UPDATED GEOTECHNICAL REPORT

FOR

PROPOSED SINGLE-FAMILY RESIDENTIAL DEVELOPMENT
TRACT NO. 17486
CITY OF VICTORVILLE, SAN BERNARDINO COUNTY, CALIFORNIA

PREPARED FOR

BEAZER HOMES
1800 EAST IMPERIAL HIGHWAY, SUITE 140
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PREPARED BY

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March 30, 2016
Project No. 1474-CR

Beazer Homes
1800 East Imperial Highway, Suite 140
Brea, California 92821

Attention: Mr. Rudy Provoost

Subject: Updated Geotechnical Report
Proposed Single-Family Residential Development
Tract No. 17486
City of Victorville, San Bernardino County, California

Dear Mr. Provoost:

We are pleased to provide our updated geotechnical report for proposed development at the subject property located in the city of Victorville, San Bernardino County, California. This report provides preliminary geotechnical recommendations for earthwork, foundation design, and construction.

In our opinion, site development appears feasible from a geotechnical viewpoint provided that the recommendations presented in this report are incorporated into the design and construction phases of the project.

GeoTek has reviewed the boring logs and results of the laboratory testing and now assumes responsibility as geotechnical consultant of record henceforth for the subject project.

The opportunity to be of service is sincerely appreciated. If you have any questions please do not hesitate to call our office.

Respectfully submitted,
GeoTek, Inc.

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Distribution: (1) Addressee via email (one PDF file)

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ENCLOSURES

1. PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to evaluate the existing geotechnical conditions for the currently proposed development. Services provided for this study included the following:

- Research and review of readily available geologic data and general information pertinent to the site, including a *Geotechnical Feasibility Investigation* report by Zeiser Kling Consultants, Inc. (Zeiser, 2005),
- Review and evaluation of site seismicity, and;
- Compilation of this updated geotechnical report which presents our recommendations for site development.

The intent of this report is to aid in the evaluation of the site for future proposed development from a geotechnical perspective. The professional opinions and geotechnical information contained in this report may need to be updated based upon our review of the final site development plans, and/or conditions encountered during rough grading of the site. Final site development plans should be provided to GeoTek, Inc. (GeoTek) for review when available.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

The subject project is located southwest of the intersection of Nyack Road and Mesa View Drive in the city of Victorville, San Bernardino County, California (see Figure 1). Based on a recent site reconnaissance, the area to be developed is currently vacant land with scattered native weeds and brush. The irregular shaped site consists of approximately 40.36 acres and can be considered as having relatively flat to gently sloping terrain with elevations ranging from approximately 3261 to 3297 mean sea level (msl) generally sloping down to the north-northeast. The site is bounded by vacant land and a residential development to the north; Mesa View Drive, followed by a residential development to the east; and vacant land to the west and south. Based on our recent site reconnaissance on March 8, 2016, site conditions have remained similar to those conditions described by Zeiser Kling Consultants, Inc. (2005).

2.2 PROPOSED DEVELOPMENT

Based on review of a *Tentative Tract Map*, prepared DH Civil Engineering (prepared date October 25, 2005), proposed site improvements include 151 single-family residential lots, with associated roadways. Two retention basins may also be constructed as part of the site improvements. Specific development plans were not provided to us. This report is based on that the proposed one- to two-story structures will be of wood-framed construction, incorporate concrete slab-on-grade floors and will be supported by conventional shallow isolated and continuous foundations.

Due to the topography of the site, retaining wall construction and slopes are not anticipated. Cuts and fill of up to approximately five (5) feet are anticipated to bring the site to design grades.

If the site development differs from the noted information made in this report, the recommendations should be subject to further review and evaluation by GeoTek. Final site development plans should be reviewed by GeoTek when they become available.

3. FIELD EXPLORATION AND LABORATORY TESTING

3.1 PREVIOUS FIELD EXPLORATION

A previous field exploration was conducted by Zeiser Kling Consultants, Inc. in March 2005 as documented in the referenced report (Zeiser Kling Constultants, Inc., 2005), and consisted of excavating eight (8) exploratory borings to depths of 6.5 to 55.25 feet. The logs of the exploratory borings by Zeiser Kling Consultants, Inc. (2005) are included in Appendix A. The approximate exploratory locations are shown on the Boring Location Map (Plate 1 by Zeiser Kling Consultants, Inc.). The map provided does not appear to depict the entire site, with the eastern edge of the site area missing and locations of two of the borings (Boring B-2 and B-4) not present.

3.2 LABORATORY TESTING

Laboratory testing was performed by Zeiser Kling Consultants, Inc. on soil samples collected during their field exploration. Results of their laboratory testing is included in Appendix B or on their exploratory logs in Appendix A.

4. GEOLOGIC AND SOILS CONDITIONS

4.1 REGIONAL SETTING

The property is situated in the Mojave Desert geomorphic province. The Mojave Desert province is a wedge-shaped area that is enclosed on the southwest by the San Andreas fault zone, the Transverse Ranges province and the Colorado Desert province, on the north and northeast by the Garlock fault zone, the Tehachapi Mountains and the Basin and Range province, and on the east by the Nevada and Arizona state lines, and the Colorado River. The area is dominated by broad alluviated basins that are mostly aggrading surfaces that are receiving non-marine continental deposits from the adjacent upland areas.

The primary fault zones of the area are found in the western half of the province and have a general northwest-southeast trend. These zones are the San Andreas, Helendale, Lenwood and Lockhart in the subject site vicinity. In addition to these major zones, there are numerous secondary fault zones in the area and many smaller fault zones in the eastern half of the province. Many of the secondary fault zones in the province have a general east-west trend.

The site is located in an area geologically mapped to be underlain by alluvium (Dibblee, T.W, 1965).

No faults are shown in the immediate site vicinity on maps reviewed for the area nor are any faults mapped on the site by Zeiser Kling Consultants, Inc. (2005).

4.2 GENERAL SOIL/GEOLOGIC CONDITIONS

A brief description of the earth materials reported to be on the site (Zeiser Kling Consultants, Inc., 2005) is presented in the following sections.

4.2.1 Alluvium

Alluvial materials were encountered in previous explorations (Zeiser Kling Consultants, Inc.) excavated on the site to a maximum depth of 51.25 feet. The alluvium is reported to consist predominantly of poorly graded sands and silty sands with gravels, which are loose and medium dense to very dense.

4.3 SURFACE AND GROUNDWATER

4.3.1 Surface Water

If encountered during earthwork operations, surface water on this site is the result of precipitation or surface run-off from surrounding areas. Overall surface drainage is generally to the north-northeast.

4.3.2 Groundwater

Regional groundwater was not encountered in previous exploratory excavations by others. Based on a review of groundwater levels (http://www.water.ca.gov/waterdatalibrary/) in the vicinity of the site, the depth to regional groundwater is greater than 100 feet.

4.4 FAULTING AND SEISMICITY

The geologic structure of the entire southern California area is dominated mainly by northwest-trending faults associated with the San Andreas system. The site is in a seismically active region. No active or potentially active fault is presently known to exist at this site nor is the site situated within an *"Alquist-Priolo"* Earthquake Fault Zone. The nearest zoned fault is the San Andreas Fault, located approximately 14 miles to the southwest.

4.4.1 Seismic Design Parameters

The site is located at approximately 34.4799 Latitude and -117.4126 Longitude. Site spectral accelerations (Ss and S_1), for 0.2 and 1.0 second periods for a Class "D" site, were determined from the USGS Website, Earthquake Hazards Program, U.S. Seismic Design Maps for Risk-Targeted Maximum Considered Earthquake (MCE_R) Ground Motion Response Accelerations for the Conterminous 48 States by Latitude/Longitude. The results are presented in the following table:

SITE SEISMIC PARAMETERS	
Mapped 0.2 sec Period Spectral Acceleration, S_S	1.500g
Mapped 1.0 sec Period Spectral Acceleration, S_1	0.600g
Site Coefficient for Site Class "D", F_a	1.0
Site Coefficient for Site Class "D", F_v	1.5
Maximum Considered Earthquake Spectral Response Acceleration for 0.2 Second, S_{MS}	1.500g
Maximum Considered Earthquake Spectral Response Acceleration for 1.0 Second, S_{M1}	0.900g
5% Damped Design Spectral Response Acceleration Parameter at 0.2 Second, S_{DS}	1.000g
5% Damped Design Spectral Response Acceleration Parameter at 1 second, S_{D1}	0.600g
Peak Ground Acceleration Adjusted for Site Class Effects, PGA_M	0.500g

Final selection of the appropriate seismic design coefficients should be made by the project structural engineer based upon the local practices and ordinances, expected building response and desired level of conservatism.

4.5 LIQUEFACTION AND SEISMICALLY INDUCED SETTLEMENT

The site is currently not located within an area designated by the County of San Bernardino (http://cms.sbcounty.gov/lus/Planning/ZoningOverlayMaps/GeologicHazardMaps.aspx) as potentially being liquefiable. Liquefaction and seismically induced settlement should not be a consideration in the design of the proposed structures due to the great depth to ground water.

4.7 OTHER SEISMIC HAZARDS

Evidence of ancient landslides or slope instabilities at this site was not observed during our site reconnaissance. Thus, the potential for landslides is considered negligible for design purposes.

The potential for secondary seismic hazards such as a seiche or tsunami is considered negligible due to site elevation and distance to an open body of water.

5 CONCLUSIONS AND RECOMMENDATIONS

5.2 GENERAL

The anticipated site development appears feasible from a geotechnical viewpoint provided that the following recommendations, and those provided by this firm at a later date are properly incorporated into the design of the project. Final site development and grading plans should be reviewed by GeoTek when they become available.

5.3 EARTHWORK CONSIDERATIONS

Earthwork and grading should be performed in accordance with the applicable grading ordinances of the City of Victorville, the 2013 California Building Code (CBC), and recommendations contained in this report. The Grading Guidelines included in Appendix C outline general procedures and do not anticipate all site-specific situations. In the event of conflict, the recommendations presented in the text of this report should supersede those contained in Appendix C.

5.2.1 Site Clearing and Demolition

In areas of planned grading and improvements, the site should be cleared of vegetation, roots, and any trash and debris. These materials should be properly disposed of off-site. Voids resulting from site clearing should be replaced with engineered fill materials with expansion characteristics similar to the on-site soils.

5.2.2 Removals/Overexcavations

In the areas of the building pads and associated improvements, the upper two (2) feet of alluvium should be removed prior to placement of engineered fill. This includes below building and hardscape areas, retaining wall and screen wall footings, and driveway and street areas.

In order to provide a uniform blanket of engineered fill, a minimum two (2) feet of engineered fill should be provided below the bottom of the proposed foundation. A representative of this firm should observe the bottom of all excavations.

The horizontal extent of removals should extend at least five (5) feet outside the footings and floor-slabs, or a distance equal to the depth of overexcavation below the bottom of the structural elements, whichever is greater.

A minimum of 12 inches of engineered fill should be provided below asphaltic concrete pavement and Portland cement concrete hardscape areas. The horizontal extent of removals should extend at least two (2) feet beyond the edge.

5.2.2.1 Preparation of Areas to Receive Engineered Fill

A representative of this firm should observe the bottom of all excavations. Upon approval, the exposed soils in areas to receive engineered fill should be scarified to a minimum depth of six (6) inches, moistened to at least optimum moisture content and compacted to a minimum relative compaction of 90 percent (ASTM D 1557).

