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August 21, 1995

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

Work Order: 1572-1-12A/28
Log Number: 17782

Subject: **GEOTECHNICAL UPDATE REPORT PROPOSED RESIDENTIAL CONSTRUCTION, LOT 12A, TRACT 4115, BRIDGETOWN PLACE, NORTH RANCH, CITY OF THOUSAND OAKS, COUNTY OF VENTURA, CALIFORNIA.**

INTRODUCTION

Presented herein are the results of our geotechnical update evaluation of the proposed development of Lot 12A, Tract 4115, city of Thousand Oaks. Our evaluation was conducted under the scope of work described in our financial responsibility letter (F.R. Number: 1519) dated 08/03/95 that was authorized 8/21/95. Our geotechnical evaluation focused on the grading plan prepared by Peak Surveys, Inc. (dated 8/10/95, 1"=10').

PROPOSED DEVELOPMENT

Based on the preliminary grading study, the proposed construction will consist of a multi-level residence complimented with hardscaping including concrete patios, walkways, driveway/motor court, a swimming pool, gazebo, and play court. Minor cut and fill grading and retaining wall construction will be required to achieve design grades.

SCOPE OF INVESTIGATION

The geotechnical conditions observed and documented during the previous geotechnical investigation of the tract and rough grading performed near the subject site were evaluated and used to develop geotechnical

recommendations for the proposed site development. The results of our evaluation and geotechnical recommendations regarding site preparation and foundation design are provided herein.

LOCATION AND SITE CONDITIONS

The subject lot is south and adjacent to Bridgetown Place, located south of Kaman Road and east of Crown Ridge Court. Tract 4115 was rough graded in 1989 with geotechnical observations and testing services provided by Gorian and Associates, Inc., (Gorian 1989). At that time, the area of Lot 12A was left in a largely natural condition. However, engineered compacted fill was placed within the lot for the extension of Bridgetown Place and a fire access road located along the west side of the lot.

A 42 inch diameter Callegus Water District water main is buried within a 20 ft wide easement trending across the southwest corner of Lot 12A. The depth of soil cover over the pipe varies depending on the surface topography.

A revised rough grading plan for Tract 4115 dated 3/4/92 was prepared by Church Engineering, Inc. This plan included revising lot designation and lot lines. Lot 13 was decreased in size and renumbered Lot 12A. The rough grading plan did not involve grading of Lot 12A. In February 1993, some grading took place on Lot 12A. A keyway for a fill slope was established across the approximate center of the lot, but the fill was never completed or reported.

A recent site visit by an engineering geologist from our office found the condition of the site substantially modified since our last site observation in February 1993. Fill soil has apparently been imported and used to construct a building pad on Lot 12A. The soil has abundant shale fragments suggesting local derivation. The soil exposed on the building pad exhibit wide and deep desiccation cracks indicating the imported soils are highly expansive and below optimum moisture content. Weeds are scattered across the building pad. A fill slope descends from the southern edge of the building pad. This slope is locally rilled (eroded) and several squirrel burrows are present. The fill

slope and area beyond to the south also support a modest growth of weeds. Burrowing is intense around the oak tree in the south part of the lot. Irrigation water runoff from the property to the west, discharges onto the western side of Lot 12A and several minor rills have developed.

SURFICIAL SOILS

Native Soil

As encountered in the subsurface (Gorian 1986), native soils in the area of Lot 12A are alluvial and consist of clayey silty sands and very sandy slightly silty clays. The surface soils are typically disturbed; however, with depth they are well consolidated. These soils should be considered highly expansive (91-130 expansion index range).

Artificial Fill

During the rough grading of Tract 4115, engineered compacted fill was placed along the north and west side of revised Lot 12A. A keyway was established for a fill slope proposed near the center of Lot 12A and approximately 2 ft of engineered compacted fill was placed. Compaction testing of this fill was never reported.

