LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

PRELIMINARY GEOTECHNICAL FEASIBILITY INVESTIGATION 580± ACRES BEDFORD CANYON CORONA AREA RIVERSIDE COUNTY, CALIFORNIA

PROJECT NO. 31558.1
MARCH 25, 2002

Prepared For:

Bluestone Communities
1300 N. Bristol Street
Newport Beach, California 92660

Attention: Mr. Ralph Emerson

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Subject Preliminary Geotechnical Feasibility Investigation, 580± Acre Project, Bedford Canyon, Corona Area, Riverside County, California

LOR Geotechnical Group, Inc. is pleased to present this report summarizing our preliminary geotechnical feasibility investigation for the above referenced project. This report was based upon a scope of services generally outlined in our Proposal dated January 22, 2002 and other written and verbal communications.

In summary, it is our opinion that the site can be developed from a geotechnical perspective, provided the recommendations presented in the attached report are incorporated into design and construction.

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INTRODUCTION

During January, February, and March of 2002, a Preliminary Geotechnical Feasibility Investigation was performed by LOR Geotechnical Group, Inc. for the proposed residential and commercial development of 580 ± acres within Bedford Canyon wash in the Corona area of Riverside County, California. The purpose of this investigation was to provide preliminary data regarding the geologic and geotechnical setting of the site to assist in preliminary concept designs for development of the site as well as to coordinate future geotechnical studies. The scope of our services included:

- Review of available pertinent geotechnical literature, reports, maps, and agency information pertinent to the study area;
- Interpretation of stereo aerial photograph pairs of the site and surrounding regions dated 1931 through 2000;
- Geologic field reconnaissance mapping to verify the areal distribution of earth units and significance of surficial features as compiled from documents, literature, and reports reviewed,
- A subsurface field investigation to estimate the average physical soil conditions pertinent to the proposed development;
- Laboratory testing of selected soil samples obtained during the field investigation;
- Development of feasibility geotechnical guidelines for site planning and
- Preparation of this report summarizing our findings and providing conclusions and recommendations for site development feasibility.

The approximate location of the site is shown on the attached Index Map, Enclosure A-1 within Appendix A.

To orient our investigation at the site, a 200-scale Site Map, prepared by AEI-CASC Engineering, Inc., undated, was furnished for our use. The proposed planning areas and existing topography were indicated on this plan. In addition, several 200-scale orthotopo maps were obtained from the Riverside County Flood Control and Water Conservation District. These maps showed the existing topography of the site overlain on aerial photography taken in April of 1991.

PROJECT CONSIDERATIONS

It is our understanding that the subject site is being considered for a master-planned residential development. While at this time no specific development plans have been prepared, the proposed development will consist of the construction residential housing, parks, a school, open space including a de-silting basin, and commercial/industrial development as well as the associated improvements to be developed on the 580 ± acre site.

No grading plans were available for our use during this investigation. However, observation of the site topography and adjacent properties indicates site development will entail minimal cuts and fills except in two or three locations where fill up to 100 feet may be needed to join the lower lying regions of the site with the higher elevations of the site.

At this time no design plans for structures have been formulated. However, the structures are anticipated to be wood frame and stucco for the residential housing and school and tilt-up, metal frame, reinforced masonry or similar type construction for the commercial/industrial buildings. Light to moderate foundation loads are anticipated with such structures, respectively.

EXISTING SITE CONDITIONS

The site consists of roughly 580 ± acres of land situated south of Eagle Glen Parkway and Cajalco Road, east and west of the I-15 freeway. Approximately 40 of the 580 ± acres lies east of the I-15 freeway, which cuts diagonally across the northeastern portion of the site. Current access to the site is from Eagle Glen Parkway via a small dirt road located along the north center portion of the site. Citrus groves cover the majority of the site. Those areas not planted with citrus groves, are typically in a relatively natural state. The site can be divided into two basic regions based on topography: the lower lying Bedford canyon wash area; and the higher, elevated, regions above and southwest of the canyon.

