GEOTECHNICAL INVESTIGATION
NEW OPERATIONS HEADQUARTERS
CALAVERAS COUNTY WATER DISTRICT
NORTHEAST CORNER OF GEORGE REED DRIVE AND TOMAS COURT
SAN ANDREAS, CALIFORNIA

Prepared for
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2369

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ATTACHMENTS

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1.0 INTRODUCTION

This report presents the results of the geotechnical investigation performed by Condor Earth Technologies, Inc. (Condor) for the proposed operations building for the Calaveras County Water District (CCWD). The approximate location of the proposed building is shown on Figure 1, Vicinity Map.

The purpose of this report is to present the results of Condor's investigation and geotechnical recommendations for earthwork and foundations for use by your other design professionals and contractors.

2.0 PROJECT DESCRIPTION

The proposed and existing improvements are shown on Figure 2, Site Plan. The project will consist of constructing an operations building, one storage building, a parking lot, driveways, exterior pedestrian pavement, and underground utilities. The buildings will be light metal-framed structures with concrete slab-on-grade lower floors situated slightly above the adjacent exterior ground surface. The operations building will have two stories, and the storage building will have one story.

The finish lower floor elevations will be about 989 feet for the operations building and 987 feet for the storage building. Building pad grading will include cuts of up to about 2 feet and fills of up to about 1 foot. The maximum dead plus live building loads will be column loads of 50 kips.

Condor based this project description on our review of preliminary plans and our discussions with the project team. If the plans change or the geotechnical aspects of our project description are significantly different from those described, then Condor should re-evaluate our recommendations.

3.0 SCOPE OF SERVICES

Condor's scope included the following:

- Researching the site geology;
- Observing and evaluating pertinent site conditions;
- Performing a subsurface investigation which included supervising the excavation and logging of test pits and performing laboratory tests on selected soil samples;
- Performing engineering evaluation;
- Developing geotechnical conclusions and recommendations for design and construction of the proposed improvements described in Section 2.0.

4.0 SITE CONDITIONS

Figure 2 shows the existing site features and topography. The ground surface is covered with high and thick weeds and slopes down gradually to the southwest. There is a southwesterly flowing drainage swale that crosses the site. The swale is about 15 feet wide (at its top) and up to about 5 feet deep, and flows to a small pond at the southwest corner of the site. The existing roads that border the site are paved. There are seven trees and five utility vaults at the site, which are all beyond the proposed buildings and parking lot.

Gold mining was previously performed in the vicinity of the site; however, no such features are shown at the location of the proposed building. It is possible that underground workings from nearby mines extend beneath the building. These workings may include but are not limited to service shafts present at the ground surface that extend to the underground workings. The locations of these ancillary features are not typically included in the published data.

5.0 SITE GEOLOGY

Figure 3 shows the site location on a geologic map. The site is mapped as having undifferentiated metamorphic rock (pre-Cretaceous), which typically consists of amphibolite, schist, greenstone, quartz, feldspar porphyry, marble and phyllite. The rock encountered in our test pits consists of marble and highly weathered phyllite. The subsurface conditions encountered in our test pits are described in Section 7.0.

Geologic evidence indicates that the Sierra Nevada Range is a westward-tilted bedrock block with late-Quaternary (active) faulting and uplift occurring along its eastern edge on the Frontal Fault System and comparatively little faulting, deformation, or local tilting occurring within the block itself (Wakabayashi and Sawyer, 2000). The cumulative vertical offset and slip rates of individual faults within the Sierra Nevada block are estimated to be 1 to 3 orders of magnitude lower than those of the Frontal Fault System to the east (Wakabayashi and Sawyer, 2000).

The site is mapped within the Foothills Fault System zone. The Foothills Fault System includes the Melones Fault zone and the Bear Mountains Fault zone. Portions of the Foothills Fault System between Oroville and Folsom (north of the project site) were called active (Cramer and others, 1978). They cite rare historical accounts of ground shaking and micro-seismic activity, attributed by others to filling of reservoirs. More recently, the Foothills Fault System was not classified as an "active" fault by the California Geological Survey. In the statewide seismic hazard assessment (1996), the Foothills Fault System is modeled as a distributed earthquake source, that is, a broad region where earthquakes may not be associated with a particular fault trace. To quantify its contribution to seismic hazard potential, seismologists have assigned the Foothill Fault Zone a slip rate of 0.05 mm/yr and a maximum earthquake magnitude of M6.5 (Petersen and others, 1996). While these parameters are well below the minimum level of seismic activity generally considered for the state seismic hazard assessment, the Foothills Fault System is included as a "Type C" seismic source due to its significance to major public policy and engineering decisions for projects in the Sierran foothills. The potential for surface rupture along this zone is low.

6.0 SUBSURFACE INVESTIGATION METHODS

Condor investigated subsurface conditions at the site in November 2010 by logging conditions exposed in six exploratory test pit (TP) excavations. Figure 2 shows the approximate locations of these test pits, and Appendix A contains the test pit logs. CCWD personnel excavated the test pits to depths between about 2.5 to 11 feet using their backhoe. Condor selected the locations of the test pits and the excavation depths, and retrieved samples of soil and rock exposed. Relatively undisturbed samples were obtained by handhammering relatively thin-walled brass tubes (approximately 2 and 2.5-inch-diameter) into the test pit sidewalls. One bulk sample of near-surface soil was also retrieved. A Condor Geotechnical Engineer logged the conditions encountered along with other pertinent data. We classified soil using the Unified Soil Classification System and the visual-manual procedure, and characterized the engineering properties of the rock using the rock property terms presented in Appendix A.

Condor delivered the samples to our laboratory and subcontracted laboratory for further examination and testing. Selected samples were tested for liquid and plastic limits, moisture content, dry density and R-value. Appendix B contains laboratory test reports.

The logs in Appendix A summarize the pertinent field data and laboratory test results. Condor based the reported soil and rock classifications and descriptions on field data, further observation of the samples in the laboratory, and the laboratory test results. Contacts shown on the logs are approximate, and subsurface conditions may vary gradually at the contacts shown.

7.0 SUBSURFACE CONDITIONS

The subsurface data obtained during our investigation indicates that the site is underlain by about 1.5 to over 8 feet of soil over rock. The soil encountered is lean clay with sand, which is generally medium stiff to stiff to a depth of about 1.5 feet and then very stiff to hard below this depth. The rock encountered in TP-1, TP-2, TP-4, and TP-6 consists of phyllite, which is moderately weathered, closely fractured with tight and slightly rough fracture surfaces, moderately strong, and moderately hard. Marble was encountered in TP-3, which is slightly weathered, occasionally fractured with tight and slightly rough fracture surfaces, strong, and hard.

Groundwater was not encountered in the test pits to the depths explored, at the time of our exploration. However, during and after periods of prolonged rainfall, temporary perched ground water can occur within the upper 5 feet of the surface.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Condor anticipates that the soil subgrade beneath the building will consist of up to about 1 foot of new engineered fill over a variable thickness of natural soil underlain by rock. At the north side of the proposed operations building, the natural soil will mostly be removed, and relatively hard rock should be exposed within about 1 foot of the soil subgrade. We anticipate that hard rock will be encountered in excavations for footings. Hard rock may also be encountered in excavations for underground utilities.

