However, a final expansion index test should be performed at the conclusion of the proposed grading operations, especially if soil is imported to the site.

Expansive clay soils expand (swell) or shrink due to changes in the soil moisture content. The expansion or contraction is caused by the attraction of water molecules to the clay particles. The amount of volume change depends upon: (1) the soil swell potential; (2) the availability of water to the clay; and (3) the restraining pressure on the soil. Swelling occurs when clay soils become wet due to excessive water. Excessive water can be caused by poor surface drainage, over-irrigation of lawns and planters, and sprinkler or plumbing leaks.

Due to the light residential loads, swelling clay soils can cause distress to residential construction (generally as uplift). There is an inherent risk associated with construction on expansive soil that should be acknowledged and understood by the developer/property owner. The geotechnical recommendations presented in this report are intended to reduce the potential for expansive soil action. However, these recommendations are not intended, nor designed to provide complete and full mitigation of expansive soil conditions. Additional recommendations can be provided upon request. Generally, within practical construction limits, it is not possible to completely control expansive soil action especially when there is an extreme moisture variation in the soil. The soil movement can be roughly 1 to 2 inches when there is a change in the internal soil moisture content. Therefore, the following should be maintained on the lot:

a) Positive drainage should be continuously provided and maintained away from all structures and slopes. Drainage should not be changed creating an adverse drainage condition.

b) Excessive landscape watering should be avoided and irrigation systems should be maintained. Sprinkler or plumbing leaks should be immediately repaired so the subgrade soils underlying or adjacent the structures do not become saturated. Trees should be planted so the roots will not extend under the foundations or slabs.

c) Water should not be allowed to pond or accumulate around the edges of the pool decking/hardscape allowing water migration into the subgrade. All pool hardware fittings should be adequately water tight, and caulking should be maintained between hardscape joints, and the interfaces between the hardscape and the adjoining house.

d) Information regarding the care and maintenance of improvements located on expansive soils should be passed on to future owners of the property.

FOUNDATION DESIGN

Conventional Foundation Design

Conventional isolated and spread footings for the 51-90 expansion index range should be embedded a minimum of 24 inches, measured below the lowest adjacent interior and exterior grade. Deepened footings or structural setbacks are addressed in the Footings on or Adjacent Slopes section herein. Footings embedded 24 inches into engineered compacted fill may be designed to impose an allowable bearing pressure of 1,500 psf. All footings should be reinforced with a minimum of 2 - #4 bars in the top and bottom (total of 4 bars) or per the structural engineer's recommendations. The slab reinforcement should be extended into the footings to within 3 inches of the bottom. The remaining design should be per the City of Thousand Oaks Building Code Table 18-1-D-2 for the 51-90 expansion range. Lateral resistance parameters are provided under the Retaining Wall Design section of this report.

The above recommendations for foundation design are based on the City of Thousand Oaks Building Code that should be considered the minimum standard. However, we have recommended an increased interior and exterior footing embedment for the 51-90 expansion index range. If the builder/owner wishes a further increased foundation design, we can provide additional recommenda-

tions. The above recommendations are for geotechnical concerns only and the design should be supplemented with the appropriate structural design.

Settlements of footings due to static loading are anticipated to be minor with a maximum settlement of less than 1 inch if embedded in a properly prepared building pad. This should be confirmed when the actual foundation loads become available. Settlements are expected to occur rapidly as loads are applied. Differential settlements between adjacent columns with similar loading are anticipated to be less than 1/4 inch. However, differential settlement between deep and shallow footings may be greater. Footing movement can occur due to wetting or drying of footing subgrade soils that are expansive as discussed in the previous Soil Expansiveness section.

Conventional Slab Design

Slabs on-grade within the house interior should be a minimum of 4 inches thick. Reinforcement should consist of a minimum of No. 3 bars at 24 inches on center in both directions or per the structural engineer's design. A 6 mil plastic moisture barrier overlain by 2 inches of clean sand and underlain by 2 inches of clean sand should underlie conventional slabs on-grade. The remaining design should be per the City of Thousand Oaks Building Code Table 18-1-D-2 for the 51-90 expansion range. If the builder/owner wishes a further increased slab design, a 5 inch thick slab underlain by a total of 6 inches of clean sand may be incorporated into the design. Concrete slabs on which organic floor coverings will be used such as oak flooring or wool carpet should be tested for moisture per the flooring manufacturer's specifications. The concrete surface should be sealed per the manufacturer's specifications if the moisture readings are excessive.