5.2.3 Engineered Fills

The on-site soils are generally considered suitable for reuse as engineered fill provided they are free from vegetation, debris and other deleterious material. The undercut areas should be brought to the final subgrade elevations with fill materials that are placed in eight (8) inch or less loose lifts, moisture conditioned to at least the optimum moisture content and compacted to a minimum relative compaction of 90 percent (ASTM D 1557). The upper 12 inches of pavement subgrade should be compacted to 95 percent (ASTM D 1557).

5.2.4 Excavation Characteristics

Excavation in the on-site materials is expected to be feasible utilizing heavy-duty grading equipment in good operating condition. All temporary excavations for grading purposes and installation of underground utilities should be constructed in accordance with local and Cal-OSHA guidelines. Temporary excavations within the on-site materials should be stable at 1:1 (horizontal:vertical) inclinations for cuts less than five (5) feet in height.

5.2.5 Shrinkage, Subsidence and Bulking

Several factors will impact earthwork balancing on the site, including shrinkage, subsidence, bulking, trench spoil from utilities and footing excavations, as well as the accuracy of topography.

Shrinkage is primarily dependent upon the degree of compactive effort achieved during construction. For planning purposes, a shrinkage factor of 10 to 15 percent may be considered for the alluvium. Site balance areas should be available in order to adjust project grades, depending on actual field conditions at the conclusion of site earthwork construction. Subsidence of up to 0.1 to 0.2 feet may occur due to the underlying materials within the vicinity of the proposed construction.

5.3 DESIGN RECOMMENDATIONS

5.3.1 Foundation Design Criteria

Foundation design criteria for a conventional foundation system, in general conformance with the 2013 CBC, are presented below. The soils are reported to be classified as having a "very low" ($0 \leq EI \leq 20$) expansion potential in accordance with ASTM D 4829. Typical design criteria for the site based upon a "very low" expansion potential are tabulated below. These are minimal recommendations and are not intended to supersede the design by the project structural engineer.

The foundation elements for the proposed structures and other improvements should bear entirely in engineered fill soils. Foundations should be designed in accordance with the *2013 California Building Code* (CBC).

Expansion index and soluble sulfate testing of the soils should be performed during construction to evaluate the as-graded conditions. Final recommendations should be based upon the as-graded soils conditions.

A summary of our foundation design recommendations is presented in the following table:

GEOTECHNICAL RECOMMENDATIONS FOR FOUNDATION DESIGN

Design Parameter	"Very Low" Expansion Potential $0 \leq EI \leq 20$
Foundation Depth or Minimum Perimeter Beam Depth (inches below the lowest adjacent grade)	One-or two-story structures – 12
Minimum Foundation Width (inches)*	One- or two-story structures – 12
Minimum Slab Thickness (inches)	4 - Actual
Sand Blanket and Moisture Retardant membrane below On-Grade Building Slabs	2 inches of sand** overlying moisture vapor retardant membrane overlying 2 inches of sand**
Minimum Slab Reinforcing	6" x 6" - W1.4/W1.4 welded wire fabric placed in the middle of slab
Minimum Footing Reinforcement for Continuous Footings, Grade Beams and Retaining Wall Footings	Two No. 4 reinforcing bars, one placed near the top and one near the bottom
Presaturation of Subgrade Soil (Percent of Optimum/Depth in Inches)	Minimum of 100% of the optimum moisture content to a depth of at least 12 inches prior to placing concrete

* Code minimums per Table 1809.7 of the 2013 CBC
** Sand should have a sand equivalent of at least 30

An allowable bearing capacity of 2000 pounds per square foot (psf) may be used for design of building and retaining wall footings. This value may be increased by 300 psf for each additional

12 inches of embedment depth and by 200 psf for each additional 12 inches in width to a maximum of 3000 psf. The allowable bearing capacity may be increased by one-third when considering short-term wind and seismic loads.

For footings designed in accordance with the recommendations presented in this report, we would anticipate a maximum settlement of less than 1-inch and a maximum differential settlement of less than ½ inch in a 30-foot span.

The passive earth pressure may be computed as an equivalent fluid having a density of 300 psf per foot of depth, to a maximum earth pressure of 3000 psf for footings founded on engineered fill. A coefficient of friction between soil and concrete of 0.40 may be used with dead load forces. The upper one foot of soil below the adjacent grade should not be used in calculating passive pressure. When combining passive and frictional resistance, the passive pressure component should be reduced by one-third.

A moisture and vapor retarding system should be placed below slabs-on-grade where moisture migration through the slab is undesirable. Guidelines for these are provided in the 2013 California Green Building Standards Code (CALGreen) Section 4.505.2 and the 2013 CBC Section 1907.1 and ACI 360R-10. The vapor retarder design and construction should also meet the requirements of ASTM E1643. A portion of the vapor retarder design should be the implementation of a moisture vapor retardant membrane.

It should be realized that the effectiveness of the vapor retarding membrane can be adversely impacted as a result of construction related punctures (e.g. stake penetrations, tears, punctures from walking on the aggregate layer, etc.). These occurrences should be limited as much as possible during construction. Thicker membranes are generally more resistant to accidental puncture than thinner ones. Products specifically designed for use as moisture/vapor retarders may also be more puncture resistant. Although the CBC specifies a six (6) mil vapor retarder membrane, it is GeoTek's opinion that a minimum 10 mil thick membrane with joints properly overlapped and sealed should be considered, unless otherwise specified by the slab design professional. The membrane should consist of Stego wrap or the equivalent.

Moisture and vapor retarding systems are intended to provide a certain level of resistance to vapor and moisture transmission through the concrete, but do not eliminate it. The acceptable level of moisture transmission through the slab is to a large extent based on the type of flooring used and environmental conditions. Ultimately, the vapor retarding system should be comprised of suitable elements to limit migration of water and reduce transmission of water vapor through the slab to acceptable levels. The selected elements should have suitable properties (i.e., thickness, composition, strength, and permeability) to achieve the desired

performance level. Consideration should be given to consulting with an individual possessing specific expertise in this area for additional evaluation.

Moisture retarders can reduce, but not eliminate, moisture vapor rise from the underlying soils up through the slab. Moisture retarders should be designed and constructed in accordance with applicable American Concrete Institute, Portland Cement Association, Post-Tensioning Concrete Institute, ASTM and California Building Code requirements and guidelines.

GeoTek recommends that a qualified person, such as the flooring contractor, structural engineer, and/or architect be consulted to evaluate the general and specific moisture vapor transmission paths and associated potential impact.

In addition, the recommendations in this report and our services in general are not intended to address mold prevention, since we along with geotechnical consultants in general, do not practice in areas of mold prevention. If specific recommendations are desired, a professional mold prevention consultant should be contacted.

5.3.2 Miscellaneous Foundation Recommendations

- To reduce moisture penetration beneath the slab on grade areas, utility trenches should be backfilled with engineered fill, lean concrete or concrete slurry where they intercept the perimeter footing or thickened slab edge.
- Soils from the footing excavations should not be placed in the slab-on-grade areas unless properly compacted and tested. The excavations should be free of loose/sloughed materials and be neatly trimmed at the time of concrete placement.
- Under-slab utility trenches should be compacted to project specifications. Compaction should be achieved with a mechanical compaction device. If soils to be used as backfill have dried out, they should be thoroughly moisture conditioned prior to placement in trenches.

5.3.3 Foundation Setbacks

Minimum setbacks for all foundations should comply with the 2013 CBC or City of Victorville requirements, whichever is more stringent. Improvements not conforming to these setbacks are subject to the increased likelihood of excessive lateral movements and/or differential settlements. If large enough, these movements can compromise the integrity of the improvements. The following recommendations are presented:

- The bottom of all footings for new structures near retaining walls should be deepened so as to extend below a 1:1 projection upward from the bottom inside edge of the wall footing.

5.3.4 Retaining and Garden Wall Design and Construction

5.3.4.1 General Design Criteria

Recommendations presented in this report apply to typical masonry or concrete vertical retaining walls to a maximum height of up to six (6) feet. Additional review and recommendations should be requested for higher walls. These are typical design criteria and are not intended to supersede the design by the structural engineer.

Retaining wall foundations should be embedded a minimum of 18 inches into engineered fill. Retaining wall foundations should be designed in accordance with Section 5.3.1 of this report. Structural needs may govern and should be evaluated by the project structural engineer.

All earth retention structure plans, as applicable, should be reviewed by this office prior to finalization.

Earthwork considerations, site clearing and remedial earthwork for all earth retention structures should meet the requirements of this report, unless specifically provided otherwise, or more stringent requirements or recommendations are made by the designer. The backfill material placement for all earth retention structures should meet the requirement of Section 5.3.4.3 in this report.

In general, cantilever earth retention structures, which are designed to yield at least 0.001H, where H is equal to the height of the wall to the base of the footing, may be designed using the active condition. Rigid earth retention structures (including but not limited to rigid walls, and walls braced at top, such as typical basement walls) should be designed using the at-rest condition.

In addition to the design lateral forces due to retained earth, surcharges due to improvements, such as an adjacent building or traffic loading, should be considered in the design of the earth retention structures. Loads applied within a 1:1 (h:v) projection from the surcharge on the stem and footing of the earth retention structure should be considered in the design.

Final selection of the appropriate design parameters should be made by the designer of the earth retention structures.

5.3.4.2 Cantilevered Walls

The recommendations presented below are for cantilevered retaining walls up to six (6) feet high. Active earth pressure may be used for retaining wall design, provided the top of the wall is not restrained from minor deflections. An equivalent fluid pressure approach may be used to compute the horizontal pressure against the wall. Appropriate fluid unit weights are given below for specific slope gradients of the retained material. These do not include other superimposed loading conditions such as traffic, structures, seismic events, or adverse geologic conditions.

ACTIVE EARTH PRESSURES	
Surface Slope of Retained Materials (h:v)	Equivalent Fluid Pressure (pcf) * Select Backfill
Level	30
2:1	45

* The design pressures assume the backfill material has an expansion index less than or equal to 20. Backfill zone includes area between the back of the wall and footing to a plane (1:1 h:v) up from the bottom of the wall foundation to the ground surface.

5.3.4.3 Retaining Wall Backfill and Drainage

Retaining walls should be provided with an adequate pipe and gravel back drain system to help prevent buildup of hydrostatic pressures. Backdrains should consist of a four (4)-inch diameter perforated collector pipe (Schedule 40, SDR 35, or approved equivalent) embedded in a minimum of one (1) cubic foot per linear foot of ¾- to 1-inch clean crushed rock or an approved equivalent, wrapped in filter fabric (Mirafi 140N or an approved equivalent). The drain system should be connected to a suitable outlet. Waterproofing of site walls should be performed where moisture migration through the wall is undesirable.

Retaining wall backfill should be placed in lifts no greater than eight (8) inches in thickness and compacted to a minimum of 90% relative compaction in accordance with ASTM Test Method D 1557. The wall backfill should also include a minimum one (1) foot wide section of ¾- to 1-inch clean crushed rock (or an approved equivalent). The rock should be placed immediately adjacent to the back of the wall and extend up from a back drain to within approximately 24 inches of the finish grade. The upper 24 inches should consist of compacted on-site soil.