The primary geotechnical issues to address include evaluating the potential for geologic hazards as well as the difficulty of excavating hard rock for foundations, and underground utilities. The geologic hazards that require evaluation include the potentials for ground surface rupture from earthquake faulting and the presence of near-surface mine features that could collapse beneath foundations.

Because the rock beneath the site may be relatively difficult to excavate using a backhoe, we recommend overexcavating rock, where it exists within depths of proposed excavations normally made using a backhoe (such as those for footings and underground utilities) and using larger grading equipment (such as a dozer with rippers and/or hoe rams) or blasting. The overexcavations should then be backfilled with compacted engineered fill. This way, excavations made to construct underground improvements using a backhoe will extend through engineered fill, which is easier to excavate using a backhoe. Condor believes that this overexcavation may be appropriate for the footings at the north side of the proposed operations building where hard and shallow rock is anticipated, and possibly for underground utility trenches (depending on the locations and depths of underground utilities).

Based on the data and our evaluations, Condor concludes that the improvements described in Section 2.0 may be constructed as proposed when the general intent of the recommendations that follow are implemented for design and during construction. Conventional spread footings designed and constructed according to our recommendations may be used to support the proposed buildings.

8.1 SEISMIC AND GEOLOGIC HAZARDS

The subsurface data indicate that there is no saturated, relatively loose, cohesionless soil beneath the proposed improvement sites. Therefore, Condor considers the potential for liquefaction to be nonexistent.

The site is not located within an Alquist-Priolo Earthquake Fault Zone (Hart and Bryant, 1997). The Alquist-Priolo Earthquake Fault Zone boundaries are typically within about ⅛-mile (660 feet) of a mapped active fault trace. The subject project site is within 660 feet of two inferred (dashed) pre-Quaternary faults traces (one mapped approximately 425 feet southwest, and one mapped approximately 280 feet northeast of the project site), which appear on published geologic mapping by the California Division of Mines and Geology (2002), as approximately shown on our Figure 3. Geologic contacts are not offset by the fault traces, indicating no historical fault movement was detected. The Quaternary Period began approximately 2.5 million years ago, so these features are not considered active. There are no local ordinances requiring special studies related to buildings proximal to these ancient inferred geological features. The threat of fault rupture is low.

Mines in rock can collapse after they are abandoned from progressive deterioration of the support system and weathering of exposed rock. Collapse of mines can occur rapidly as an isolated cave-in after periods of heavy rain. The magnitude of surface subsidence resulting from collapse would depend on the depth and size of the collapse. Mines collapsing beneath foundations could cause significant foundation settlement, structural damage, and unsafe conditions.

Although there are no known mines beneath or adjacent to the proposed building location, underground mining did occur in the vicinity that could have extended to beneath the site and potentially collapse, and cause building damage and hazardous conditions. Available sources show nearby mines to be oriented away from the site (Clark and Lydon, 1962). For this reason, we do not recommend any additional subsurface investigation work be performed at the site. If anomalies suggesting the potential for openings such as ground settlement and closed drainage patterns are discovered, then additional subsurface investigation work may be warranted, and our recommendations should be re-evaluated.

8.2 SEISMIC DESIGN

Condor recommends using the following values for seismic design according to the 2007 CBC:

• Site Class	B
• Spectral Response Acceleration, S_s, (0.2 second Period)	0.369
• Spectral Response Acceleration, S_1, (1.0 second Period)	0.184
• Site Coefficient, F_a	1.0
• Site Coefficient, F_v	1.0

In accordance with the 2007 CBC, C_s may be calculated using a value of S_s equal to 1.5 for regular structures with five or less stories and periods (T) of 0.5 seconds or less (American Society of Civil

Engineers 7-05, Minimum Design Loads for Buildings and Other Structures Section 12.8.1.3 – as referenced in the CBC).

8.3 EARTHWORK

8.3.1 Site Preparation

The existing ground surface should be prepared as described in this section in all areas to receive fill, and improvements. Site preparation includes demolition/removal of existing surface and subsurface improvements (such as the existing pavement), and removal of debris, organics, organic topsoil, and any other unsuitable material. Site preparation operations should extend at least 5 feet beyond the limits of new fill or improvements (where possible). We anticipate that stripping to a depth of about 2 to 4 inches will be required to remove the organics and topsoil. Deeper stripping may be locally required to remove concentrations of vegetation, such as brush and tree roots. No debris, thick layers of organic topsoil, or other unsuitable material was encountered in our test pits. The cleared vegetation and debris should be removed from the site, but the strippings can be stockpiled for reuse in landscape areas.

Any vegetation and organic topsoil with more than 2 percent organic material by dry weight should be removed. Debris, foundations, pavements, utilities to be abandoned, and other underground facilities should also be removed. The exposed ends of pipes that have been removed should be capped. The Geotechnical Engineer should observe and approve the prepared site prior to any excavation, subgrade preparation, and placement of fill or improvements.

8.3.2 Excavations

The contractor shall be responsible for the stability of all temporary excavations and should comply with applicable CalOSHA regulations (California Construction Safety Orders). All open cuts should be regularly monitored for evidence of incipient stability failures.

As discussed in Section 8.0, overexcavation of rock using larger grading equipment or blasting may be appropriate. The contractor should review the grading, underground utility, and foundation plans, any other plans for excavations, and subsurface data and evaluate the excavation equipment and procedures that will be required and appropriate. Condor suggests that the contractor should be prepared to use a hydraulic hammer and possibly blasting. It is likely that excavated materials will include rocks that require processing or crushing in order to use as fill.

8.3.3 Subgrade Preparation

Soil loosened during site preparation and excavation, or any other soft or loose soil remaining after excavation and beneath proposed fills should be removed and replaced with properly compacted engineered fill. Subgrades should be approved by the Geotechnical Engineer prior to compacting and covering them.

After approval by the Geotechnical Engineer, subgrades or excavated surfaces beneath fill or improvements, and that consist of soil as opposed to rock, should be scarified to a depth of 8 inches (where possible), uniformly moisture conditioned to facilitate compaction, as necessary, and compacted to at least 90 percent relative compaction (ASTM Test Method D-1557). Soil subgrades beneath vehicular pavement areas should be moisture conditioned to slightly over optimum and compacted to at least 95 percent relative compaction (ASTM Test Method D-1557).

Subgrades should be kept moist and free of disturbance until they are covered. Scarification, moisture conditioning, and recompaction of subgrades that become dry and/or disturbed should be performed. The Geotechnical Engineer should approve all subgrades before they are covered by fill or improvements.