Additional fill was apparently placed to construct a building pad on Lot 12A. The fill appears to have been imported. To our knowledge this fill was not observed or tested by a soils engineer, therefore we consider this fill to be a non-engineered non-compacted fill stockpile. The distribution of this fill is not known, but appears to be chiefly confined to the north two-thirds of the Lot.

Faulting and Seismicity

Faults identified as either active or potentially active by the State Geologist are not known to be present on site or in the immediate vicinity and the site is not within an Alquist-Priolo special studies zone (Hart, 1994). Direct evidence or geomorphic features suggesting active or potentially active faults were not observed on site. The potential for ground rupture on site due to faulting is considered extremely remote.

The subject lot is in the Transverse Ranges Geomorphic Province, a seismically active area. This site, like any in the Thousand Oaks area, can be expected to experience strong ground motion from earthquakes generated on regional faults, as evidenced by the January 17, 1994 Northridge earthquake (magnitude 6.7).

Groundwater

No groundwater was encountered during our previous or present investigation of the site. 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 12A 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. These recommendations should be reviewed and revised as necessary prior to finalizing the site grading and foundation plans. 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 if the grading plans are revised.

Remedial grading is necessary to remove non-engineered and unsuitable native soil on Lot 12A as described in the following Site Preparation and Grading section of this report. Deepened footings or structural setbacks from adjacent slopes are addressed in the Footings on or Adjacent Slopes section herein. Only a limited amount of soil may be placed over the Callegus Water Main that crosses the southwest corner of the lot. All improvements within the Callegus easement must be considered to be temporary.

SEISMICITY

No active or potentially active faults are known to exist on the site. However, the property will experience strong groundshaking due to

earthquakes generated on regional faults. Current design standards for seismically induced groundshaking resistant construction are addressed in the Uniform and Thousand Oaks Building Codes. The site is located within UBC seismic zone 4. For seismic design, we recommend using site coefficient type S_2. The current Building Code Standards 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. The owner may consider discussing with the project's structural engineer the costs and benefits of increasing the Seismic Zone Factor by 25 to 50 percent.

SITE PREPARATION AND GRADING

General

The following site preparation and grading recommendations are presented for the construction of the building pad shown on the grading plan by Peak Surveys Inc. (dated 5/10/95, 1"=10'). All aspects of grading including site preparation, grading and fill placement, keying and benching should be per the City of Thousand Oaks Building and Grading Codes.

Vegetation Removal

Vegetation and construction debris present on the pad should be removed from all areas of construction prior to the 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 15557.

Soil Removals

All topsoil and artificial non-engineered fill should be removed to competent in-place native soil having a minimum relative compation of 90%. The soil may be used for engineered compacted fill provided it is properly placed and free of deleterious material as discussed herein.

Callegus Water District Water Main

A 42 inch diameter Callegus Water District water main is buried within a 20 ft wide easement trending across the southwest corner of the lot. No soil removals should be performed within this area until the pipe is located and the safe cover determined. No ripping should be performed over the pipe. The surcharge over the pipe should be per the requirements of the Callegus Water District.

In-Place Processing and Fill Placement

After all necessary removals are complete, 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. 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.

Utility Trenches

The backfill of all utility trenches within building areas, and parking and drive areas should be compacted to at least 90% of the maximum dry soil density.

Excavations

During construction the contractor is responsible for the 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.

Slab Areas

The upper 6 inches of the slab subgrade should be recompacted prior to placing the sand subbase, if the subgrade soils have been disturbed during footing construction or utility installation.

MANUFACTURED SLOPE CONSTRUCTION AND MAINTENANCE

General

Cut and fill slopes may be constructed at a maximum gradient of 2(h):1(v). All manufactured slopes will require maintenance.

Cut Slopes

All cut slope faces or retaining wall backcuts must be observed by the project geotechnical consultant to verify the absence of adverse geologic conditions. The need for remedial grading (if necessary) can be determined once the planned cuts are completed.