As an alternative to the drain rock and fabric, Miradrain 2000, or approved equivalent, may be used behind the retaining wall. The Miradrain 2000 should extend from the base of the wall to within 2 feet of the ground surface. A perforated pipe should be placed at the base of the wall in direct contact with the Miradrain 2000. The Miradrain fabric at the base of the Miradrain 2000 panel should be wrapped around the perforated pipe to prevent soil intrusion into the pipe.

The presence of other materials might necessitate revision to the parameters provided and modification of the wall designs. Proper surface drainage needs to be provided and maintained.

5.3.4.4 Restrained Retaining Walls

Retaining walls that will be restrained prior to placing and compacting backfill material or that have reentrant or male corners, should be designed for an at-rest equivalent fluid pressure of 55 pcf, plus any applicable surcharge loading. For areas of male or reentrant corners, the restrained wall design should extend a minimum distance of twice the height of the wall laterally from the corner, or a distance otherwise determined by the project structural engineer.

5.3.4.5 Other Design Considerations

- Retaining and garden wall foundation elements should be designed in accordance with building code setback requirements. A minimum horizontal setback distance of five (5) feet as measured from the bottom outside edge of the footing to a sloped face is recommended.
- Wall design should consider the additional surcharge loads from superjacent slopes and/or footings, where appropriate.
- No backfill should be placed against concrete until minimum design strengths are evident by compression tests of cylinders.
- The retaining wall footing excavations, backcuts, and backfill materials should be approved by the project geotechnical engineer or their authorized representative.
- Positive separations should be provided in garden walls at horizontal distances not exceeding 20 feet.

5.3.5 Soil Sulfate Content

Based on laboratory testing reported by Zeiser Klind Consultants, Inc. (2005) and included herein in Appendix B, indicate soluble sulfate contents of less than 0.1% by weight. Soluble sulfate contents of this level would be in the range of "not applicable" (i.e. negligible) per Table

4.2.1 of ACI 318. Based on the existing test results and Table 4.3.1 of ACI 318, no special concrete mix design would be necessary to resist sulfate attack.

5.3.6 Import Soils

Import soils should have expansion characteristics similar to the on-site soils. GeoTek also recommends that the proposed import soils be tested for expansion and corrosivity potential. GeoTek should be notified a minimum of 72 hours prior to importing so that appropriate sampling and laboratory testing can be performed.

5.3.7 Concrete Flatwork

5.3.7.1 Exterior Concrete Slabs, Sidewalks and Driveways

Exterior concrete slabs, sidewalks and driveways should be designed using a four (4) inch minimum thickness. No specific reinforcement is required from a geotechnical perspective. However, some shrinkage and cracking of the concrete should be anticipated as a result of typical mix designs and curing practices commonly utilized in industrial construction.

Sidewalks and driveways may be under the jurisdiction of the governing agency. If so, jurisdictional design and construction criteria would apply, if more restrictive than the recommendations presented in this report.

Subgrade soils (typically "very low" expansion potential) should be pre-moistened prior to placing concrete. The subgrade soils below exterior slabs, sidewalks, and driveways should be pre-saturated to a minimum of 100% of optimum moisture content to a depth of at least 12 inches.

All concrete installation, including preparation and compaction of subgrade, should be done in accordance with the City of Victorville specifications, and under the observation and testing of GeoTek and a City inspector, if necessary.

5.3.7.2 Concrete Performance

Concrete cracks should be expected. These cracks can vary from sizes that are essentially unnoticeable to more than 0.125-inch in width. Most cracks in concrete, while unsightly, do not significantly impact long-term performance. While it is possible to take measures (proper concrete mix, placement, curing, control joints, etc.) to reduce the extent and size of cracks that occur, some cracking will occur despite the best efforts to minimize it. Concrete can also undergo chemical processes that are dependent upon a wide range of variables, which are

difficult, at best, to control. Concrete, while seemingly a stable material, is subject to internal expansion and contraction due to external changes over time.

One of the simplest means to control cracking is to provide weakened control joints for cracking to occur along. These do not prevent cracks from developing; they simply provide a relief point for the stresses that develop. These joints are a widely accepted means to control cracks but are not always effective. Control joints are more effective the more closely spaced they are. GeoTek suggests that control joints be placed in two orthogonal directions and located a distance apart approximately equal to 24 to 36 times the slab thickness.

Exterior concrete flatwork (patios, walkways, driveways, etc.) is often some of the most visible aspects of site development. They are typically given the least level of quality control, being considered "non-structural" components. We suggest that the same standards of care be applied to these features as to the structures themselves.

5.4 POST CONSTRUCTION CONSIDERATIONS

5.4.1 Landscape Maintenance and Planting

Water has been shown to weaken the inherent strength of soil, and slope stability is significantly reduced by overly wet conditions. Positive surface drainage away from graded slopes should be maintained and only the amount of irrigation necessary to sustain plant life should be provided for planted slopes. Controlling surface drainage and runoff, and maintaining a suitable vegetation cover can minimize erosion. Plants selected for landscaping should be lightweight, deep-rooted types that require little water and are capable of surviving the prevailing climate.

Overwatering should be avoided. Care should be taken when adding soil amendments to avoid excessive watering. An abatement program to control ground-burrowing rodents should be implemented and maintained. This is critical as burrowing rodents can decreased the long-term performance of slopes.
It is common for planting to be placed adjacent to structures in planter or lawn areas. This will result in the introduction of water into the ground adjacent to the foundation. This type of landscaping should be avoided.

5.4.2 Drainage

The need to maintain proper surface drainage and subsurface systems cannot be overly emphasized. Positive site drainage should be maintained at all times. Drainage should not flow uncontrolled down any descending slope. Water should be directed away from foundations

and not allowed to pond or seep into the ground adjacent to the footings. Soil areas within 10 feet of the proposed structure should slope at a minimum of 5-percent away from the building, if possible unless the area is paved. Paved areas are to be sloped at 2-percent away from the structure. Roof leaders and downspouts should discharge onto paved surfaces sloping away from the structure or into a closed pipe system which outfalls to the street gutter pan or directly to the storm drain system. Pad drainage should be directed toward approved areas and not be blocked by other improvements.

It is the owner's responsibility to maintain and clean drainage devices on or contiguous to their lot. In order to be effective, maintenance should be conducted on a regular and routine schedule and necessary corrections made prior to each rainy season.

5.5 PLAN REVIEW AND CONSTRUCTION OBSERVATIONS

We recommend that site grading, specifications and foundation plans be reviewed by this office prior to construction to check for conformance with the recommendations of this report. We also recommend that GeoTek representatives be present during site grading and foundation construction to observe and document proper implementation of the geotechnical recommendations. The owner/developer should verify that GeoTek representatives perform at least the following duties:

- Observe site clearing and grubbing operations for proper removal of unsuitable materials.
- Observe and test bottom of removals prior to fill placement.
- Evaluate the suitability of on-site and import materials for fill placement, and collect soil samples for laboratory testing where necessary.
- Observe the fill for uniformity during placement, including utility trench backfill. Also, perform field density testing of the fill materials.
- Observe and probe foundation excavations to confirm suitability of bearing materials.

If requested, a construction observation and compaction report can be provided by GeoTek, which can comply with the requirements of the governmental agencies having jurisdiction over the project. We recommend that these agencies be notified prior to commencement of construction so that necessary grading permits can be obtained.

6 INTENT

It is the intent of this report to aid in the design and construction of the proposed development. Implementation of the advice presented in this report is intended to reduce risk associated with construction projects. The professional opinions and geotechnical advice contained in this report are not intended to imply total performance of the project or guarantee that unusual or variable conditions will not be discovered during or after construction.

The scope of our report is limited to the boundaries of the subject property. This update does not and should in no way be construed to encompass any areas beyond the specific area of the proposed construction as indicated to us by our client. Further, no evaluation of any existing site improvements is included. The scope is based on our understanding of the project and the client's needs, our fee estimate (Proposal No. P-0301716) dated March 10, 2016 and geotechnical engineering standards normally used on similar projects in this locality at the present.

7 LIMITATIONS

Our findings are based on site conditions observed and the stated sources. Thus, our comments are professional opinions that are limited to the extent of the available data.

GeoTek has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report.

Since our recommendations are based on the site conditions observed and encountered, and laboratory testing, our conclusions and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty of any kind is expressed or implied. Standards of care/practice are subject to change with time.

8 SELECTED REFERENCES

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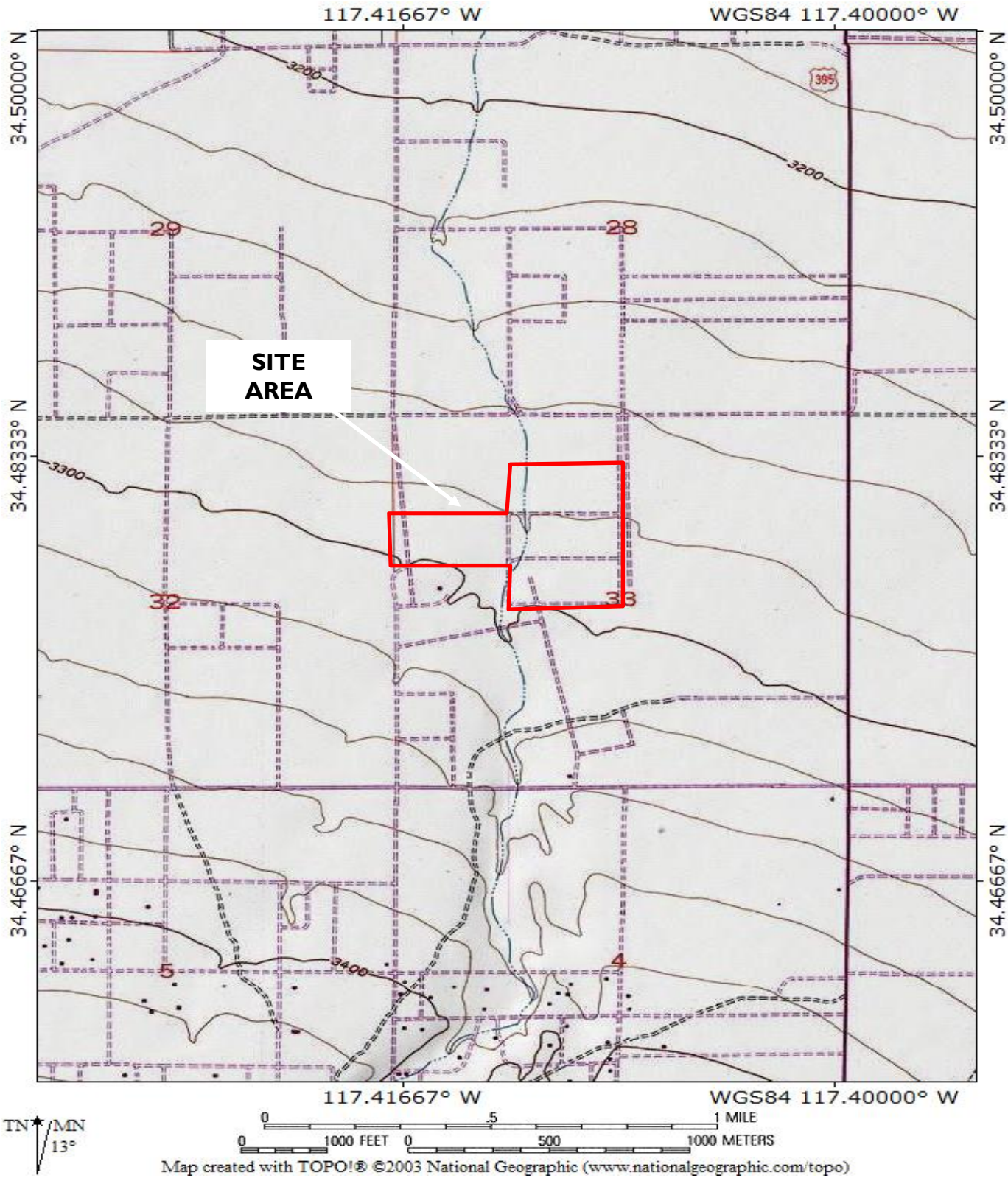
Zeiser Kling Consultants, Inc., 2005, "Geotechnical Feasibility Investigation Proposed Residential Develoment, Southwest Corner of Nyack Road and Mesa View Drive, Victorville, San Bernardino County, California," PN 05014-00, dated March 11.