8.3.4 Engineered Fill

Engineered fill should have less than 2 percent by dry weight of vegetation and deleterious material and should meet the gradation requirements presented in the following table:

Sieve Designation	Minimum Percent Passing by Dry Weight
4-inch square	100
0.75-inch square	70
US No. 4	60

Fine-grained soil with a liquid limit greater than 40 and a plasticity index greater than 15 should not be used as engineered fill. Imported fill placed within 1 foot of pavement soil subgrades should have an R-value of at least 15. Our observations indicate that the soils excavated from this site should meet the plasticity requirements for fill. However, crushing and/or removal of bedrock particles greater than 4 inches in size could be required. Fill within one foot of pavement soil subgrades should have an R-Value of at least 15. The Geotechnical Engineer should approve all fill for use prior to placement.

Fill placed in swales and drainage channels should be benched into firm soil along the bottom and sides to provide a firm level surface on which to place new compacted fill.

Engineered fill meeting the requirements given in the preceding paragraphs should be uniformly moisture conditioned to over optimum and compacted to at least 90 percent compaction (ASTM Test Method D-1557). Trench backfill may be compacted to at least 85 percent relative compaction (ASTM Test Method D-1557), if the trenches are more than 5 feet beyond the edges of structures, pavements, slabs-on-grade, or other improvements. Engineered fill should be placed in horizontal lifts that are less than 8 inches in uncompacted thickness, and each lift should be compacted to the above requirements prior to placing subsequent lifts.

8.3.5 Utility Trenches

Utility trenches excavated parallel to shallow foundations and edges of pavement should be set back so the trench bottoms lie outside a 1.5 horizontal to 1 vertical plane extending down from the footing bottom or pavement edge.

Below-grade utilities should be bedded and backfilled according to the requirements of the service provider (utility company) and the County and/or City. Where no specific requirements are imposed, we recommend placing free-draining bedding sand from 6 inches below to 1 foot above the conduit or pipe. Bedding sand should have a sand equivalent of at least 30.

Bedding sand and backfill should not be jetted or ponded into place but should be mechanically compacted in accordance with the recommendations in Section 8.3.4.

8.4 SURFACE DRAINAGE AND EROSION CONTROL

Surface drainage should be provided to reduce ponding and drain surface water away from foundations, slabs-on-grade, and edges of pavements. Surface runoff should be directed toward suitable collection or discharge facilities. We recommend that within 10 feet of buildings, a surface gradient of at least 2 to 4 percent be used for paved and unpaved surfaces, respectively. Elsewhere, we recommend using a positive surface drainage of 2 percent. Pavements should be designed with gradients of 2 percent in their principal direction of drainage, unless drainage reaches are less than 20 feet.

We recommend that approved temporary and permanent erosion control measures be implemented to reduce erosion and comply with applicable County and/or City requirements. Soil on graded or cut slopes should be fertilized, mulched, and planted as soon as possible after grading with erosion-resistant vegetation. These plants should be watered lightly at appropriate intervals until growth is established.

8.5 FOOTINGS

Footings should be embedded at least 18 inches below the lowest adjacent soil subgrade. We define soil subgrade as the prepared soil beneath floor slabs, aggregate layers, and landscape soil.

Footings bearing on undisturbed natural soil, rock, or compacted engineered fill may be designed using an allowable bearing capacity of 3,000 pounds per square foot (psf) for dead plus normal duration live loads. This allowable bearing capacity value may be increased by one-third for total load conditions, including wind and seismic.

For resistance to lateral loads, base friction resistance may be calculated using an ultimate friction coefficient of 0.35. Passive resistance may be calculated using a uniform pressure of 1,300 psf (rectangular distribution) for transient loads, such as seismic loads, and an equivalent fluid unit weight (triangular distribution) of 250 pcf for sustained loads. Passive resistance contributed by the top 12 inches of soil should be neglected unless a concrete slab-on-grade or pavement covers the ground. We reduced these allowable passive pressures by a factor of 1.5 from the ultimate value to limit the foundation movement required to mobilize passive pressure. The recommended passive pressure and base friction may be combined without reduction in calculating total lateral resistance.

We anticipate that bedrock excavation will result in some overexcavation because excavated rock has relatively large particle sizes. Any overexcavations may be backfilled with engineered fill consisting of on-site material, provided no more than 1 foot of fill beneath footings is required. Overexcavations beneath and on the sides of footings may be backfilled with lean cement slurry or concrete with a 28-day unconfined compressive strength of at least 100 pounds per square inch (psi).

The Geotechnical Engineer should check all footing excavations prior to placing steel and casting concrete. Any unsuitable, loose, or soft soil encountered at footing bottoms, as determined by the Geotechnical Engineer during construction, should be removed and replaced by concrete or lean cement slurry.

Condor estimates that settlement of footings designed and constructed according to our recommendations should settle less than ½ inch, and differential settlement should be less than ½ inch in 30 horizontal feet.

8.6 SLABS-ON-GRADE

Subgrade soil beneath slabs-on-grade should be prepared and maintained moist and undisturbed until they are covered according to the recommendations presented in Section 8.3. Soil subgrades should not be covered until the Geotechnical Engineer approves them.

To reduce water vapor transmission upward through floor slabs, they should be constructed on a minimum 4-inch thick layer of capillary break material covered with a vapor retarder. The capillary break material should be free-draining, clean gravel or rock, such as No. 4 by ¾-inch pea gravel or permeable aggregate complying with Caltrans Standard Specification, Section 68, Class 1, Type B Permeable Material. The vapor retarder should be at least 10-mil in thickness and meet the material requirements for Class C vapor retarders presented in ASTM Standard Specification E1745, and should be installed according to ASTM E1643. These installation requirements include overlapping seams by 6 inches, taping seams, and sealing penetrations in the vapor retarder.

Condor does not practice in the field of moisture vapor transmission and we suggest that qualified experts be contacted to assist in the design and construction of measures related to moisture transmission through slabs-on-grade. The American Concrete Institute (ACI) Committee document "Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials" (ACI 302.2R-06) does provide guidelines for reducing moisture migration through slabs-on-grade. This document advises that concrete slabs be cast directly on the vapor retarder (ACI 302.2R-06, Section 9.3) and provides guidelines for selecting vapor permeance, tensile strength and puncture resistance. When casting the slab directly on the vapor retarder, a reduced joint spacing, low shrinkage mix design, or other appropriate measures should be used to control slab curl. The ACI guide also notes that a maximum water-cement ratio of 0.5 has yielded satisfactory performance on many slab-on-grade projects. Water-reducing admixtures may be useful in achieving workability at low water-cement ratios. Control joints should be provided at appropriate intervals to control the location of shrinkage cracks. After proper curing, the slab should be allowed to dry and then should be tested to check that the moisture transmission rate is appropriate for the intended floor covering.

To minimize shrinkage cracking, concrete slabs should be reinforced with No. 3 rebar spaced 18 inches on center each way.

Where moisture transmission through slabs-on-grade such as pedestrian exterior concrete pavements is tolerable, then the slabs may be cast directly on the soil subgrade. We suggest, however, that 4-inch thick layers of aggregate base be placed beneath exterior slabs to protect the soil subgrades from disturbance during construction activity, such as placement of reinforcing steel, or from drying of the subgrade soil.