The lower lying canyon areas comprise the majority of the site and are make up the northern portions. This lower lying area is relatively planar, with an overall gentle gradient to the northeast. Citrus groves are present across the majority of the lower

lying regions of the site except for two small areas which are in a relatively natural state, with a moderate to heavy growth of brush. The active drainage of the site lies along the southern portion of the lower lying region and marks the boundary to the elevated areas of the site.

The elevated portions of the site rise steeply to the south from the lower lying regions some 100+ feet. These areas are also relatively planar with an overall gentle gradient to the northeast. Within the southern portion of the site, two planar areas are divided by a relatively steep, natural drainage trending northeast and another similar drainage exists on the far southern end. The majority of the planar areas within the elevated portions of the site are also planted with citrus groves. Along the southwest side of Bedford Canyon, the canyon walls have been eroded off to near vertical cliffs. The canyon walls along the northeast side are much more subdued. Based on our review of the aerial photos, it appears that the grading of the Eagle Glen Golf Course in the early 1990's shifted the current drainage coarse along the southwest edge of Bedford Canyon wash. This appears to be rapidly eroding these banks. Evidences for this was also noted in the presence of an old irrigation pipe which prior to the construction of the golf course, ran down this old canyon wall from the bluffs above. At the time of our visit this pipe was hanging out over the slope approximately 50 feet, evidence that the slope has been drastically eroded back.

Located near the center of the site was the grove caretaker's residence. This consisted of a mobile home, a steel storage and workshop buildings. At various places across the site there were small, above ground storage tanks for chemical additives, as well as wind machines and power poles. A large retention basin was noted along the southern portion of the site, and five water wells were also noted across the site. The site is bordered on the northwest by residential homes. The 15-freeway cuts diagonally across the northeastern portion of the site. The Corona Clay Quarry borders the northeastern portion of the site. The Eagle Glen Golf Course borders the site to the west.

AERIAL PHOTOGRAPH ANALYSIS

During the course of this study, an analysis of time-sequential stereoscopic aerial photograph pairs of the site and surrounding region, on file at the Riverside County Flood Control and Water Conservation District, were reviewed. Stereoscopic aerial

photograph pairs of the site and surrounding region dating from 1931 to 2000 were examined. A complete list of the photographs studied is given in the references at the back of this report.

SUBSURFACE FIELD INVESTIGATION

Our subsurface field exploration program was conducted on January 31, February 1, 4 through 7, and 14 of 2002 and consisted of excavating a total of 31 exploratory trenches using a tractor-mounted backhoe and drilling a total of 23 exploratory borings with a truck-mounted CME 55 drill rig equipped with an 8-inch diameter hollow stem auger. The trenches were excavated to depths ranging from 4.5 feet to 15.0 feet below the existing ground surface. The borings were drilled to depths ranging from 24.0 feet to 51.5 feet below the existing ground surface. The approximate locations of our exploratory trenches and borings are presented on the enclosed Site Geologic Map, Enclosures A-7 and A-8, within Appendix A.

Logs of the subsurface conditions encountered in the exploratory trenches were maintained by a geologist from this firm. In-place density tests were taken at various depths within the trenches using the Nuclear Density Method (ASTM D 2922). Bulk samples of the encountered materials were obtained and returned to the laboratory in sealed containers for further testing and evaluation.

Logs of the subsurface conditions encountered in the exploratory borings were also maintained by a geologist from this firm. Relatively undisturbed and bulk samples were obtained at a maximum depth interval of 10 feet and returned to the laboratory in sealed containers for further testing and evaluation.

A detailed description of the field exploration program and the trench and boring logs are presented in Appendix B.

LABORATORY TESTING PROGRAM

Selected soil samples obtained during the field investigation were subjected to laboratory testing to evaluate their physical and engineering properties. Laboratory testing included moisture content, dry density, laboratory compaction, direct shear, sieve analysis, sand equivalent, R-Value, percent passing the No. 200 sieve, expansion

index, and chemical analysis. A detailed description of the laboratory testing program and the test results are presented in Appendix C.