Concrete slabs on-grade should be provided with tooled crack control joints at 10-15 foot centers or as specified by the structural engineer. Concrete shrinkage cracks could become excessive if water is added to the concrete above the allowable limit and proper finishing and curing practices are not followed. Concrete mixing, placement, finishing and curing should be performed per the American Concrete Institute (ACI 302-1 R-89). Concrete slump should not exceed 5 inches unless specified otherwise by the structural engineer.

Tile Flooring

Tile flooring can crack, reflecting cracks in the concrete slab below the tile. Therefore, the slab designer should consider additional steel reinforcement of concrete slab on-grade where tile will be placed. The tile installer should consider installation methods that reduce possible tile cracking. A vinyl crack isolation membrane (approved by the Tile Council of America/Ceramic Tile Institute) is recommended between tile and concrete slabs on grade.

Footing Excavations

All footings should be cut square and level and cleaned of all loose slough and soils silted into the excavations. The footing excavations should be observed by the project geotechnical consultant prior to placing reinforcing steel. The footings should be cast as soon as possible to avoid deep desiccation of the footing subsoils. Soil excavated from the footing trenches should not be spread over areas of construction unless properly compacted.

Moisture Penetration

Conventional footing and slab on-grade subgrade soils should be moistened to a minimum of 3% over the optimum moisture content to a minimum depth of 18 inches. The above moisture should be obtained and maintained at least a suggested 2 days prior to casting the concrete. The subgrade soil premoistening should be observed by the project geotechnical consultant prior to casting the concrete.

Soils silted into the footing excavations during the premoistening operations should be removed prior to casting the concrete.

Footings on or Adjacent Slopes

Footings on or near slopes that are sensitive to differential movement should be deepened to provide setback to the slope face. The minimum setback should be per Chapter 18 of the Uniform Building Code (UBC) with a minimum 5 foot setback per the city of Thousand Oaks Building Code. The setback should be measured 2 feet in from the existing slope faces to account for the loose slope conditions. Therefore, the minimum setback is 10 feet measured horizontally from the bottom outside edge of the footing to the slope face.

Accessory structures such as concrete walkways, garden walls, and fences that are sensitive to differential movement should be supported by foundations meeting the setback criteria. A structure such as a fence near the descending slopes not meeting the setback requirements could move laterally.

RETAINING WALL DESIGN

Foundations

Continuous footings founded below level ground or meeting the required slope setback may be designed to impose a uniform allowable soil bearing pressure of 1,500 psf. The maximum pressure under the toe should not exceed the allowable bearing pressure. The resultant of the retaining wall footing pressure should pass within the middle third of the width of the footing. The footings should be embedded a minimum of 24 inches into firm soil and have a minimum width of 24 inches. Footing reinforcement should be per the structural engineer's recommendations.

Active Pressures

Retaining walls should be designed to resist an active pressure exerted by compacted backfill or retained soil. Retaining walls that may yield at the top should be designed for an equivalent fluid pressure equal to 40 and 55 pounds per cubic foot (pcf) for a level backfill and 2(h):1(v) slope, respectively. The above active pressure is not designed to resist expansion of the backfill. Therefore, if water is allowed to saturate backfill or backcut materials consisting of clayey soils, the expansion pressure could exceed the active pressure provided.

Foundations or other loads near the tops of retaining walls should be treated as an equivalent surcharge on the backfill. Retaining wall backcuts should be observed for adverse conditions by the project geotechnical consultant. The above active pressures are not designed to retain an adverse geologic condition.

Lateral Resistance

Lateral forces exerted by retained soil or compacted fill may be resisted by passive soil pressure and friction. The passive soil pressure may be taken as an equivalent fluid pressure of 300 pcf where the footing is on level ground. Friction between the bottom of the footings and soil may be taken as 0.4. Passive resistance and friction may be combined with no reduction.