8.7 PAVEMENT

Soil subgrades beneath pavement areas should be prepared and maintained moist and undisturbed until covered in accordance with the recommendations in Section 8.3.3. The Geotechnical Engineer should approve subgrades immediately before they are covered.

Based on the results of our R-value tests and our evaluation, we recommend using an R-value of 15 for design. Condor should evaluate the actual R-value during construction after pavement subgrades are prepared. The R-value of imported material should be at least as high as the design value.

Class 2 aggregate base (AB) beneath pavement areas should comply with the minimum requirements specified in Caltrans Standard Specifications, Section 39 for 19 mm (0.75-inch) Type B aggregate and should be compacted to a minimum of 95 percent relative compaction (ASTM Test Method D-1557). AB that becomes disturbed after compaction should be re-compacted and re-tested prior to paving. The Geotechnical Engineer should approve the AB surface for proper compaction immediately prior to paving.

Paved areas should be sloped and adequately drained to prevent surface water or subsurface seepage from saturating and weakening the pavement subgrade soil. Where adjacent landscape or vacant areas slope down to pavement, provisions should be made to reduce seepage of subsurface water beneath pavements. Curbs that extend at least 2 inches below the soil subgrade could be used to reduce seepage. For better performance, especially where swales descend down towards pavement edges, we recommend that adequate surface drainage be provided and that subdrains (edge drains) be considered.

The subsections that follow contain additional recommendations for design of asphalt concrete (AC) and concrete pavements.

8.7.1 Asphalt Concrete Pavement

We based our design recommendations for new AC pavement on the Caltrans Flexible Pavement Design Method as presented in Chapter 600 of the California Department of Transportation Highway Manual, and an R-value of 15. The designs include a 0.2 factor added to the required gravel equivalent (GE) of the AC layer. The table that follows presents the resulting recommended pavement design sections.

Traffic Index	Recommended AC Thickness (inches)	Recommended AB Thickness (inches)
4 (and below)	2.5	6
5	2.5	9.5
6	3	11.5

AC = Asphalt Concrete
AB = Class 2 Aggregate Base (minimum R-Value = 78)

AC should comply with the Caltrans material property requirements.

8.7.2 Concrete Pavement

Exterior concrete pavement design should conform with County and/or City standards. A modulus of subgrade reaction, k_v (30-inch circular plate) of 150 psi, may be used for design of vehicular concrete pavement. We recommend that exterior concrete pavements consist of at least 6 inches of AB beneath at least 6 inches of concrete.

The concrete used for pavement areas should have a 28-day compressive strength of at least 3,000 psi, and should have entrained air to resist damage from freezing.

Expansion/contraction joints should be constructed at a maximum spacing of 15 feet. Where the outer edge of a concrete pavement meets asphalt pavement, the concrete slab should be thickened by 50 percent at a taper not to exceed a slope of 1 in 10.

9.0 CONSTRUCTION CONSIDERATIONS

If earthwork operations are performed during the rainy season or where wet soils are encountered regardless of season, measures such as drying of soil, excavation and replacement, chemical treatments of the soil, or use of stabilization fabric and rock may be useful to stabilize "pumping" soils and facilitate compaction.

As discussed in Section 8.3.2, excavations extending more than a few feet below the top of bedrock may be difficult to excavate using a backhoe.

10.0 ADDITIONAL SERVICES

Condor should review project plans and specifications to check that our recommendations apply, and that the intent of our recommendations is incorporated in the design.

Because subsurface conditions vary, it is not possible to include all construction details related to the geotechnical aspects of the project in plans and specifications. Geotechnical recommendations depend on the possible need for adjustment in the field during construction. The adjustments depend on conditions revealed during construction that could only be anticipated based on available subsurface information at the time we issued this report. Therefore, Condor, or another qualified representative, should perform geotechnical observation and testing services during grading and construction of foundations and pavements to check that the intent of our recommendations were followed during construction and that the geotechnical aspects of the work are performed in accordance with the approved plans and specifications. In addition, we should check for any subsurface conditions that vary from the conditions encountered during our subsurface investigation, and we should develop supplemental geotechnical recommendations, as necessary.

11.0 LIMITATIONS

The geotechnical conclusions and recommendations presented in this report are intended for planning and design of the proposed operations headquarters building as described in Section 2.0. These conclusions and recommendations may not apply if:

- The report is used for a different site or project.
- The recommendations presented in this report are not followed.
- Any other change is made that materially alters the proposed project.

We based the conclusions and recommendations presented in this report on the data obtained from the test pits shown on Figure 2. Subsurface conditions may, and usually do, vary between and around these locations. Should varied conditions be discovered during construction, additional exploration, testing, analysis, and development of supplemental recommendations may be required. Any person associated with this project who observes conditions or features of the site or its surrounding areas that are different from those described in the report should report them immediately to Condor for evaluation.

Implementation of our recommendations requires an adequate testing and observation program during construction. If Condor does not perform this testing and observation, as discussed in various sections of this report, then the Geotechnical Engineer responsible for observation and testing should thoroughly review this report and should agree with its conclusions and recommendations or, otherwise, provide alternative recommendations. If Condor is not retained for these services, then the client and their consultant that performed the services assumes the responsibility for any potential claim during and after construction because of misinterpretation of recommendations in this report. Condor will no longer be the Geotechnical Engineer of Record when another consultant performs any additional geotechnical services.

This report was prepared in accordance with the generally accepted standards of geotechnical engineering practice that exist in Calaveras County at the time Condor issued it. No other warranty, express or implied, is made. It is the Owner's responsibility to see that all parties to the project, including the designers, contractors, and subcontractors, are made aware of this report in its entirety.

Changes in the standards of practice in the field of geotechnical engineering, changes in site conditions such as new excavations or fills, new agency regulations, or modifications to the proposed project warrant professional review of this report. Because of this, there is a practical limit to the usefulness of this report without critical professional review. It is suggested that 2 years be considered a reasonable time for the validity of this report.

Respectfully submitted,

CONDOR EARTH TECHNOLOGIES, INC.