Beazer Homes
Proposed Single-Family Residential Development
Tract No. 17486
Victorville, San Bernardino County, California

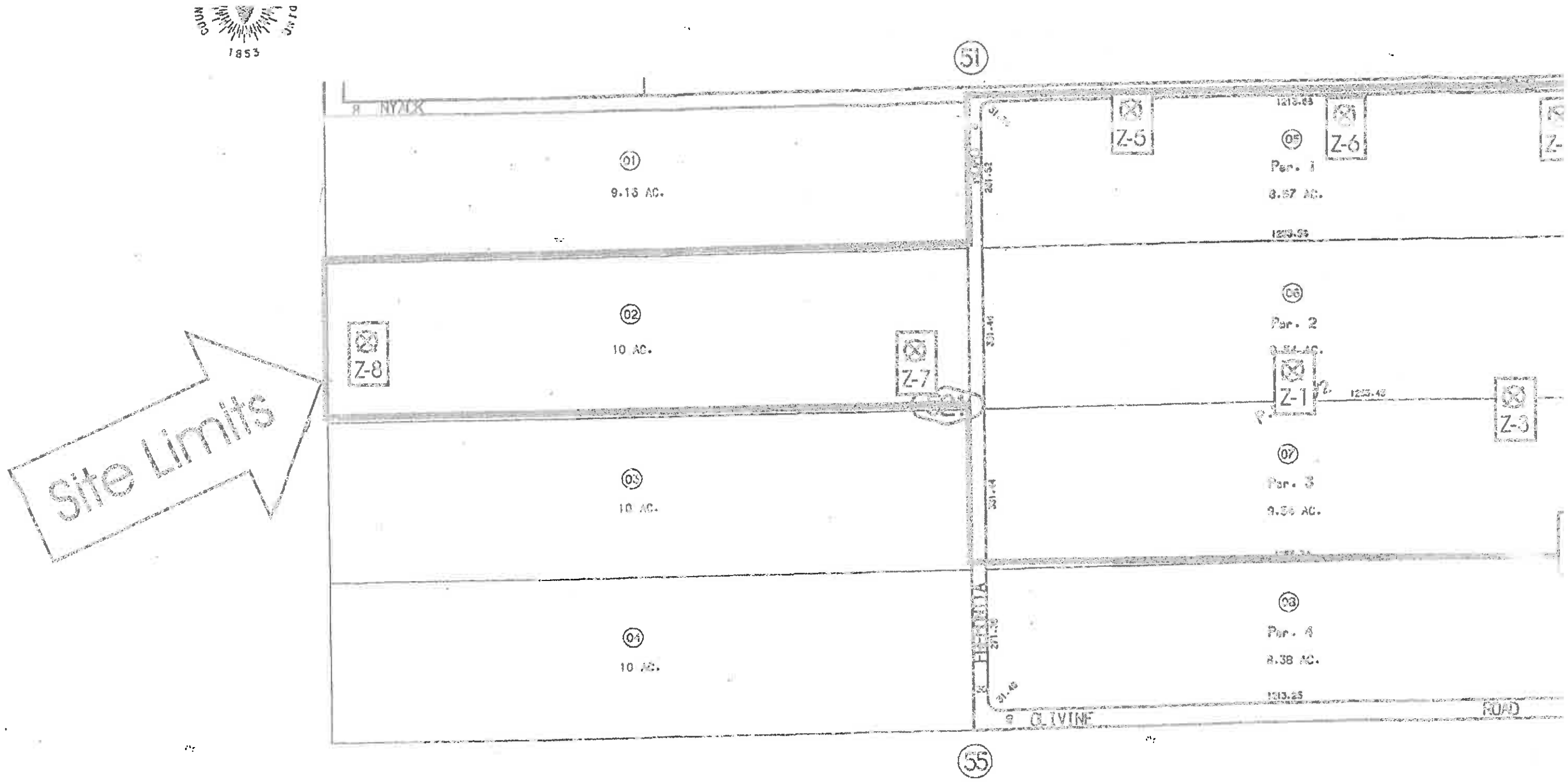
Project No. 1474-CR

N

Modified from USGS 7.5 Topographic Map

Figure 1
Site Location and General Site Topography Map

GEOTEK



Ptn. N.W. 1/4, Sec. 33
T.5 N., R.5 W.

Assessor's Map
Book 3088 Page 52
San Bernardino County

Parcel Map No. 2188, P.M. 19/2

DEC. 1991

Z-8 Approximate Location of Hollow-stem Auger Boring

Note: Base map provided by Beazer Homes.
All locations are approximate.

ZEISER KLING Consultants, Inc.

BORING LOCATION MAP
Geotechnical Feasibilty Study
Nyack Rd. & Mesa View Dr.
Victorville, California

Plate 1

GEOTEK

APPENDIX A

LOGS OF EXPLORATORY BORINGS (Zeiser Kling Consultants, Inc., 2005)

Tract No. 17486

City of Victorville, San Bernardino County, California

Project No. 1474-CR

GEOTEK

LOG OF EXPLORATORY BORING

Project:	Deazer Nyack&MesaView	Boring No.:	Z-1
Project Number:	05014-00	Driller:	Jet Drilling
		Drill Type:	CME-75
Date Drilled:	2/15/05	Hammer Wt. / Drop:	140lb / 30in
Logged By:	C. Spitzer	Ground Elev. [ft]:	--

Standard Split Spoon | Shelby Tube | Water Level ATD | California | Bulk Sample | Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/ft	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
						Aberdeen (Qal):(0 to 55-1/4 feet)			
			8 12 17	6.1	113	@ 2 feet: Silty SAND (SM):brown to light brown, fine to medium grained, moist to damp, medium dense.			
5			30 33 30	5.2	114	@ 5 feet: Silty SAND (SM):brown, medium to coarse grained, moist to damp, medium dense.		RV, SU	
			34 50	1.5	109	@ 8 feet: Silty SAND (SM):light brown to buff, medium to coarse grained, dry, very dense.			
10			50/2"	3.4	99	@ 12 feet: Silty SAND (SM):light brown to buff, fine grained, siltier than above, small amount of fine gravel, dry, very dense.			
15			50/2"			@ 15 feet: Silty SAND (SM):light reddish brown, fine grained, siltier than above, small amount of fine gravel, dry, very dense.			
20			23 30 36			@ 20 feet: No recovery. Assumed same as above.			
25			22 50/5"			@ 25 feet: Silty SAND (SM):light pink, fine grained, less silt than at 15 feet, fine subangular to rounded gravel up to 1/2 inch in diameter, dry, very dense.			

LOG OF EXPLORATORY BORING

Project:	Beazer Nyack&MesaView	Boring No.:	Z-1
Project Number:	05014-00	Driller:	Jet Drilling
		Drill Type:	CME-75
Date Drilled:	2/15/05	Hammer Wt. / Drop:	140lb / 30in
Logged By:	C. Spitzer	Ground Elev. [ft]:	--

Standard Split Spoon | Shelby Tube | Water Level ATD
California | Bulk Sample | Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
			50/2"			@ 30 feet: Silty SAND (SM):light pink, fine grained, less silt than at 25 feet, subangular to rounded gravel up to 1 inch in diameter, dry, very dense.			
35			50/3"			@ 35 feet: Silty SAND (SM):light pink, fine grained, subangular to rounded gravel up to 1 inch in diameter, more abundant gravel than above, dry, very dense.			
40			50/3"			@ 40 feet: Silty SAND (SM):light pink, fine grained, more silt than at 35 feet, subangular to rounded gravel up to 1 inch in diameter, dry, very dense.			
45			50/6"			@ 45 feet: Silty SAND (SM): light brown, very fine sand, dry, very dense.			
50			50/6"			@ 50 feet: Silty SAND (SM): light brown, very fine sand, dry, very dense.			
55			50/3"			@ 55 feet: Silty SAND (SM): light brown, very fine sand, dry, very dense. Total depth = 55-1/4 feet below ground surface. No groundwater encountered. Hole caved to 30 feet below ground surface. Backfilled with cuttings.			

HS B1 T1 05014-00.GPJ ZKC.GDT 3/1/05

ZEISER KLING Consultants, Inc.

LOG OF EXPLORATORY BORING

Project:	Beazer Hyack&MesaView	Boring No.:	Z-2
Project Number:	05014-00	Driller:	Jet Drilling
		Drill Type:	CME-75
Date Drilled:	2/15/05	Hammer Wt. / Drop:	140lb / 30in
Logged By:	C. Spitzer	Ground Elev. [ft]:	---

Standard Split Spoon | Shelby Tube | Water Level ATD
California | Bulk Sample | Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
						Alluvium (Qal): (0 to 6-1/2 feet)			
			15 7 6	4.8	109	@ 2 feet: Poorly graded SAND (SP): reddish brown, coarse grained, moist, medium dense.			
5			4 4 8	4.6	107	@ 5 feet: Poorly graded SAND with gravel (SP): brown, coarse grained, gravel up to 2 inches in diameter, moist, dense.			
						Total depth = 6-1/2 feet below ground surface. Practical refusal at 6-1/2 feet below ground surface. No groundwater encountered. No caving encountered. Backfilled with cuttings.			

LOG OF EXPLORATORY BORING

Project: Bezzer Nyack&MesaView
Project Number: 05014-00
Date Drilled: 2/15/05
Logged By: C. Spitzer

Boring No.: Z-3
Driller: Jet Drilling
Drill Type: CME-75
Hammer Wt. / Drop: 140lb / 30in
Ground Elev. [ft]: ---

Standard Split Spoon | Shelby Tube | Water Level ATD
California | Bulk Sample | Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
			5 5 6	4.4	106	Alluvium (Qal):(0 to 19 feet) @ 2 feet: Poorly graded SAND (SP):reddish brown, slightly silty, coarse to medium grained, moist, loose to medium dense.		DS, MAX	
5			7 7 8	2.6	112	@ 5 feet: Poorly graded SAND (SP):reddish brown, slightly silty, medium grained minor ammounts of gravel, moist, loose to medium dense.			
						@ 10 feet: Poorly graded SAND with gravel (SP):motiled grayish brown, slightly silty, medium grained, gravel up to 1 inch in diameter, moist, loose to medium dense.			
10			15 37 38	1.7	111				
15			31 45 50			@ 15 feet: Silty SAND (SM):light brown, fine grained, small amount of fine gravel, dry, very dense.			
			33 50/3"			@ 18 feet: Practical refusal with auger. Sample recovered as: Poorly graded SAND (SP): reddish brown, coarse grained, dry, very dense. Total depth = 18 feet 9 inches below ground surface. Practical refusal at 18 feet 9 inches below ground surface. No groundwater encountered. Backfilled with cuttings.			