GEOLOGIC CONDITIONS

Regional Geologic Setting

The subject site is located along the northeastern foothills of the Santa Ana Mountains, just northwest of the Elsinore-Temecula basin, which in turn lies within the Perris Plain. The Santa Ana Mountains and Perris Plain lies within the larger Peninsular Ranges Geomorphic Province of southern California. The Peninsular Ranges Geomorphic Province is characterized by a series of north westerly trending mountain ranges extending from the coast of California eastward into the California desert and south to the tip of Baja California. These ranges are separated by wide valleys such as the Elsinore-Temecula basin and the Perris Plain. The Santa Ana Mountains are composed of a core of metamorphic rocks of the Bedford Canyon formation with lesser amounts of volcanic rocks. The age of these rocks is not known, but they are considered to be early Mesozoic or older (on the order of several hundred million years or more). Overlying the core of metamorphic rocks there is a relatively thick sequence of younger, late Mesozoic through Quaternary age, sedimentary rocks. The Elsinore-Temecula basin to the southeast was created by oblique movement along the Elsinore fault system which moved the Santa Ana Mountains to the northwest, away from the broad Perris Plain to the east. This tensional movement results in the down dropping of the Elsinore basin along, dip-slip faults that bounds the highlands. Erosion of the surrounding highlands has resulted in perhaps several thousands of feet of valley in-fill into the basin. Similar erosion of the Santa Ana Mountains to the northwest, along the southern Corona area, has resulted in the carving of a series a sub-parallel canyons leading down out of the mountains. The buildup of sediments from these canyons has over time built up into a very large coalescing alluvial fan which forms much of the elevated areas of southern Corona. However this fan has been dissected by a few of the larger drainage courses, such as Bedford Canyon.

The majority of the site lies within the Bedford Canyon wash. This wash is comprised of relatively young alluvial sediments. The depth of these units at the site was not determined during this study, but is considered to be highly variable ranging from a

few feet to on the order of several hundred or more to the older sedimentary bedrock and crystalline bedrock which underlies the valley floor.

The site lies within a relatively seismically active region of southern California. The nearest known active earthquake fault is the Elsinore fault zone. This system runs along the southwestern portion of the site other faults in the region include the Cucamonga fault located, approximately 23 miles to the north, the San Jacinto fault located approximately 20 miles to the northeast, the Newport-Inglewood fault located approximately 25 miles to the southwest, and the San Andreas fault approximately 30 miles to the northeast.

Site Geologic Conditions

As noted above the subject site is underlain by various ages of relatively unconsolidated alluvial materials overlying various ages of sedimentary rocks. While units of the crystalline metamorphic rocks were noted in the mountains just adjacent the site, they were not exposed at the site. The materials exposed at the site were categorized into the following geologic units: topsoil, fill, alluvium, older alluvium of the Corona Compound Alluvial Fan, terrace deposits, and sedimentary bedrock. These units are described as encountered during this investigation, in further detail in the following sections and are shown on the enclosed Site Geologic Map, Enclosures A-7 and A-8, within Appendix A.

Bedrock Units: The oldest rock units noted exposed at the site included a series of grayish-green, white, tan, or reddish-brown sandstone and siltstone rocks. These materials were noted cropping out at several places along the base of the southwestern canyon wall, and within several of our borings and trenches. These units were typically composed of greenish tan to tan silty sandstone to greenish tan sandy siltstone with sand and silt size grains of quartz and feldspars. There were occasional gravel and cobbles of a dark brown quartzite composition and a reddish brown volcanic rock. The overall units were typically moderately hard and dense, but highly weathered, were exposed, with a "hacky" or "puffy" appearance. Most of the units were moderately fractured and filled with secondary deposits of calcite.

The age and formation of these units was not determined during this study. However an earlier study of the region conducted by Gray (1961) indicated that these rocks

belong to either the Upper Eocene age (about 36 million years old) Sespe sandstone and conglomerate formation, or the Lower Miocene age (about 23 million years old) Vaqueros sandstone and siltstone formation. For this study we therefore labeled this group the Vaqueros/Sespe formation undifferentiated.