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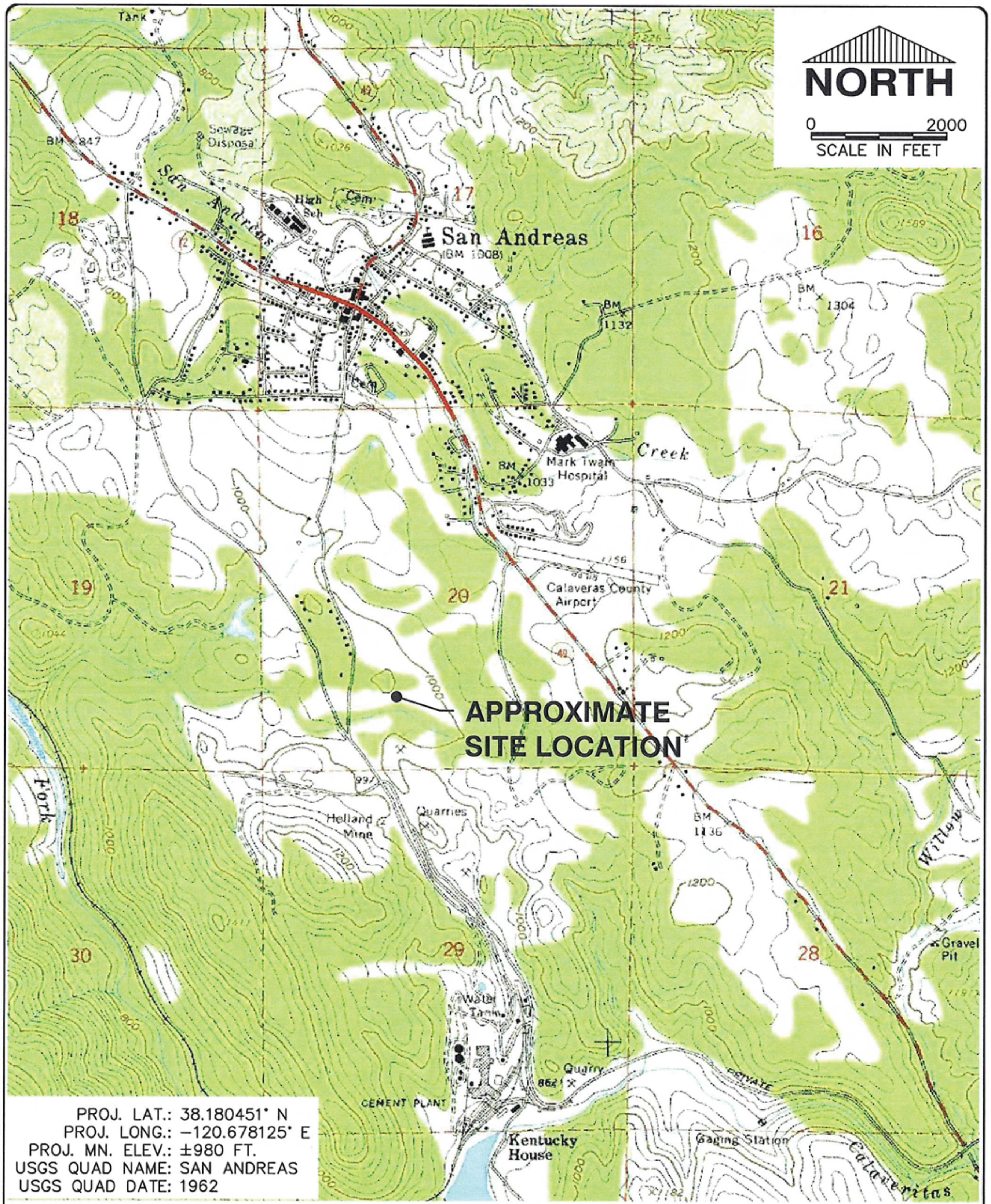
FIGURES



PROJ. LAT.: 38.180451° N
PROJ. LONG.: −120.678125° E
PROJ. MN. ELEV.: ±980 FT.
USGS QUAD NAME: SAN ANDREAS
USGS QUAD DATE: 1962

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Job No.	5132M
Published Date	11/23/10
Scale	AS SHOWN
Drawn	DJT
Chk'd	ASK

VICINITY MAP
PROPOSED OPERATIONS HEADQUARTERS
CALAVERAS COUNTY WATER DISTRICT
SAN ANDREAS, CALAVERAS COUNTY, CA

FIGURE
1

File No.
5132M-F1

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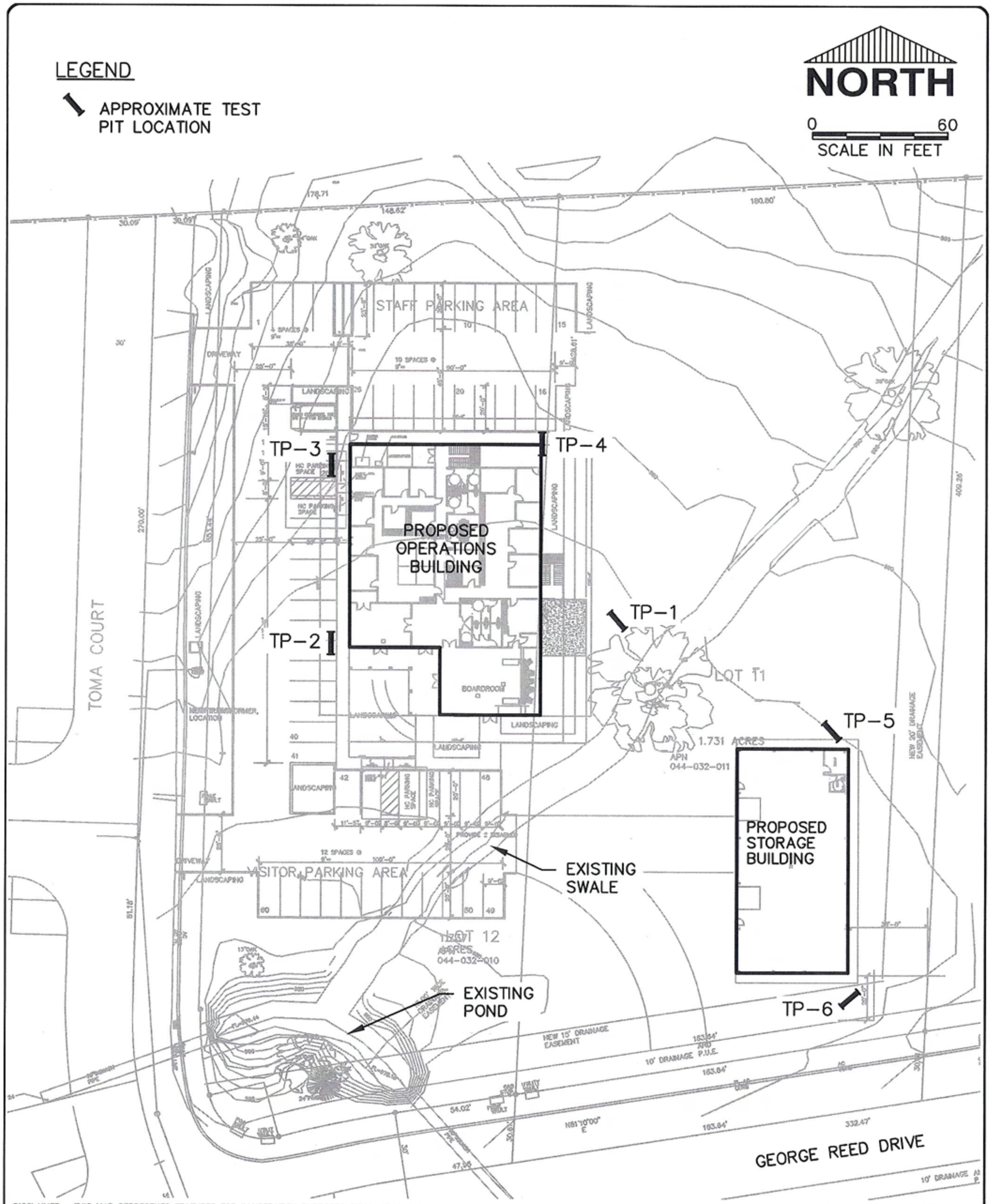

DISCLAIMER: THIS MAP REPRESENTS FEATURES FOR ILLUSTRATION PURPOSES ONLY. IT IS NOT A LEGAL SURVEY AND IS NOT INTENDED FOR USE IN DETERMINING BOUNDARIES. ANY USE OF THIS MAP FOR PURPOSES OTHER THAN FOR APPROXIMATE LOCATION OF FEATURES IS DONE SO AT THE USER'S RISK AND WITHOUT THE CONSENT OF CONDOR EARTH TECHNOLOGIES, INC.