Retaining Wall Drainage and Backfill

Retaining walls should be provided with a drainage system consisting of a minimum 1 foot wide section of No. 4 rock (or pea gravel) and sand at a 1:1 ratio or equivalent drain material. The drainage material should extend from the base of the wall to within 24 inches of the ground surface. A perforated drainpipe (perforations 3/8" or smaller) with a minimum 1% grade should be placed in the lower portion

of the gravel. The invert of the drainpipe should be at least 6 inches below any adjacent slab on-grade. Weep holes may be used instead of perforated pipes for exterior walls.

The back of the wall should be waterproofed to resist moisture infiltration into or through the wall. The upper 2 feet of exterior wall backfill should consist of compacted native soils. A layer of filter cloth is suggested between the drain material and 2 foot soil cap to minimize the migration of soil into the drain material.

Wall backfill should be compacted to a minimum of 90% of the maximum soil density using light equipment. The retaining wall backfill should be benched into the backcut consisting of unweathered firm soils.

SITE DRAINAGE

Positive drainage should be provided away from slopes and structures during and after construction. Planters near a structure should be constructed so that irrigation water will not saturate the soils underlying footings and slabs. The building pads should be graded at a minimum gradient of 2% away from the building toward an approved drainage course, or alternative drainage should be provided. Trees should not be planted where the roots could extend under the foundations or hardscape. Tree roots will extend out from a tress equal to the drip line or twice the drip line.

GUTTERS AND DOWNSPOUTS

Gutters and downspouts per the city of Thousand Oaks Building Code should be installed to collect roof water that might otherwise infiltrate the soils near the structures. The downspouts should be drained into PVC collector pipes that will carry the water away from the structures.

EXTERIOR SLABS AND WALKWAYS

All exterior concrete slabs on-grade and walkways should be a minimum of 3½ inches thick and underlain by a minimum of 4 inches of sand. For concrete driveways (auto traffic only), the thickness should be increased to a minimum of 5 inches thick and underlain by a minimum of 6 inches of sand. Exterior slabs should be reinforced with a minimum of #3 bars on 24 inch centers in each direction. Slab subgrade should consist of engineered compacted fill prepared according to the recommendations presented in the previous Site Preparation and Grading section. All slabs should have crack control joints at intervals of 10 to 15 feet.

Concrete subgrade soils should be properly placed and compacted for the support of the concrete flatwork. Prior to placing the concrete, the subgrade soils should be premoistened to a minimum of 3% over the optimum moisture content for a minimum depth of 18 inches. Proper premoistening can reduce the risk of slab subgrade expansion, if used in addition to other preventive measures. Where critical, the subgrade soil premoistening should be observed by the project geotechnical consultant prior to placing the concrete.

Exterior slabs can experience differential uplift caused by non-uniform expansion of the subgrade soils due to varied migration of water beneath the slab. Differential uplift can occur at the corner, edge or center of slab. Therefore, all planter areas should be graded so excess water drains positively away from the concrete or possibly onto the concrete and not under the hardscape. Also, a reinforced deepened perimeter edge should be considered on all slabs to minimize non-uniform moisture migration where surface water could infiltrate the sand layer under the slab. Perimeter edges should extend a minimum of 8 inches below the bottom of the slab and have a width of 6 inches. A deeper edge would further reduce the risk of deep water migration into the slab subsoils. Where a slab or walkway is adja-

cent to a descending slope (within 2 feet) the slope side edge should be equipped with a minimum 24 inch deep perimeter edge.

Shrinkage cracks could become excessive if water is added to the concrete in excess of the allowable limit, and proper finishing and curing practices are not followed. Finishing and curing should be performed per the Portland Cement Association guidelines.

SWIMMING POOL

General

A swimming pool may be constructed on the lot from a geotechnical standpoint if the following geotechnical recommendations are followed and incorporated into the design. Risks associated with pool construction, such as pool or deck movement, cannot be completely eliminated, especially if proper construction practices, drainage, maintenance of landscaping, pool plumbing and pool equipment are not provided. All geotechnical aspects of pool construction addressed in this letter should be observed by the project geotechnical consultant.