Terrace Deposits: Overlying the sandstone and siltstone bedrock materials is a coarse grained unit composed of relatively unconsolidated, yet very dense, sandy gravel with cobbles and gravelly sand. These units varied in composition from a medium and grained sand to a poorly graded gravel with up to 60% of medium, sub-rounded gravel in a coarse sand matrix. These units were typically reddish to yellowish-brown and composed of rocks with the similar composition as exposed in the Santa Ana Mountains to the southwest, suggesting a source. The overall units were unconsolidated yet they were very dense with some induration. Bedding was crude, predominately noted by the layering of the gravels and cobbles. Some of these units were noted to dip back towards the mountains at up to 10 degrees.

The age and formation of these units was not determined during this study. However the earlier study of the region conducted by Gray (1961) indicated that older alluvial terrace deposits in some areas are overidden by Pleistocene landslide materials and or thus thought to be, at least in part, of Pleistocene age (older than 11,000 years but younger than 1.8 million years).

Older Alluvial Deposits: The upper portions of the bluffs were noted, at least in part, to be composed of unconsolidated alluvial materials which form the southern portion of a coalescing alluvial fan that forms the southern portion of the town of Corona, described by Gray (1961) as the Corona Compound Fan. These units are lying unconformably upon the terrace deposits and bedrock units described above. They are similar in composition to the terrace deposits. However the clasts in general are finer grained and the color is typically brown to grayish-brown.

Alluvium: Recent alluvial deposits were encountered within all of our exploratory borings and trenches placed across the lower elevations of the site, within the Bedford Canyon wash area. These units consisted primarily of silty sand with various amounts of gravel and cobbles. Other units encountered included some units of sandy gravel and well graded gravel with sand and lessor units of sandy silt and well graded sand.

These younger alluvial units were typically loose in the upper 1 to 2 feet, increasing in relative density with depth.

Fills: Fill materials, where encountered at the site, varied in thickness from approximately 2 to 48 feet. The majority of the fills encountered at the site are believed to be the result of the leveling of the site from the citrus crops i.e., filling in of gullies. These typically ranged from 1 to 5 feet, however some of these were up to 10 feet (deep). An extremely deep area of fill was encountered within boring B-10 and trench T-28. The fill materials encountered within the boring were approximately 48 feet thick and contained brick, concrete, and trash debris. Based on the topography on the maps utilized in the field which pre-date the fill in this area and the current topography, these fill materials appear to have been recently pushed in to fill a previous large canyon in this area. The depth of the fill materials in this area are anticipated to be up to 60 or more feet in total thickness. Other than as encountered in boring B-10, trenches T-9 and T-23, the fill materials encountered were clean of trash and debris and consisted primarily of silty sand with angular gravel with lessor units of sandy gravel and well graded gravel with sand and some boulders up to 16-inches in diameter. The fill materials encountered were typically in a relatively loose state. In addition there is a very long, narrow, levee of fill running along the southeastern canyon wall, which is about 10 to 15 feet tall.

Topsoil: The majority of the site contained a relatively thin veneer of topsoil materials as encountered within our explorations at the site. In numerous locations, cattle manure, associated with the citrus grove usage of the site, was found overlying the topsoil materials and was noted to be approximately 1-inch thick. The topsoil materials were noted to typically consist of dry to damp, loose, brown to dark brown, silty sand with some angular gravel.

Our mapping of these units noted that they were composed a numerous channel fills that ranged from fine silts, uncommon, to the more predominate coarse gravelly sand. However, we did not that the lower portions of this unit tended to be slightly more indurated and yellowish brown in color, while the upper portions tended to be slightly looser and brown. This is most likely due to the obvious fact that the upper portions are younger.

Again, the age and formation of these units was not determined during this study. However the earlier study of the region conducted by Gray (1961) indicated that older alluvial deposits most likely predominately recent in age (up to 11,000 years) with some of the older units may be late Pleistocene (up to 700,000 years). The study conducted by Weber in 1977 indicated that these units are on the order of 500,000 years.

Regardless of the age, most all of these units oriented in near horizontal layers, with a slight dip to the northeast. However in several areas this dip was disturbed by localized faulting.