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Job No. 5132M
Published Date 11/23/10
Scale AS SHOWN
Drawn DJT
Chk'd ASK

SITE PLAN
PROPOSED OPERATIONS HEADQUARTERS
CALAVERAS COUNTY WATER DISTRICT
SAN ANDREAS, CALAVERAS COUNTY, CA

FIGURE 2

File No. 5132M-F1

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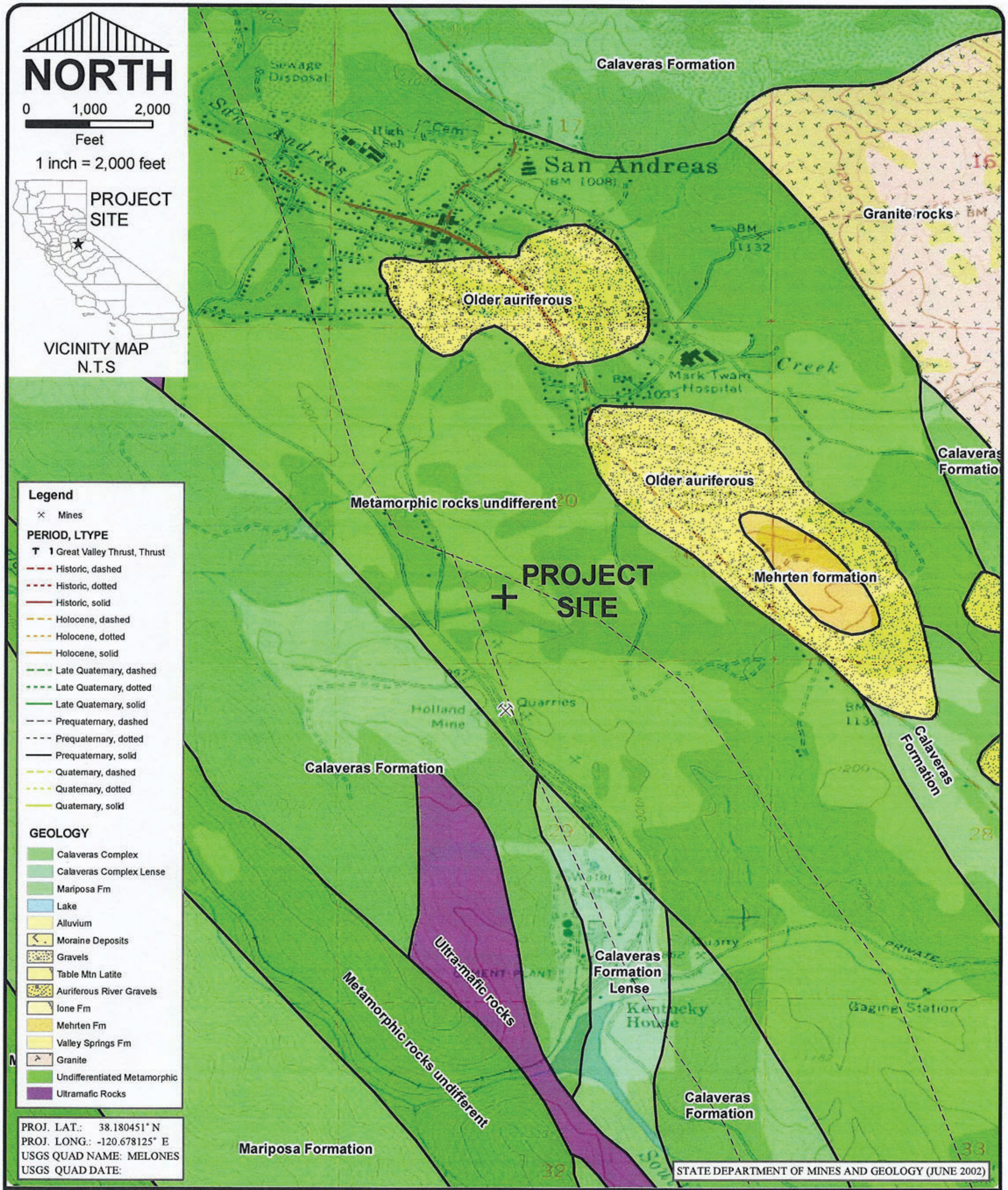

PROJ. LAT.: 38.180451° N
PROJ. LONG.: -120.678125° E
USGS QUAD NAME: MELONES
USGS QUAD DATE:

STATE DEPARTMENT OF MINES AND GEOLOGY (JUNE 2002)

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5132

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23 NOV. 2010

Scale
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Drawn
JDM

Chk'd
AK

SURFACE GEOLOGY MAP NEW OPERATIONS HEADQUARTERS CALAVERAS COUNTY WATER DISTRICT

FIGURE
3

File No.
5950_F33.mxd

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APPENDIX A

Test Pit Logs

CONDOR EARTH TECHNOLOGIES, INC.

LOG OF TEST PIT - TP-1

Project:	New Operations Headquarters - Calaveras County Water District Northeast Corner of George Reed Drive/Toma Court Intersection San Andreas, California	**Location:**	See Figure 2
		Approx. Coord.:	
		Approx. Elev. (ft):	988.5
Project No.:	5132M	**Approx. Depth (ft):**	5
Logged By:	A. Kositsky	**Approx. Length (ft):**	10
Date:	11/15/10	**Orientation:**	
		Equipment:	Rubber-tired backhoe with 2-foot-wide bucket

Depth (ft): 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14

<u>NATURAL SOIL</u> - LEAN CLAY WITH SAND (CL): brown, moist, stiff, fine-grained sand

0.5 feet: w = 14.8, γ_d = 90

1 foot: dry to moist, hard

2.5 feet: w = 7.8, γ_d = 103

LEAN CLAY WITH SAND (CL): brown, dry to moist, hard, fine-grained sand, some coarse and subrounded gravel consisting of strong and hard marble

5 feet: pyllite

GROUNDWATER:	Not encountered at time of excavation
SAMPLE:	Tube samples at 0.5 feet and 2.5 feet
NOTES:	

<u>LEGEND:</u>

PP = Pocket Penetrometer Resistance - Unconfined Compressive Strength (tons per square foot)

F = Percent Passing No. 200 Sieve by Dry Weight, LL = Liquid Limit, PI = Plasticity Index

w = Moisture Content (percent), γ_d = Dry Unit Weight (pounds per cubic foot)

q_u = Unconfined Compressive Strength - Laboratory (pounds per square foot)

S_u = Undrained Shear Strength (pounds per square foot)

Drained Shear Strength Parameters: c' = Cohesion (pounds per square foot), ϕ' = Internal Friction Angle (deg)

CONDOR EARTH TECHNOLOGIES, INC.