The pool walls are expected to be supported by engineered compacted fill and native soil. The pool excavation should be observed by the project geotechnical consultant

Pool Excavation

All aspects of grading including site preparation, excavation and fill placement should be per the city of Thousand Oaks Building Code. Soils exposed in the pool excavation should be kept moist until the concrete placement. Completion of the pool excavation and construction should be performed in a timely manner so that the excavation is open for a maximum of two weeks. Soil excavated from the pool area should not be spread over areas of construction or slopes unless properly placed and compacted as previously described herein. Any portion of the slopes disturbed by the pool construction should be repaired under the supervision of the project geotechnical consultant.

Pool Walls

The pool walls should be designed per the City of Thousand Oaks standards for an expansive soil condition. Additionally, the walls should be designed for an equivalent fluid pressure equal to 65 pcf. The requirements of the Uniform Building Code regarding setback to a slope should be followed however, the setback to a descending slope should not be reduced by 1/2. The pool should be designed for a differential settlement of 1/2 inch.

The pool walls near a structure should be designed to support loads imposed by the structure on the pool wall. Foundations located below a 2(h):1(v) line extending up from the base of the pool wall will not impose loads on the pool wall. Pool walls supporting loads imposed by the adjacent structure should be designed by a structural engineer who should evaluate the impact of the adjacent structure on the pool wall. Water should not be allowed to saturate the soils behind the walls as the expansion pressures could exceed the active pressure provided.

Pool Plumbing

The pool piping should be designed with flexible or slip joints to accommodate the possibility of movement without causing breaks in the plumbing. It is imperative that any leaks in the pool plumbing or drainage system be repaired at once. Leaks in the plumbing can cause saturation of the soils adjacent the pool resulting in possible soil movement and/or slumping (failures) on adjacent slopes.

Concrete Deck

Concrete decking and hardscape surrounding the swimming pool should be constructed on engineered compacted fill. Soil excavated from the swimming pool area or elsewhere, should not be used underneath the deck unless properly compacted and moisture conditioned. Joints between adjoining sections of pool decking and between the pool decking and the pool walls should be caulked. Periodic inspection by the owner and subsequent recaulking, if necessary, are important maintenance procedures that will help prevent water from migrating into the supporting subgrade.

CLOSURE

This report has been prepared for the addressee and their design consultants solely for the design and construction of the development described herein. This report may not contain sufficient information for other uses or the purposes of other parties. These recommendations should not be extrapolated to areas not covered by this report or used for other development schemes without consulting Gorian and Associates, Inc.

The recommendations contained herein are based on interpretations of the subsurface conditions concluded from information gained from archives. However, we are not representing that all documents pertaining to this lot were found or reviewed in the preparation of this update. The interpretations may differ from actual subsurface conditions that can vary horizontally and vertically across the site. We cannot attest to the absence of concealed adverse soil conditions nor can we anticipate changes in the soil conditions that can result from construction procedures. Due to possible subsurface variations, all aspects of field earthwork and foundation work addressed in this or subsequent report(s) should be observed by the project geotechnical consultant. Gorian and Associates, Inc., disclaim responsibility and liability for problems that may occur when the recommendations presented in this report are not followed.

Any person using this report for bidding or construction purposes should perform such independent investigations as he deems necessary. All earthwork on the subject lot should be observed and tested by the project geotechnical consultant. The work should be performed per the current City of Thousand Oaks Building Code. However, the services of the geotechnical consultant should not be construed to relieve the owner or contractors of their responsibilities or liabilities.

oOo

Please call if you have any questions regarding this report or require additional information.

Respectfully submitted,

GORIAN AND ASSOCIATES, INC.

By: Jerome J. Blanck
GE 151

Attachments: References
City of Thousand Oaks Table 18-1-D-2
Distribution: Addressee (6)

GORIAN & ASSOCIATES, INC

REFERENCES

Applied Technology Council, 1978, Tentative Provisions for the Development of Seismic Regulations for Builders. Applied Technology Council Publication ATC 3-06, NBS Special Publication 510, NSF Publication 78-8.