Fill Slopes

Fill slopes should be keyed and benched into compacted engineered fill or firm competent native soils. Fill slope keyways (excluding the stabilization fill slope) should be a minimum of 15 feet wide and cut to a minimum depth of 2 feet at the toe into competent in-place materials. The keyway should be tilted into the slope and should be at least 3 feet deep at the heel (measured from below the slope toe elevation). The keyway must be observed by the project geotechnical consultant prior to placing any fill.

Where possible, the outer slope faces should be overfilled and trimmed back to provide for firm, well compacted surfaces. The slope faces if not overfilled and trimmed back should be compacted with a sheepsfoot and/or grid roller. Slope faces should be tested and reworked as necessary to achieve the 90 percent relative compaction required.

Slope Maintenance

All slopes will require maintenance to reduce the risk of erosion and degradation with time due to a natural or man-made conditions. Future performance of the slopes will depend on the control of burrowing animals and maintenance of the brow ditches, drainage structures, and the slope vegetation as discussed below.

All slopes must be maintained with dense, deep rooting (minimum 2± feet deep), drought resistant groundcover and shrubs or trees. Where necessary 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, and must be avoided. Care should be taken to maintain a uniform, near optimum moisture content in the slopes, and to avoid overdrying, or excess irrigation. Slopes should not be over-watered and should not be watered before forecasted rain.

All drainage structures (including those at the surface and buried) 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 evict them.

SOIL EXPANSIVENESS

The on-site soils from a preliminary design standpoint may be considered in the 91-130 soil expansion index range. However, the actual expansion index can be higher or lower at the conclusion of grading. Consequently, a final Expansion Index Test should be performed at the conclusion of grading operations.

Expansive soils contain clay that changes in volume (shrink or swell) due to changes in the soil moisture content. The volume change 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 light residential loads, swelling clay soils can cause distress to residential construction (generally as uplift). Construction on expansive soil has an inherent risk that must 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

re not intended, nor designed to provide complete and full mitigation of expansive soil conditions. Additional recommendations can be proved pon request. Generally within practical construction limits, it is not possible to completely control expansive soil action especially hen there is a 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, it is important that:

a) Positive drainage be provided and maintained away from all structures including pool.

) Landscape watering is held to minimum and irrigation systems are maintained. Sprinkler or plumbing leaks must be immediately repaired so that the subgrade soils underlying or adjacent to the structures do not become saturated.

c) The drainage is not changed creating an adverse drainage condition.

d) Water not be allowed to pond or accumulate around the edges of decking allowing water migration into the subgrade.

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

OUNDATION DESIGN

onventional Footings and Slabs

solated and conventional footings may be designed to impose an llowable bearing pressure of 1,500 pounds per square foot (psf). The bearing pressure may be increase by one third for temporary loading. ootings for the house should be embedded a minimum of 30 inches, for interior and exterior footings. Deepened footings or structural etbacks are addressed in the Footings on or Adjacent Slopes section herein. The measurement of the footing embedment should be from the owest adjacent grade, interior or exterior. The minimum footing width hould be one foot. All footings should be reinforced with a minimum of 2 - #4 bar in the top and bottom (total of 4 bars) or per the tructural engineer's recommendations. Also, the footings should be reinforced the entire depth with vertical #4 bars bent and continued nto the slab. Lateral resistance parameters are provided under the Retaining Wall Design section of this report.

The geotechnical foundation design recommendations are based the requirements of Table 29-A-2 (attached) of the City of Thousand Oaks Building Code (revised June 1992) except for a recommended slight increased footing depth. The City of Thousand Oaks Building Code Table 29-A-2 should be considered the minimum requirements for construction. The final foundation design should be determined based on the final expansion index test results. Additional foundation recommendations exceeding that presented herein can be provided upon request.

Settlements of footings are anticipated to be minor with a maximum settlement of ½ 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 uplift of the soils can occur if soil expansion occurs, roughly 1± inch or more (see the Soil Expansiveness section).