LOG OF TEST PIT - TP-2

Project:	New Operations Headquarters - Calaveras County Water District Northeast Corner of the George Reed Drive/Toma Court Intersection San Andreas, California	**Location:**	See Figure 2
		Approx. Coord.:	
		Approx. Elev. (ft):	988
Project No.:	5132M	**Approx. Depth (ft):**	3.5
Logged By:	A. Kositsky	**Approx. Length (ft):**	10
Date:	11/15/10	**Orientation:**	
		Equipment:	Rubber-tired backhoe with 2-foot-wide bucket

Depth (ft)

0		
1		**NATURAL SOIL - LEAN CLAY WITH SAND (CL):** brown, moist to wet, medium stiff, fine-grained sand 1 foot: dry to moist, very stiff to hard
2		
3		**CALAVERAS FORMATION - PHYLLITE:** Moderately weathered, closely fractured, tight and slightly rough fractures, moderately strong, moderately hard
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

GROUNDWATER: Not encountered at time of excavation

SAMPLE:

NOTES:

LEGEND:

PP = Pocket Penetrometer Resistance - Unconfined Compressive Strength (tons per square foot)

F = Percent Passing No. 200 Sieve by Dry Weight, LL = Liquid Limit, PI = Plasticity Index

w = Moisture Content (percent), γ_d = Dry Unit Weight (pounds per cubic foot)

q_u = Unconfined Compressive Strength - Laboratory (pounds per square foot)

S_u = Undrained Shear Strength (pounds per square foot)

Drained Shear Strength Parameters: c' = Cohesion (pounds per square foot), ϕ' = Internal Friction Angle (deg)

CONDOR EARTH TECHNOLOGIES, INC.

LOG OF TEST PIT - TP-3

Project: New Operations Headquarters - Calaveras County Water District
Northeast Corner of the George Reed Drive/Toma Court Intersection
San Andreas, California
Project No.: 5132M
Logged By: A. Kositsky
Date: 11/15/10

Location: See Figure 2
Approx. Coord.:
Approx. Elev. (ft): 990
Approx. Depth (ft): 2.5
Approx. Length (ft): 10
Orientation:
Equipment: Rubber-tired backhoe with 2-foot-wide bucket

Depth (ft)

0		
1		**NATURAL SOIL - LEAN CLAY WITH SAND (CL):** brown, moist , very stiff to hard, fine-grained sand LL = 28, PI = 9, R-Value = 23
2		**CALAVERAS FORMATION - MARBLE:** Slightly weathered, Occasionally fractured, tight and slightly rough fractures, strong, hard
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

GROUNDWATER: Not encountered at time of excavation
SAMPLE: Bulk Sample: 0.5 to 1.5 feet
NOTES:

LEGEND:

PP = Pocket Penetrometer Resistance - Unconfined Compressive Strength (tons per square foot)
F = Percent Passing No. 200 Sieve by Dry Weight, LL = Liquid Limit, PI = Plasticity Index
w = Moisture Content (percent), γ_d = Dry Unit Weight (pounds per cubic foot)
q_u = Unconfined Compressive Strength - Laboratory (pounds per square foot)
S_u = Undrained Shear Strength (pounds per square foot)
Drained Shear Strength Parameters: c' = Cohesion (pounds per square foot), ϕ' = Internal Friction Angle (deg)

CONDOR EARTH TECHNOLOGIES, INC.

LOG OF TEST PIT - TP-4

Project: New Operations Headquarters - Calaveras County Water District
Northeast Corner of the George Reed Drive/Toma Court Intersection
San Andreas, California
Project No.: 5132M
Logged By: A. Kositsky
Date: 11/15/10

Location: See Figure 2
Approx. Coord.:
Approx. Elev. (ft): 989.5
Approx. Depth (ft): 4
Approx. Length (ft): 10
Orientation:
Equipment: Rubber-tired backhoe with 2-foot-wide bucket

Depth (ft)		
0		**NATURAL SOIL - LEAN CLAY WITH SAND (CL):** brown, moist , stiff , fine-grained sand
1		1.5 feet: dry to moist, very stiff to hard
2		
3		**CALAVERAS FORMATION - PHYLLITE:** Moderately weathered, closely fractured, tight and slightly rough fractures, moderately strong, moderately hard
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		

GROUNDWATER: Not encountered at time of excavation
SAMPLE:
NOTES:

LEGEND:

PP = Pocket Penetrometer Resistance - Unconfined Compressive Strength (tons per square foot)
F = Percent Passing No. 200 Sieve by Dry Weight, LL = Liquid Limit, PI = Plasticity Index
w = Moisture Content (percent), γ_d = Dry Unit Weight (pounds per cubic foot)
q_u = Unconfined Compressive Strength - Laboratory (pounds per square foot)
S_u = Undrained Shear Strength (pounds per square foot)
Drained Shear Strength Parameters: c' = Cohesion (pounds per square foot), ϕ' = Internal Friction Angle (deg)

CONDOR EARTH TECHNOLOGIES, INC.

LOG OF TEST PIT - TP-5

Project: New Operations Headquarters - Calaveras County Water District
Northeast Corner of the George Reed Drive/Toma Court Intersection
San Andreas, California

Project No.: 5132M

Logged By: A. Kositsky

Date: 11/15/10

Location: See Figure 2

Approx. Coord.:

Approx. Elev. (ft): 988.5

Approx. Depth (ft): 5

Approx. Length (ft): 10

Orientation:

Equipment: Rubber-tired backhoe with 2-foot-wide bucket

Depth (ft)		
0 1 2 3		**<u>NATURAL SOIL</u> - LEAN CLAY WITH SAND (CL):** brown, moist, medium stiff to stiff, fine-grained sand 1.5 feet: dry to moist, hard
4 5 6 7 8		**LEAN CLAY WITH SAND (CL):** brown, dry to moist, hard, fine-grained sand, some fine to coarse and subangular gravel consisting of phyllite, which is highly weathered, friable, and ha low hardness
9 10 11 12 13 14		

GROUNDWATER: Not encountered at time of excavation

SAMPLE: Tube samples at 2 feet (partial)

NOTES:

<u>LEGEND:</u>

PP = Pocket Penetrometer Resistance - Unconfined Compressive Strength (tons per square foot)

F = Percent Passing No. 200 Sieve by Dry Weight, LL = Liquid Limit, PI = Plasticity Index

w = Moisture Content (percent), γ_d = Dry Unit Weight (pounds per cubic foot)

q_u = Unconfined Compressive Strength - Laboratory (pounds per square foot)

S_u = Undrained Shear Strength (pounds per square foot)

Drained Shear Strength Parameters: c' = Cohesion (pounds per square foot), ϕ' = Internal Friction Angle (deg)

CONDOR EARTH TECHNOLOGIES, INC.