Gorian and Associates, Inc., January 26, 1987, Geotechnical Site Investigation, Tract 4115 (Formerly Lot 124 of Tract 3507-2), South Side of Kanan Road, North Ranch, City of Thousand Oaks, California. Work Order: 1572-1-11, Log Number: 11304.

Gorian and Associates, Inc., June 4, 1989, Final Rough Grading Compaction Test Report, Residential Building Pads for Lot 1 through 12, Tract 4115, Westlake North Ranch, City of Thousand Oaks, California. Work Order: 1572-1-20, Log Number: 13367.

Gorian and Associates, Inc., December 18, 1990, Cursory Site Inspection, Lots 1 through 17, Tract 4115. Work Order: 1572-1-28, Log Number: 14843.

Gorian and Associates, Inc., October 13, 1992, Final Rough Grading Compaction Test Report, Residential Building Pads for Lots 1A through 11A, Tract 4115, Westlake North Ranch, City of Thousand Oaks, California. Work Order: 1572-1-20, Log Number: 16103.

TABLE 18-1-D-2

MINIMUM FOUNDATION REQUIREMENTS

CITY OF THOUSAND OAKS

	FOUNDATIONS FOR SLAB & RAISED FLOOR SYSTEMS							CONCRETE SLABS			
								3½" MINIMUM THICKNESS 4" OVER 51 EI			
EXPANSION INDEX	NUMBER OF STORIES	STEM THICKNESS	FOOTING WIDTH	FOOTING THICKNESS	ALL PERIMETER FOOTINGS	INTERIOR FOOTINGS FOR SLAB AND RAISED FLOORS (d)	REINFORCEMENT FOR CONTINUOUS FOUNDATIONS	REINFORCEMENT (b)	TOTAL THICKNESS OF SAND	PREMOISTENING OF SOILS UNDER FOOTINGS, PIERS AND SLABS	RESTRICTIONS ON PIERS UNDER RAISED FLOORS
		(INCHES)			DEPTH BELOW NATURAL SURFACE OF GROUND AND FINISH GRADE						
0-20 Very low (non-exp)	1 2 3	6 8 10	12 15 18	6 7 8	12 18 24	12 18 24	1-#4 top and bottom	#4 @ 48" or #3 @ 36"	2"	Moistening of ground recommended prior to placing concrete.	Piers allowed, single floor loads only.
21-50 Low	1 2 3	6 8 10	12 15 18	6 7 8	15 18 24	12 18 24	1-#4 top and bottom		4"	3 % over optimum moisture required to a depth of 18" below lowest adjacent grade. Testing required.	Piers allowed, single floor loads only.
51-90 Medium	1 2 3	6 8 10	12 12 15	6 8 8	21 21 24	12 18 24	1-#4 top and bottom #3 bars @ 24" O.C., 12" into footing, 36" into slab	#3 @ 24" Each Way	4"	3 % over optimum moisture required to a depth of 18" below lowest adjacent grade. Testing required.	Piers not allowed.
91-130 High	1 2 3	6 8 10	12 12 15	8 8 8	27 27 27	12 18 24	2-#4 top and bottom #3 bars @ 24" O.C., 12" into footing, 36" into slab	#3 @ 24" Each Way	6"	3 % over optimum moisture required to a depth of 24" below lowest adjacent grade. Testing required.	Piers not allowed.
Above 130 Very high	Special design by registered engineer/architect (a)										

NOTES:

(a) All foundations on soils with an expansion index in excess of one hundred-thirty (130) shall have a special design by a foundation engineer registered as a civil engineer in California, and such design shall not be less than the minimum standards specified in Table 18-1-D-2 for soils with an expansion index between ninety one (91) and one hundred thirty (130).

(b) All slab reinforcement shall be positioned above the center of the slab.

(c) Fireplace footings shall be reinforced with No. 4 deformed bars at twenty-four (24") inches on center both ways.

(d) Interior footings on soils in the zero (0) to twenty (20) expansion index range of expansiveness need not be continuous.