A detailed description of the subsurface soil conditions as encountered within our exploratory trenches and borings, is presented on the Trench and Boring Logs within Appendix B.

Groundwater Hydrology

Groundwater was not encountered within any of our exploratory trenches or borings, nor was any groundwater seepage observed during our site reconnaissance.

The nearest known groundwater wells lie within the center portion of the site. Groundwater records in this well, provided by the care taker of the citrus orchard, indicates that the regional groundwater lies at a depth of approximately 160 feet below the surface in the lower elevations of the site. Groundwater is anticipated to flow to the northeast following the regional topography within the lower elevations of the site.

Surface Runoff

Current surface runoff of precipitation waters across the site is typically from the southwest to the northeast as sheet flow on the relatively planar portions of the site. The active Bedford Canyon drainage is currently as a stream flow emanating from the Santa Ana Mountains adjacent to the southwest of the site and traversing the site along the southern edge of the lower lying portions adjacent to the bluffs on the southeast, flowing towards the northeast. Another smaller canyon runoff is present

between the two southern bluffs and flows to the northeast where it joins the Bedford Canyon wash runoff near the north portion of the site.

Mass Movement

The majority of the site lies on a relatively flat surface. The occurrence of mass movement failures such as landslides, rockfalls or debris flows within such areas are generally not considered common and no evidence of mass movement was observed within the relatively flat areas of the site. However, areas of moderate topographic relief are present across the site. Along both the north and south portions of the lower lying wash region, very steep, near vertical cliffs are present. As shown on the enclosed Site Geologic Map, Enclosures A-7 and A-8, within Appendix A, a relatively small landslide was noted along the southern wall of the northern bluff west of the I-15 freeway. This feature is assumed to be related to the mapped faulting in this location as interpolated from the aerial photographs. In addition, larger landslides were observed within the southeastern and southwestern portions of the site. The natural stability of these features should be addressed within specific studies for the individual tracts/development areas.

Faulting

As previously noted, the site is located within, and around, Bedford Canyon in the far southern regions of the city of Corona. This canyon emanates out of the Santa Ana Mountains which rise abruptly just southwest of the site. Past studies have long noted the Elsinore fault zone running along the base of these mountains. This fault was first shown on a published map and given the name "Elsinore" by A.C. Lawson in 1908 (Lawson and others 1908). The geology of the region was later studied by C.H. Gray with the State of California in 1961, who noted the recency of movement along this fault and a series of sub-parallel fault strands off the main fault zone. This early study was complemented by a seismic hazards study in 1977 by F. H. Weber, also with the State of California Division of Mines and Geology. The most recent mapping reviewed during our study of the area, was the Open File Report 02-21 by the United States Geological Survey. This latest study was a geologic map of the Corona 7.5 minute quadrangle by Gray, Morton, and Weber (Gray, Morton, and Weber, 2002). A copy of this map is included as Enclosure A-2 and a description of the geologic units is enclosed as Enclosure A-3, within Appendix A of this report.

These and other studies have long documented the presence of the Elsinore fault zone as a major active fault zone of southern California. Regionally it is part of the San Andreas system which in concert with other "sister" faults, the San Jacinto fault to the east and the Newport-Inglewood fault to the west, acts to distribute the right lateral movement across the North American and Pacific plates. Understandably the bulk of the movement along this fault is attributed as right lateral with some studies claiming lateral offsetting of the Santa Ana Mountains up to 18 miles to the northwest in relation to the Perris plain (Norris and Webb, 1990). However, the seismic movement and activity of this zone is considered to be very complicated with tensional motion also occurring. This is noted by a series of "normal" or pull apart faults which parallel the Elsinore fault zone. This "pulling apart" motion is generally considered responsible for the opening of the Elsinore Valley "graben" to the southeast of the site.