LOG OF TEST PIT - TP-6

Project:	New Operations Headquarters - Calaveras County Water District Northeast Corner of the George Reed Drive/Toma Court Intersection San Andreas, California	**Location:**	See Figure 2
		Approx. Coord.:	
		Approx. Elev. (ft):	988.5
Project No.:	5132M	**Approx. Depth (ft):**	5.5
Logged By:	A. Kositsky	**Approx. Length (ft):**	11
Date:	11/15/10	**Orientation:**	
		Equipment:	Rubber-tired backhoe with 2-foot-wide bucket

Depth (ft)

0	
1	**NATURAL SOIL - LEAN CLAY WITH SAND (CL):** brown, moist , medium stiff to stiff, fine-grained sand 1 foot: w = 17.1, γ_d = 98
2	1.5 feet: dry to moist, very stiff to hard
3	
4	**CALAVERAS FORMATION - PHYLLITE:** Moderately weathered, closely fractured, tight and slightly rough fractures, moderately strong, moderately hard
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	

GROUNDWATER: Not encountered at time of excavation

SAMPLE: Tube sample at 1 foot

NOTES:

LEGEND:

PP = Pocket Penetrometer Resistance - Unconfined Compressive Strength (tons per square foot)

F = Percent Passing No. 200 Sieve by Dry Weight, LL = Liquid Limit, PI = Plasticity Index

w = Moisture Content (percent), γ_d = Dry Unit Weight (pounds per cubic foot)

q_u = Unconfined Compressive Strength - Laboratory (pounds per square foot)

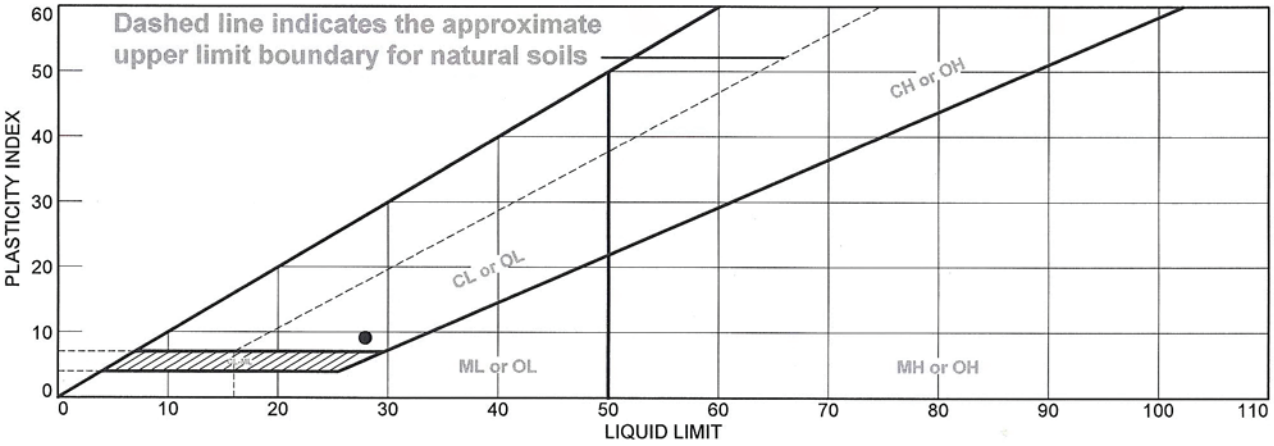
S_u = Undrained Shear Strength (pounds per square foot)

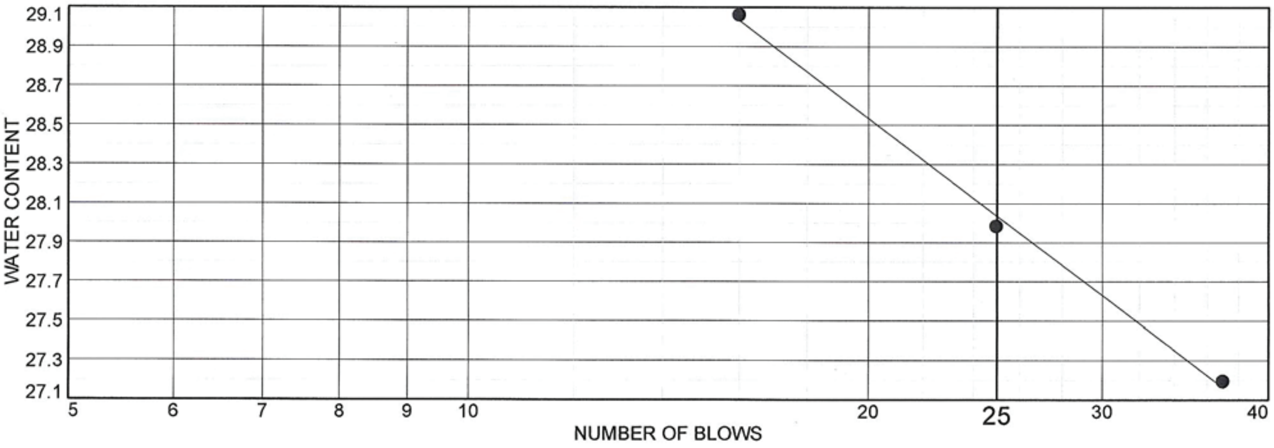
Drained Shear Strength Parameters: c' = Cohesion (pounds per square foot), ϕ' = Internal Friction Angle (deg)

APPENDIX B
Laboratory Test Results

CONDOR

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Reddish Brown Sandy Lean Clay	28	19	9			

Project No. 5132M **Client:** C.C.W.D.

Project: Admin Building Geotechnical Report

●**Location:** TP_3 **Depth:** 0.5'-1.5' **Sample Number:** RV-1

Remarks:

CONDOR EARTH TECHNOLOGIES

Jamestown, CA

Figure

Tested By: Anthony Allopenna **Checked By:** Andy Kositsky

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17857 High School Road, Jamestown, CA 95327 (209) 984-4593/4596(f)

www.condorearth.com

Resistance "R" Value Test Report (California Test 301)

CET Job: 5132M

Client: **C.C.W.D.**
Project: **Admin Building Geotechnical**

Sample ID : **RV-1**
Soil Description: **Reddish Brown Sandy Lean Clay**
Date Received: **November 16, 2010**
Tested by: **A. Allopenna**
Sample Source: **TP-3**
Depth of Sample: **0.5'-1.5'**

Specimen Number	1	2	3	4
Exudation Pressure (psi)	443	314	243	-
Expansion Pressure (psf)	165	113	48	-
Resistance Value, "R"	42	25	14	-
Moisture Content at Test (%)	12.8	13.1	13.9	-
Dry Density at Test (pcf)	117.7	116.8	115.7	-
Initial Moisture Content (%)	12.78			
R-Value by Exudation Pressure =	**23**			
R-Value by Expansion Pressure =	**27**	Assumed/Given TI = 4		
R-Value Design =	**23**			