Conventional Slab Design

For preliminary slab-on-grade design, the slabs on-grade within the building interiors 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. Conventional slabs on-grade should be underlain by a 6 mil plastic moisture barrier overlain by 2 inches of clean sand and underlain by 2 inches of clean sand. All other design requirements should be per Table 29-A-2 (attached) of the City of Thousand Oaks Building Code, for the 91-130 expansion range. The final slabs on-grade design should be determined based on the final expansion index test results.

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. This is a common problem often mistakenly attributed to poor soil conditions. 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 slabs-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 must 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 any 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 located on or near a slope should be deepened or setback to provide footing support and to reduce the impact of changes that can occur on slope faces. Deepened footings or setbacks should be used for all buildings and accessory structures sensitive to differential movement. The setbacks should be per Chapter 29 of the 1991 edition of the Uniform Building Code with a minimum setback of 5 feet per the City of Thousand Oaks Building Code.

RETAINING WALL DESIGN

Foundations

Continuous footings founded below level ground 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 outside the house should be embedded a minimum of 24 inches into firm soils 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 50 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 in bedrock must be observed for adverse geologic 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 minimum 1' 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 drain pipe (perforations 3/8" or smaller) with a minimum 1% grade should be placed in the lower portion of the gravel. The invert of the drain pipe should be at least 6 inches below any adjacent slab on-grade. Instead of perforated pipes, weep holes may be used.

The back of the wall should be waterproofed where moisture infiltration through the wall would be a problem,. 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 where the backcut is shallower than 3/4:(h):1(v).

SITE DRAINAGE

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

GUTTERS AND DOWNSPOUTS

Gutters and downspouts 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. However, for concrete driveways (auto traffic only), the thickness should be increased to a minimum of 5 inches. Exterior slabs should be reinforced with a minimum of #3 bars on 24 inch centers in each direction. 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 to 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 and where surface water could infiltrate the sand layer under the slab. The perimeter edge 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 adjacent 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.

A pool is indicated south of the proposed residence on the previously mentioned grading plan. Based on this location, 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

Risks in this type of construction cannot be completely eliminated, especially if proper construction practices, drainage and proper maintenance of landscaping, pool plumbing and pool equipment are not provided. All geotechnical aspects of pool construction addressed in this report should be observed by the project geotechnical engineer.

Pool Excavation

All aspects of grading including site preparation, excavation and fill placement should be per the City of Thousand Oaks Building Codes. Soils exposed in the pool excavation should be kept moist until the concrete placement. Completion of the pool excavation and construction should be performed timely so 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 Figure 29-1 of the City of Thousand Oaks Building Code 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 must be designed by a structural engineer who should evaluate the impact of the adjacent structure on the pool wall. Water must not be allowed to saturate the soils behind the walls, 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 slope movement and/or slumping (failures).

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 Dunhill Homes, Inc. and their design consultants to be used solely in 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. The interpretations may differ from actual subsurface conditions that can vary horizontally and vertically across the site. 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.

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

Respectfully submitted,
GORIAN AND ASSOCIATES, INC.

By: Jerome J. Blunck
GE 151

Attachments: Reference Sheet
Table 29-A-2

Distribution: Addressee (2)

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REFERENCES

Gorian and Associates, Inc., September 21, 1978, Geotechnical investigation, Tract 3507-1, Westlake North Ranch, City of Thousand Oaks, California. Work Order: 898-1-10, Log Number: 4993.

Gorian and Associates, Inc., July 21, 1986, Soil engineering site investigation, Lots 9 and 10, Tentative Tract 4115, south side of Kanan Road, North Ranch, City of Thousand Oaks, California. Work Order 1572-1-10, Log Number: 10957.

Gorian and Associates, Inc., May 20, 1992, Geotechnical update letter for proposed rough grading of revised Lots 1A through 17A, Tract 4115, Westlake North Ranch, City of Thousand Oaks, California. Work Order: 1572-1-28, Log Number: 15829.

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TABLE 29-A-2
MINIMUM FOUNDATION REQUIREMENTS
CITY OF THOUSAND OAKS

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

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 29-A-2 for soils in the 91-130 expansion index range.

(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 need not be continuous.