The Elsinore fault system consists of a sub-parallel set of faults which extend from below the US/Mexico border northwestwards through the Temecula and Elsinore Valleys and then into the southern Corona area. At this point the fault system bifurcates into the Chino fault to the north and the Whittier fault to the northwest. The work by Weber (1977) studied the portion of fault from Corona southeast into Temecula. Along this portion, the fault system was divided into the following eight segments: Fresno, Tin Mine, Eagle, Main Street, Glen Ivy North, Glen Ivy South, Willard and Wildomar. The portion of the fault zone which crosses the site was shown on that study as the Eagle fault zone. This portion consisted of a very complicated series of sub-parallel faults with vastly differing movement and history of activity. The southwestern side of this zone was marked by a thrust fault, were metamorphic bedrock units of the Bedford Canyon Formation have been pushed up over younger, sedimentary bedrock units. Just northeast of this thrust fault Weber noted the presence of the main active trace, lying just southwest of the subject site. Movement along this fault is considered right lateral and is responsible for offsetting the canyon. Northeast of the main fault Weber noted the presence of a series of pull-apart, or normal faults which break and offset units of Tertiary sedimentary rocks and older alluvial materials of Pleistocene age.

The information from these earlier studies resulted in the State of California zoning the Elsinore fault as a significant active fault and included it within the Alqiust-Priolo Earthquake fault zone (DMG CD-2000). This designation requires that prior to development, special fault studies must be conducted to evaluate the hazards

associated with the development. At that time the state only included the main break of the Elsinore fault within this zone, which lies just southwest of the site, therefore no A-P zone actually exists on the site. This A-P zone in relation to the site is shown on Enclosure A-4, within Appendix A.

Based on our review of documents on file at the city of Corona Department of Public Works, a series of unpublished studies were conducted for the Eagle Glen development project, located adjacent to the site on the northwest, were conducted by private geologic consulting firms in the late 1980's and early 1990's. These included a fault hazard evaluation of the McMillian Ranch properties, by the geologic consulting firm of Leighton and Associates in 1989, and a series of similar studies by the firm of Geosoils Inc., in 1999, conducted for the Eagle Glen development adjacent the site to the northwest. Unfortunately the city of Corona was only able to produce incomplete copies of these reports. They referred us to the County of Riverside. These documents had not yet been obtained by the date of this report. However. the portions of the GeoSoils reports that we were able to review at the city did indicate that Leighton and Associates and Geosoils had found evidence of active faulting along several of the main strands of the Elsinore fault and recommended building set backs.

Our geologic mapping of the site noted the presence of these faults in the general locations as the studies conducted by Gray (1961) and Weber (1977). In addition evidence for one additional splay was also noted. Since none of the earlier studies used any nomenclature for these sub-parallel faults, other than "un-named faults", for this study we have adopted an alphabetical nomenclature for the faults starting with "Fault A" on the strand noted the farthest to the northeast then working to the southwest to the main fault labeled as "Fault I". A complete description of each of the conditions of these features is given below.

It should also be noted that the latest map by the U.S.G.S. all of the faults at the site except for one (Gray, Morton, and Weber, 2002). We contacted one of the authors of this map, D. Morton, who informed us that these faults were removed for lack of exposures. However, the recent erosions of the canyon walls have recently exposed their locations.

Fault "A"

Fault "A" was noted only from an aerial photograph lineament, and some indirect geomorphic and geologic evidence. In the early photographs taken of the site prior to the planting of citrus groves on the site, there is a very distinct linear alignment trending across the northeastern portion of Bedford Canyon. This feature trends to the northwest, some-what parallel to the 15 freeway and lies approximately 950 feet southwest of the freeway. At the location were this lineament intersects with the southeastern canyon wall the feature has been covered by a small landslide. However, the geologic materials exposed in the canyon wall northeast of the landslide consist of the upper portion of the Corona Compound Alluvial fan to the northeast of this feature, while the materials exposed in the canyon wall to the southwest of the landslide consist of the Vaqueros/Sespe sandstone unit at the base of the canyon, overlain by the older terrace materials, which in turn are overlain by the lower members of the Corona Compound Alluvial fan.