HS EA TP 05014-00.GPJ ZJCI.GDT 2/4/05

LOG OF EXPLORATORY BORING

Project:	Beazer Nyack&MesaView	Boring No.:	Z-4
Project Number:	05014-00	Driller:	Jet Drilling
		Drill Type:	CME-75
Date Drilled:	2/15/05	Hammer Wt. / Drop:	140lb / 30in
Logged By:	C. Spitzer	Ground Elev. [ft]:	---

Standard Split Spoon | Shelby Tube | Water Level ATD | California | Bulk Sample | Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
						Alluvium (Qal):(0 to 21 feet)			
			4 4 3	4.2	112	@ 2 feet: Poorly graded SAND (SP):reddish brown, coarse to medium grained, up to 1 inch diameter gravel, moist, loose to medium dense.			
5			6 7 9	6.1	103	@ 5 feet: Poorly graded SAND (SP):reddish brown, coarse to medium grained, up to 1 inch diameter gravel, moist, medium dense.		WA	
10			22 19 26	5.1	111	@ 10 feet: Poorly graded SAND (SP):reddish brown, coarse to medium grained, more silt and less gravel than above, up to 1 inch diameter gravel, moist, very dense.			
15			17 37 27			@ 15 feet: Poorly graded SAND (SP):reddish brown, coarse to medium grained, more abundant gravel up to 2 inches in diameter, moist, very dense.			
20			27 46 50/2"			@ 20 feet: Poorly graded SAND (SP):reddish brown, coarse to medium grained, more abundant gravel up to 2 inches in diameter, moist, very dense.			
						Total depth = 21 feet 2 inches below ground surface. Practical Refusal at 21 feet 2 inches below ground surface. No groundwater encountered. Backfilled with cuttings.			

HS Ba T... 05014-00.GPJ ZYGLOGT 3/2/05

LOG OF EXPLORATORY BORING

Project: Beazer Nyack&MesaView
Project Number: 05014-00
Date Drilled: 2/15/05
Logged By: C. Spitzer

Boring No.: Z-5
Driller: Jet Drilling
Drill Type: CME-75
Hammer Wt. / Drop: 140lb / 30in
Ground Elev. [ft]: --

Standard Split Spoon | Shelby Tube | Water Level ATD
California | Bulk Sample | Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
						Alluvium (Qal):(0 to 26-1/2 feet) From Cuttings: Silty SAND (SM): brown, fine to medium grained, moist.			
5			9 15 21	10.9	123	@ 5 feet: Silty SAND (SM):brown, fine to medium grained, slightly clayey, moist, medium dense.			
10			11 14 22	1.1		@ 10 feet: Silty SAND (SM):light brown, fine to medium grained, dry, dense.			
15			27 23 22			@ 15 feet: Silty SAND (SM):light brown, medium grained, less silt than above, dry, dense.			
20			44 31 29			@ 20 feet: Silty SAND (SM):light brown, medium grained, less silt than above, dry, very dense.			
25			10 14 17			@ 25 feet: Silty SAND (SM):light brown, fine to medium grained, dry, medium dense.			
						Total depth = 26-1/2 feet below ground surface. No groundwater encountered. Backfilled with cuttings.			

LOG OF EXPLORATORY BORING

Project: Beazer Nyack&MesaView
Project Number: 05014-00
Date Drilled: 2/15/05
Logged By: C. Spitzer

Boring No.: Z-6
Driller: Jet Drilling
Drill Type: GME-75
Hammer Wt. / Drop: 140lb / 30in
Ground Elev. [ft]: --

Standard Split Spoon | Shelby Tube | Water Level ATD
California | Bulk Sample | Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
						Alluvium (Qal) (0 to 16 feet) From Cuttings: Poorly graded SAND (SP): brown, fine to medium grained, moist.			
5			6 8 10			@ 5 feet: Poorly graded SAND (SP):reddish brown, coarse grained, moist, medium dense.			
10			24 22 30	3.9	114	@ 10 feet: Silty SAND (SM):light brown, fine to medium grained, dry, dense.			
15			21 35 50/2"			@ 15 feet: Silty SAND (SM):light brown, medium grained, less silt than above, dry, dense.			
						Total depth = 16 feet 2 inches below ground surface. No groundwater encountered. Backfilled with cuttings.			

HS PLOT: 05014-2.GPJ ZKCI.GDT 3/5/05

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LOG OF EXPLORATORY BORING

Project:	Beazer Nyack&MossaView	Boring No.:	B-7
Project Number:	05014.00	Driller:	2R Drilling
		Drill Type:	CME-75
Date Drilled:	3/3/05	Hammer Wt. / Drop:	140lb / 30in
Logged By:	C. Spitzer	Ground Elev. [ft]:	---

Standard Split Spoon | Shelby Tube | Water Level ATD | California | Bulk Sample | Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
						Alluvium (Qal):(0 to 26-1/2 feet)			
			4 4 6	5.2	115	@ 2 feet: Poorly Graded SAND (SP):reddish brown, medium to coarse grained, slightly clayey, moist, loose.			
5			3 5 8			@ 5 feet: Poorly Graded SAND (SP):reddish brown, medium to coarse grained, slightly clayey, some fine gravel, slightly moist, loose.			
10			17 31 46	7.4	130	@ 10 feet: Poorly Graded SAND (SP):reddish brown, medium to coarse grained, slightly silty, some fine gravel, dry, very dense.			
15			12 13 18			@ 15 feet: Poorly Graded SAND (SP):reddish brown, medium to coarse grained, some fine gravel, dry, very dense.			
20			25 31 33	10.0	102	@ 20 feet: Poorly Graded SAND (SP):reddish brown, medium to coarse grained, more silt than above, some fine gravel, dry, very dense.			
25			10 9 15			@ 25 feet: Silty SAND (SM):light brown, fine to very fine grained, dry, medium dense.			
						Total depth = 26-1/2 feet below ground surface. No groundwater encountered. Backfilled with cuttings.			

ZEISER KLING Consultants, Inc.

LOG OF EXPLORATORY BORING

Project:	Beazer Hyatt&MesaView	Boring No.:	Z-6
Project Number:	05014-00	Driller:	2R Drilling
		Drill Type:	CME-75
Date Drilled:	3/3/05	Hammer Wt. / Drop:	140lb / 30in
Logged By:	C. Spitzer	Ground Elev. [ft]:	---

Standard Split Spoon | Shelby Tube | Water Level ATD
California | Bulk Sample | Static Water Table

Depth [ft]	Graphic Log	Sample Type	Blows/6"	Moisture Content [%]	Dry Density, [pcf]	SOIL DESCRIPTION and CLASSIFICATION (USCS)	Pocket Pen. [tsf]	Lab Tests	Remarks
			10 12 13	10.4	127	Alluvium (Qal):(0 to 26-1/2 feet) @ 2 feet: Silty SAND (SM):reddish brown, fine to coarse grained, some fine gravel, some organics, moist, medium dense.			
5			3 5 7	6.4	107	@ 5 feet: Poorly Graded SAND (SP):reddish brown, medium to coarse grained, moist, loose.		MAX	
10			45 50/5"			@ 10 feet: Poorly Graded SAND (SP):reddish brown, medium to coarse grained, dry, very dense.			
15			15 26 42	1.1	104	@ 15 feet: Poorly Graded SAND (SP):reddish brown, fine grained, silty, dry, very dense.			
20			8 11 17			@ 20 feet: Poorly Graded SAND (SP):reddish brown, fine grained, very silty, dry, very dense.			
25			11 24 33	0.9	99	@ 25 feet: Poorly Graded SAND (SP):reddish brown, fine grained, very silty, gravel up to 3/4 inch in diameter, dry, very dense.			
						Total depth = 26-1/2 feet below ground surface. No groundwater encountered. Backfilled with cuttings.			

HS BATT 05H11-00.GPJ ZKCI.GDT 3/9/05

ZEISER KLING Consultants, Inc.

APPENDIX B

LABORATORY TEST RESULTS (Zeiser Kling Consultants, Inc., 2005)

Tract No. 17486
City of Victorville, San Bernardino County, California
Project No. 1474-CR

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APPENDIX C (CONT'D)

LABORATORY TEST RESULTS

Maximum Dry Density

Sample Location	Soil Description	Maximum Dry Density (pcf)	Optimum Moisture Content (percent)
Z-3 @ 0'-7'	Reddish Brown Poorly Graded Sand (SP)	133.5	7.5
Z-8 @ 0'-10'	Brown Silty Sand (SM)	129.5	9.5

Direct Shear

Sample Location	Soil Description	Cohesion (psf)	Friction Angle (degrees)
Z-3 @ 0'-7'	Brown Silty Sand (SM)	150	33

Soluble Sulfate

Sample Location	Soil Description	Soluble Sulfate (Percent)
Z-1 @ 0'-10'	Brown Silty Fine Sand (SM)	0.0025 (25 ppm)

R-Value

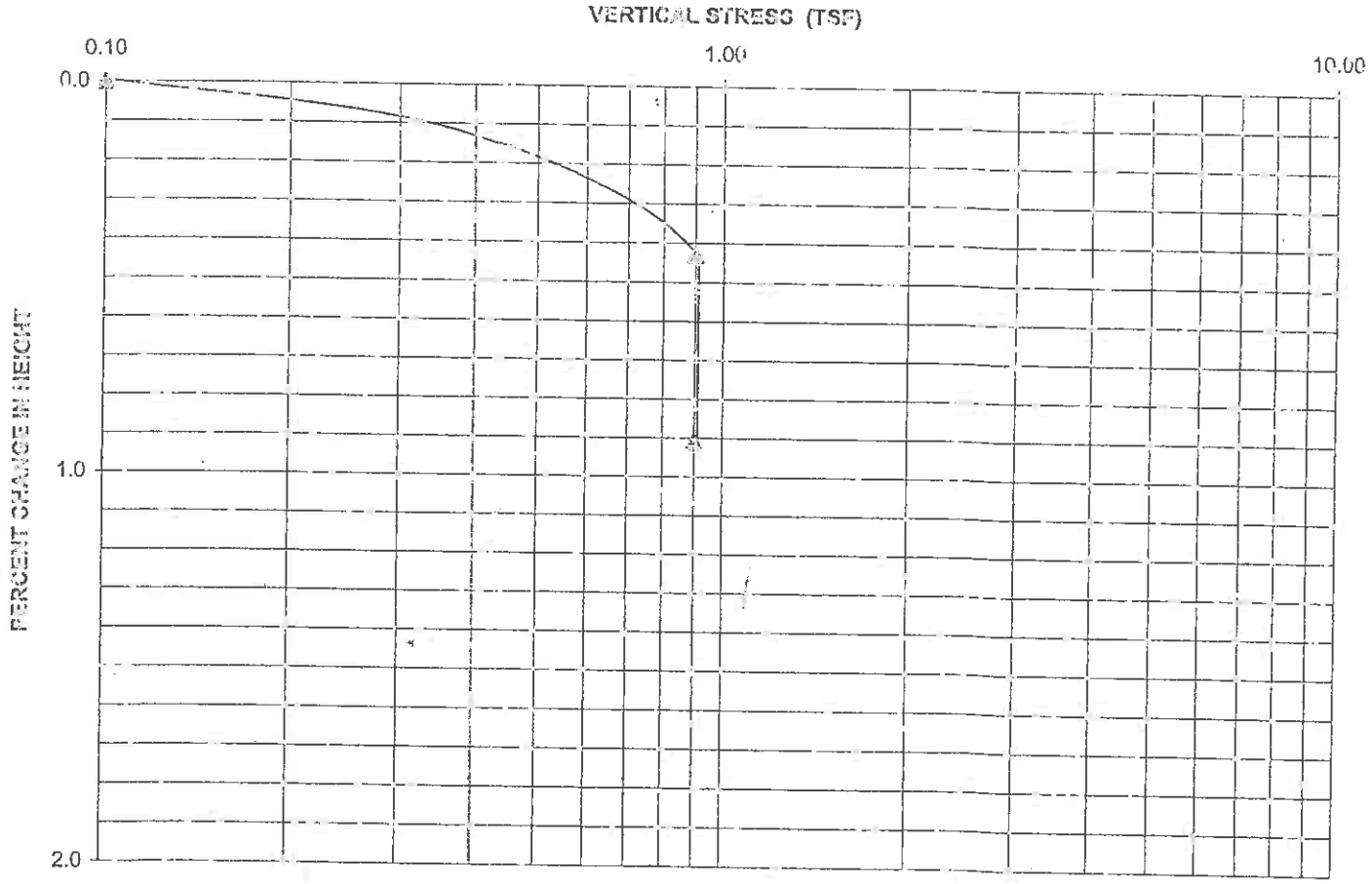
Sample Location	Soil Description	Percent Passing #200 Sieve	R-Value (By exudation)
Z-1 @ 0'-10'	Brown Silty Fine Sand (SM)	27.8	51

Percent Passing #200 Sieve

Sample Location	Soil Description	Percent Passing #200 Sieve
Z-4 @ 5'	Light Brown Poorly Graded Sand (SP)	3.9

PROJECT: [illegible]	NO. : [illegible]	MOISTURE & DENSITY DATA	BEFORE TEST	AFTER TEST
BORING NO.: [illegible]	SAMPLE NO. / DEPTH : [illegible]	WET WEIGHT + RING,(g)	[illegible]	[illegible]
APPROPRIATE VERTICAL STRESS: [illegible]	TSF	DRY WEIGHT + RING,(g)	103.66	[illegible]
FRAME NO. : [illegible]	TECHNICIAN: [illegible]	WEIGHT OF WATER,(g)	8	16.94
SOIL DESCRIPTIONS : [illegible]		WEIGHT OF RING,(g)		[illegible]
SPECIMEN TYPE : [illegible]	LIQUID LIMIT :	DRY WEIGHT OF SOIL,(g)	123.93	123.93
REMARKS : "Seat, load and inundate only - No time-rate"		MOISTURE CONTENT,(%)	6.5	13.7
Tap water was used / Use distilled water for I_o determination		DRY DENSITY,(Pcf)	103.5	104.4

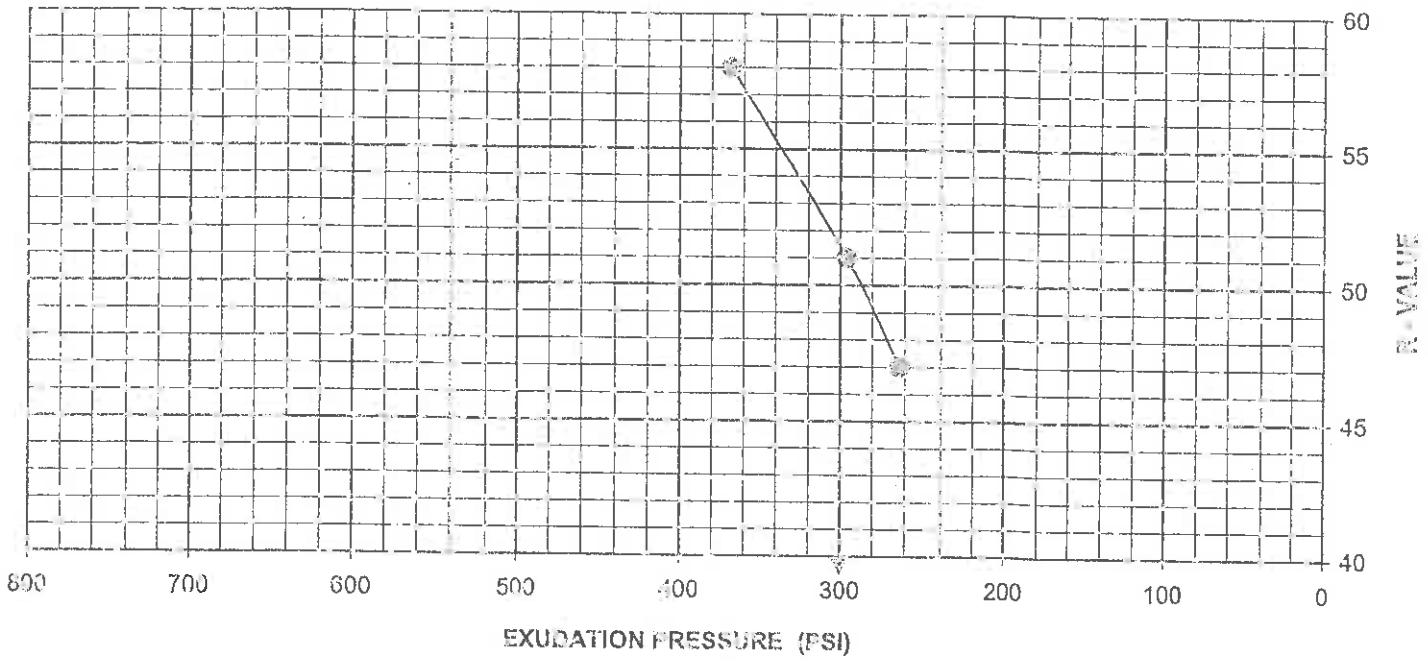
DATE OF READING	TIME	LOAD (KG)	STRESS (TSF)	DIAL READING (INCHES)	% CONSOL	DATE OF READING	TIME	LOAD (KG)	STRESS (TSF)	DIAL READING (INCHES)	% CONSOL
3-Mar-05	[illegible]	[illegible]	0.5	[illegible]	0		3:08			0.2092	0.92
	[illegible]	[illegible]		[illegible]	0.42						
	[illegible]	[illegible]		[illegible]	0.43						
	[illegible]	[illegible]		[illegible]	0.43						
9-Mar-05	7:48			[illegible]	0.90						
	8:21			0.2092	0.92						

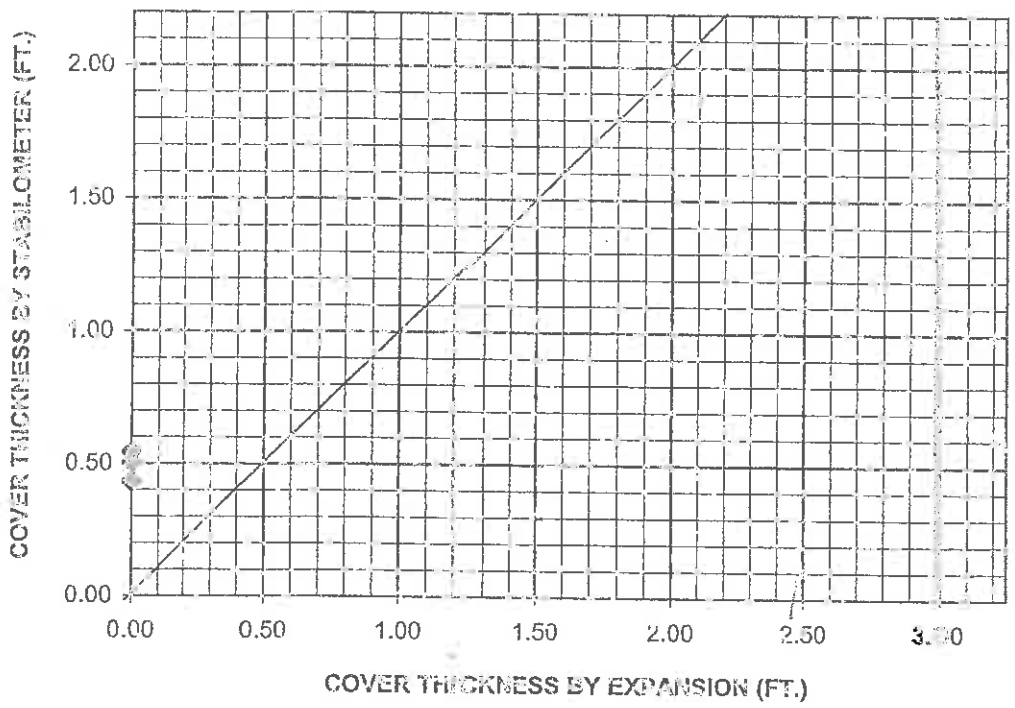


COLLAPSE POTENTIAL, I_c (%)	COLLAPSE INDEX$_{(2\ TSF)}$, I_e (%)	DEGREE OF COLLAPSE
0.49	[illegible]	[illegible]

ZEISER KLING CONSULTANTS, INC.
1221 E. Dyer Road, Suite 105; Santa Ana, CA. 92705
Tel: (714) 755-1355; Fax: (714) 755-1366

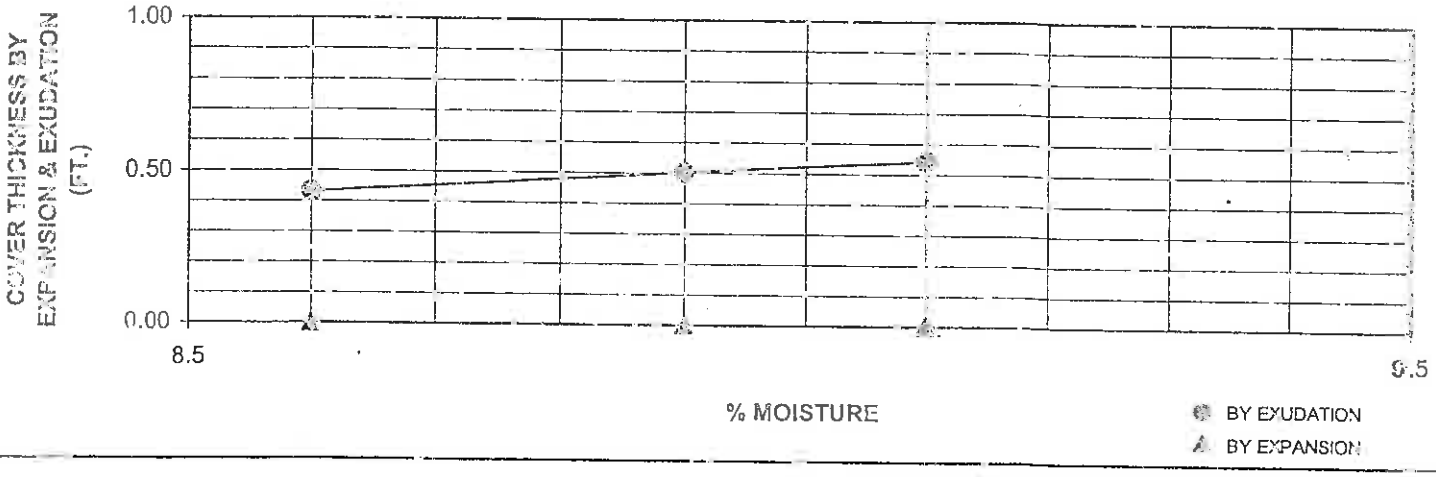
COLLAPSE POTENTIAL OF SOILS
(ASTM D5333-03)





R - VALUE CURVES

05014-00	
PROJECT NUMBER	
BEAZER HOMES	
PROJECT NAME	
Z-1 @ 0 - 10'	
SAMPLE NO. / LOCATION	
R - VALUES :	
BY EXUDATION	5[illegible]
BY EXPANSION	-
COVER THICKNESS (FT.)	



Project Name: [illegible]

Project No. : [illegible]

Date : [illegible]

Tested By: [illegible]

Sample Location : [illegible] Depth : [illegible]

Sample Descriptions / Classification : BROWN SILTY SAND (SM)

APPLIED NORMAL LOAD (ksf)	1.0		2.0		4.0	
SHEAR STRESS (ksf)	0.766		1.418		2.532	
DENSITY AND SATURATION	INITIAL	FINAL	INITIAL	FINAL	INITIAL	FINAL
WET WT.OF SOIL+RING (gms)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
DRY WT. OF SOIL+RING (gms)		189.45		187.87		183.74
WEIGHT OF WATER (gms)	-	18.77	-	18.36	-	18.25
WEIGHT OF RING (gms)	-	[illegible]	-	[illegible]	-	[illegible]
WEIGHT OF DRY SOIL (gms)	-	143.81	-	143.64	-	143.80
MOISTURE CONTENT (%)	[illegible]	13.0	7.5	12.8	7.5	12.7
WET DENSITY (pcf)	129.1	135.7	129.1	135.4	129.1	135.3
DRY DENSITY (pcf)	-	120.0	-	120.1	-	120.0
SPEC.GRAVITY,Gs (Assumed)	2.68					
THICKNESS OF SPECIMEN, (in.)	1.00					
DEGREE OF SATURATION, (%)	51.1	38.9	51.2	87.0	51.1	86.5
VOID RATIO	-	0.393	-	0.393	-	0.393

Lateral Displacement, d_h 0.3950 (in.)

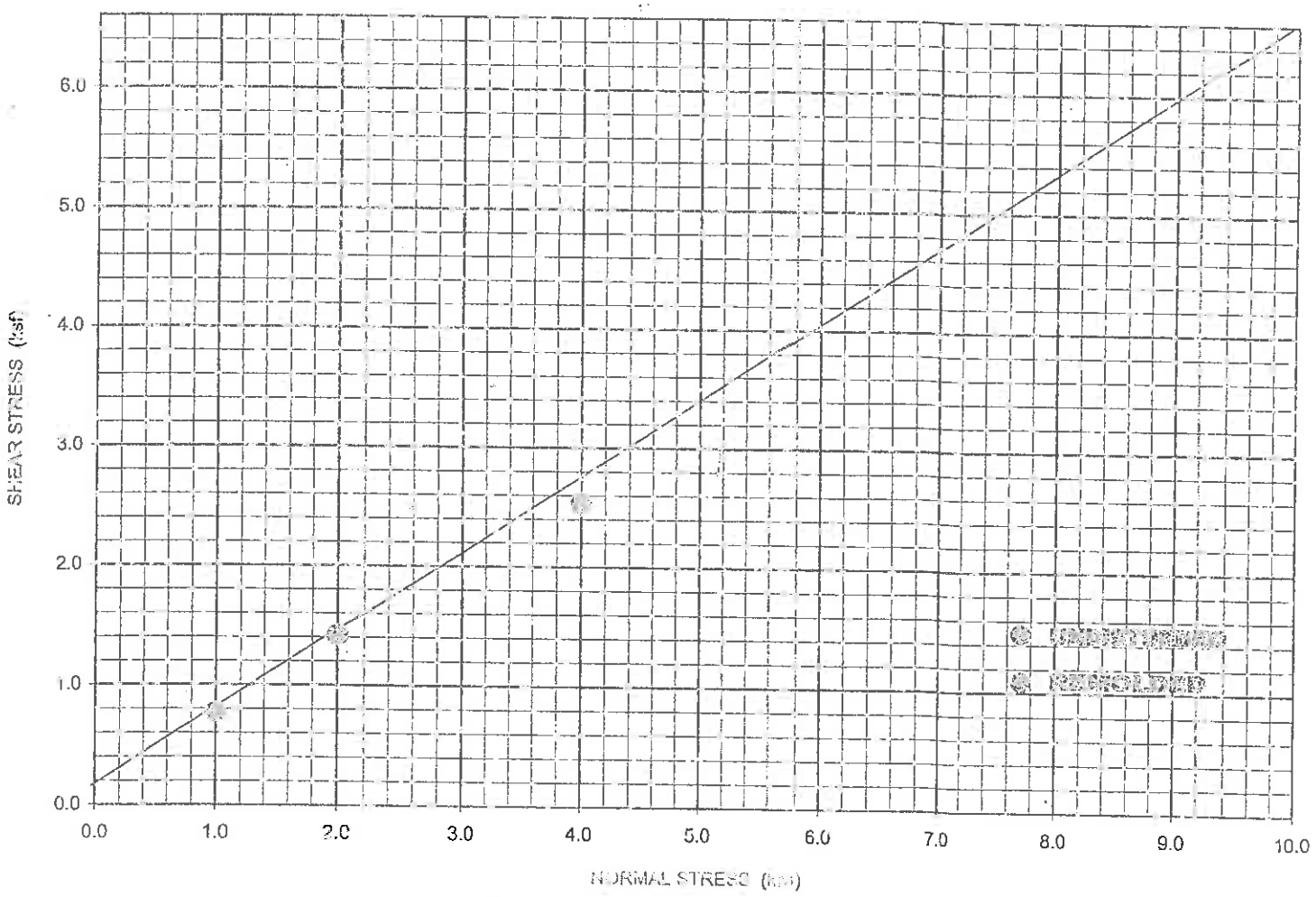
Displacement Rate, d_r 0.05 (in./min.)

Elapsed Time of Test, t_e 6.10 (min.)

Cohesion, (c) 150 (psi)

Friction Angle, (ϕ) 33 °

Remarks : Remolded @ 90% Ref Comp @ Optimum Moisture Content



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DIRECT SHEAR TEST
(ASTM D3080-03)

APPENDIX C

GENERAL EARTHWORK AND GRADING GUIDELINES

Tract No. 17486

City of Victorville, San Bernardino County, California

Project No. 1474-CR

GEOTEK

GENERAL GRADING GUIDELINES

Guidelines presented herein are intended to address general construction procedures for earthwork construction. Specific situations and conditions often arise which cannot reasonably be discussed in general guidelines, when anticipated these are discussed in the text of the report. Often unanticipated conditions are encountered which may necessitate modification or changes to these guidelines. It is our hope that these will assist the contractor to more efficiently complete the project by providing a reasonable understanding of the procedures that would be expected during earthwork and the testing and observation used to evaluate those procedures.

General

Grading should be performed to at least the minimum requirements of governing agencies, Chapters 18 and 33 of the Uniform Building Code, CBC (2013) and the guidelines presented below.

Preconstruction Meeting

A preconstruction meeting should be held prior to site earthwork. Any questions the contractor has regarding our recommendations, general site conditions, apparent discrepancies between reported and actual conditions and/or differences in procedures the contractor intends to use should be brought up at that meeting. The contractor (including the main onsite representative) should review our report and these guidelines in advance of the meeting. Any comments the contractor may have regarding these guidelines should be brought up at that meeting.

Grading Observation and Testing

1. Observation of the fill placement should be provided by our representative during grading. Verbal communication during the course of each day will be used to inform the contractor of test results. The contractor should receive a copy of the "Daily Field Report" indicating results of field density tests that day. If our representative does not provide the contractor with these reports, our office should be notified.
2. Testing and observation procedures are, by their nature, specific to the work or area observed and location of the tests taken, variability may occur in other locations. The contractor is responsible for the uniformity of the grading operations; our observations and test results are intended to evaluate the contractor's overall level of efforts during grading. The contractor's personnel are the only individuals participating in all aspect of site work. Compaction testing and observation should not be considered as relieving the contractor's responsibility to properly compact the fill.
3. Cleanouts, processed ground to receive fill, key excavations, and subdrains should be observed by our representative prior to placing any fill. It will be the contractor's responsibility to notify our representative or office when such areas are ready for observation.
4. Density tests may be made on the surface material to receive fill, as considered warranted by this firm.

5. In general, density tests would be made at maximum intervals of two feet of fill height or every 1,000 cubic yards of fill placed. Criteria will vary depending on soil conditions and size of the fill. More frequent testing may be performed. In any case, an adequate number of field density tests should be made to evaluate the required compaction and moisture content is generally being obtained.
6. Laboratory testing to support field test procedures will be performed, as considered warranted, based on conditions encountered (e.g. change of material sources, types, etc.) Every effort will be made to process samples in the laboratory as quickly as possible and in progress construction projects are our first priority. However, laboratory workloads may cause in delays and some soils may require a **minimum of 48 to 72 hours to complete test procedures**. Whenever possible, our representative(s) should be informed in advance of operational changes that might result in different source areas for materials.
7. Procedures for testing of fill slopes are as follows:
    a) Density tests should be taken periodically during grading on the flat surface of the fill, three to five feet horizontally from the face of the slope.
    b) If a method other than over building and cutting back to the compacted core is to be employed, slope compaction testing during construction should include testing the outer six inches to three feet in the slope face to determine if the required compaction is being achieved.
8. Finish grade testing of slopes and pad surfaces should be performed after construction is complete.

Site Clearing

1. All vegetation, and other deleterious materials, should be removed from the site. If material is not immediately removed from the site it should be stockpiled in a designated area(s) well outside of all current work areas and delineated with flagging or other means. Site clearing should be performed in advance of any grading in a specific area.
2. Efforts should be made by the contractor to remove all organic or other deleterious material from the fill, as even the most diligent efforts may result in the incorporation of some materials. This is especially important when grading is occurring near the natural grade. All equipment operators should be aware of these efforts. Laborers may be required as root pickers.
3. Nonorganic debris or concrete may be placed in deeper fill areas provided the procedures used are observed and found acceptable by our representative.

Treatment of Existing Ground

1. Following site clearing, all surficial deposits of alluvium and colluvium as well as weathered or creep effected bedrock, should be removed unless otherwise specifically indicated in the text of this report.

2. In some cases, removal may be recommended to a specified depth (e.g. flat sites where partial alluvial removals may be sufficient). The contractor should not exceed these depths unless directed otherwise by our representative.
3. Groundwater existing in alluvial areas may make excavation difficult. Deeper removals than indicated in the text of the report may be necessary due to saturation during winter months.
4. Subsequent to removals, the natural ground should be processed to a depth of six inches, moistened to near optimum moisture conditions and compacted to fill standards.
5. Exploratory back hoe or dozer trenches still remaining after site removal should be excavated and filled with compacted fill if they can be located.

Fill Placement

1. Unless otherwise indicated, all site soil and bedrock may be reused for compacted fill; however, some special processing or handling may be required (see text of report).
2. Material used in the compacting process should be evenly spread, moisture conditioned, processed, and compacted in thin lifts six (6) to eight (8) inches in compacted thickness to obtain a uniformly dense layer. The fill should be placed and compacted on a nearly horizontal plane, unless otherwise found acceptable by our representative.
3. If the moisture content or relative density varies from that recommended by this firm, the contractor should rework the fill until it is in accordance with the following:
   a) Moisture content of the fill should be at or above optimum moisture. Moisture should be evenly distributed without wet and dry pockets. Pre-watering of cut or removal areas should be considered in addition to watering during fill placement, particularly in clay or dry surficial soils. The ability of the contractor to obtain the proper moisture content will control production rates.
   b) Each six-inch layer should be compacted to at least 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency. In most cases, the testing method is ASTM Test Designation D 1557.
4. Rock fragments less than eight inches in diameter may be utilized in the fill, provided:
   a) They are not placed in concentrated pockets;
   b) There is a sufficient percentage of fine-grained material to surround the rocks;
   c) The distribution of the rocks is observed by, and acceptable to, our representative.
5. Rocks exceeding eight (8) inches in diameter should be taken off site, broken into smaller fragments, or placed in accordance with recommendations of this firm in areas designated suitable for rock disposal. On projects where significant large quantities of oversized materials are anticipated, alternate guidelines for placement may be included. If significant oversize materials are encountered during construction, these guidelines should be requested.
6. In clay soil, dry or large chunks or blocks are common. If in excess of eight (8) inches minimum dimension, then they are considered as oversized. Sheepsfoot compactors or other suitable

methods should be used to break up blocks. When dry, they should be moisture conditioned to provide a uniform condition with the surrounding fill.

Slope Construction

1. The contractor should obtain a minimum relative compaction of 90 percent out to the finished slope face of fill slopes. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment.
2. Slopes trimmed to the compacted core should be overbuilt by at least three (3) feet with compaction efforts out to the edge of the false slope. Failure to properly compact the outer edge results in trimming not exposing the compacted core and additional compaction after trimming may be necessary.
3. If fill slopes are built "at grade" using direct compaction methods, then the slope construction should be performed so that a constant gradient is maintained throughout construction. Soil should not be "spilled" over the slope face nor should slopes be "pushed out" to obtain grades. Compaction equipment should compact each lift along the immediate top of slope. Slopes should be back rolled or otherwise compacted at approximately every 4 feet vertically as the slope is built.
4. Corners and bends in slopes should have special attention during construction as these are the most difficult areas to obtain proper compaction.
5. Cut slopes should be cut to the finished surface. Excessive undercutting and smoothing of the face with fill may necessitate stabilization.

UTILITY TRENCH CONSTRUCTION AND BACKFILL

Utility trench excavation and backfill is the contractors responsibility. The geotechnical consultant typically provides periodic observation and testing of these operations. While efforts are made to make sufficient observations and tests to verify that the contractors' methods and procedures are adequate to achieve proper compaction, it is typically impractical to observe all backfill procedures. As such, it is critical that the contractor use consistent backfill procedures.

Compaction methods vary for trench compaction and experience indicates many methods can be successful. However, procedures that "worked" on previous projects may or may not prove effective on a given site. The contractor(s) should outline the procedures proposed, so that we may discuss them **prior** to construction. We will offer comments based on our knowledge of site conditions and experience.

1. Utility trench backfill in slopes, structural areas, in streets and beneath flat work or hardscape should be brought to at least optimum moisture and compacted to at least 90 percent of the laboratory standard. Soil should be moisture conditioned prior to placing in the trench.

2. Flooding and jetting are not typically recommended or acceptable for native soils. Flooding or jetting may be used with select sand having a Sand Equivalent (SE) of 30 or higher. This is typically limited to the following uses:
   a) shallow (12 + inches) under slab interior trenches and,
   b) as bedding in pipe zone.

   The water should be allowed to dissipate prior to pouring slabs or completing trench compaction.
3. Care should be taken not to place soils at high moisture content within the upper three feet of the trench backfill in street areas, as overly wet soils may impact subgrade preparation. Moisture may be reduced to 2% below optimum moisture in areas to be paved within the upper three feet below sub grade.
4. Sand backfill should not be allowed in exterior trenches adjacent to and within an area extending below a 1:1 projection from the outside bottom edge of a footing, unless it is similar to the surrounding soil.
5. Trench compaction testing is generally at the discretion of the geotechnical consultant. Testing frequency will be based on trench depth and the contractors procedures. A probing rod would be used to assess the consistency of compaction between tested areas and untested areas. If zones are found that are considered less compact than other areas, this would be brought to the contractors attention.

JOB SAFETY

General

Personnel safety is a primary concern on all job sites. The following summaries are safety considerations for use by all our employees on multi-employer construction sites. On ground personnel are at highest risk of injury and possible fatality on grading construction projects. The company recognizes that construction activities will vary on each site and that job site safety is the contractor's responsibility. However, it is, imperative that all personnel be safety conscious to avoid accidents and potential injury.

In an effort to minimize risks associated with geotechnical testing and observation, the following precautions are to be implemented for the safety of our field personnel on grading and construction projects.

1. Safety Meetings: Our field personnel are directed to attend the contractor's regularly scheduled safety meetings.
2. Safety Vests: Safety vests are provided for and are to be worn by our personnel while on the job site.
3. Safety Flags: Safety flags are provided to our field technicians; one is to be affixed to the vehicle when on site, the other is to be placed atop the spoil pile on all test pits.

In the event that the contractor's representative observes any of our personnel not following the above, we request that it be brought to the attention of our office.

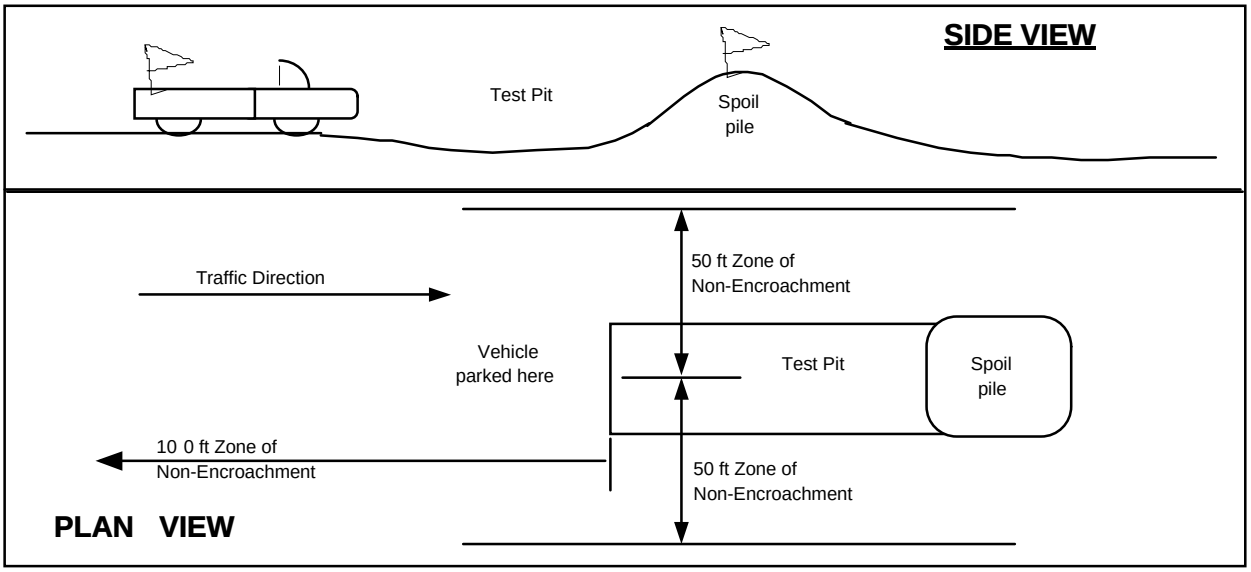
Test Pits Location, Orientation and Clearance

The technician is responsible for selecting test pit locations. The primary concern is the technician's safety. However, it is necessary to take sufficient tests at various locations to obtain a representative sampling of the fill. As such, efforts will be made to coordinate locations with the grading contractors authorized representatives (e.g. dump man, operator, supervisor, grade checker, etc.), and to select locations following or behind the established traffic pattern, preferably outside of current traffic. The contractors authorized representative should direct excavation of the pit and safety during the test period. Again, safety is the paramount concern.

Test pits should be excavated so that the spoil pile is placed away from oncoming traffic. The technician's vehicle is to be placed next to the test pit, opposite the spoil pile. This necessitates that the fill be maintained in a drivable condition. Alternatively, the contractor may opt to park a piece of equipment in front of test pits, particularly in small fill areas or those with limited access.

A zone of non-encroachment should be established for all test pits (see diagram below). No grading equipment should enter this zone during the test procedure. The zone should extend outward to the sides approximately 50 feet from the center of the test pit and 100 feet in the direction of traffic flow. This zone is established both for safety and to avoid excessive ground vibration, which typically decreases test results.

TEST PIT SAFETY PLAN



Slope Tests

When taking slope tests, the technician should park their vehicle directly above or below the test location on the slope. The contractor's representative should effectively keep all equipment at a safe operation distance (e.g. 50 feet) away from the slope during testing.

The technician is directed to withdraw from the active portion of the fill as soon as possible following testing. The technician's vehicle should be parked at the perimeter of the fill in a highly visible location.

Trench Safety

It is the contractor's responsibility to provide safe access into trenches where compaction testing is needed. Trenches for all utilities should be excavated in accordance with CAL-OSHA and any other applicable safety standards. Safe conditions will be required to enable compaction testing of the trench backfill.

All utility trench excavations in excess of 5 feet deep, which a person enters, are to be shored or laid back. Trench access should be provided in accordance with OSHA standards. Our personnel are directed not to enter any trench by being lowered or "riding down" on the equipment.

Our personnel are directed not to enter any excavation which;

1. is 5 feet or deeper unless shored or laid back,
2. exit points or ladders are not provided,
3. displays any evidence of instability, has any loose rock or other debris which could fall into the trench, or
4. displays any other evidence of any unsafe conditions regardless of depth.

If the contractor fails to provide safe access to trenches for compaction testing, our company policy requires that the soil technician withdraws and notifies their supervisor. The contractors representative will then be contacted in an effort to effect a solution. All backfill not tested due to safety concerns or other reasons is subject to reprocessing and/or removal.

Procedures

In the event that the technician's safety is jeopardized or compromised as a result of the contractor's failure to comply with any of the above, the technician is directed to inform both the developer's and contractor's representatives. If the condition is not rectified, the technician is required, by company policy, to immediately withdraw and notify their supervisor. The contractor's representative will then be contacted in an effort to effect a solution. No further testing will be performed until the situation is rectified. Any fill placed in the interim can be considered unacceptable and subject to reprocessing, recompaction or removal.

In the event that the soil technician does not comply with the above or other established safety guidelines, we request that the contractor bring this to technicians attention and notify our project

manager or office. Effective communication and coordination between the contractors' representative and the field technician(s) is strongly encouraged in order to implement the above safety program and safety in general.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures particularly the zone of non-encroachment.

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