This sequence of relatively younger, "older alluvial", materials juxtaposed against relatively older bedrock and terrace deposits may represent the southwest end of a small normal fault, or pull apart fault. This would imply that the north-end of this pull apart system should be located to the northeast. We did note the exposure older terrace materials along the canyon wall northeast of the freeway, and our boring B-22 encountered shallow sandstone bedrock at this location. This may imply that the Fault "A" is the southwestern fault of a small "graben" or pull apart basin with the northeast fault covered by the freeway. However, this feature could also simply represent a lithology change with younger alluvial materials placed against older materials to the southwest.

The intersection of Fault "A" with the southeast canyon was measured with a hand-held GPS unit at 33° 48.986' North, 117° 31.072' West. From this point the aerial photograph lineament trends North 40 to 50° to the west across the canyon for about 1,800 feet.

Faults "B" and "C"

The mapping conducted by Weber in 1977 noted four queried, or conjectural faults which were noted only from exposures along the southwestern canyon wall (see

Enclosures A-7 and A-8, within Appendix A). Along this approximate area, our field mapping noted two "pull-apart" fault sets. Each of these sets was noted to be a graben, or down-dropped fault block with relatively younger materials juxtaposed on both sides by older materials, bounded by a dip slip fault on each side.

The two faults bounding the northeastern most of these two grabens were labeled as Faults "B" and "C" from the northeast to the southwest. The intersection of Fault "B" with the southeast canyon was measured with a hand-held GPS unit at 33° 48.707', North 117° 31.378' West. At this point the fault plane was noted as a very thin layer of brown silty clay which was trending about north 20 degrees to the west and dipping about 70 degrees to the southwest. This fault offset a sequence of sandstone bedrock overlain by older terrace deposits and older alluvial materials against the older alluvial materials.

A few hundred feet to the southwest of Fault "B" the other side of the graben was encountered, with older alluvial juxtaposed against sandstone and terrace deposits. Here the bounding fault was labeled as Fault "C". The intersection of Fault "C" with the southeast canyon was measured with a hand-held GPS unit at 33° 48.670' North, 117° 31.402' West, and the attitude of the fault plane was about north 80 degrees to the west and dipping about 50 degrees to the northeast.

Faults "D" and "E"

The second set of graben faults noted in our field mapping roughly correlated to a similar graben originally mapped by Gray (1961). Gray mapped a block of relatively younger bedrock siltstone materials bounded on the northeast and southwest by units of relatively older sandstone units, with the contact marked by normal, or dip-slip faults on the bluffs along the far southeastern portions of the site (see Enclosures A-7 and A-8, within Appendix A). From this point, this set of faults trended to the northwest to Bedford Canyon. At the approximate location were these faults intersected with the southeastern canyon wall, our field mapping noted evidence for a similar set of normal faults. The northeastern fault on this system we labeled Fault "D" with the southwest fault labeled as Fault "E".

The intersection of Fault "D" with the southeast canyon was measured with a hand-held GPS unit at 33° 48.586' North, 117° 31.481' West. The attitude of the fault

plane curved with and average strike of about North 50 to 70 degrees to the west and dipping from about 65 to 85 degrees to the southwest. This fault juxtaposed units of the relatively older terrace materials, overlain by the lower portion of the older alluvial fans, against the upper portion of older alluvial fans.

Again, a few hundred feet to the southwest of Fault "D" the other side of the graben was encountered, with older alluvial juxtaposed against the terrace deposits. The intersection of Fault "E" with the southeast canyon was measured with a hand-held GPS unit at 33° 48.476' North, 117° 31.643' West. Here no distinct fault plane was noted. Instead there was a series of disturbed alluvial materials with a sequence of northeast dipping calcite filled shears over a zone about 2 to 3 feet wide.

Faults "G" and "F"

The mapping by Gray (1961) indicated that at least two the faults noted on the southeastern canyon walls of Bedford Canyon may project across the canyon. The approximate location of these were labeled as faults "G" and "F". However during our study the mapping of these faults was hampered by a dense growth of brush along the northwestern canyon wall. However at these locations we did not the presence of several clusters of small trees and palm trees which may indicated shallow groundwater.

Fault "H"

The mapping by Gray, Morton, and Weber (2002) indicated one fault crossing the southeastern portion of the site. This fault is shown to trend from the southeast to the northwest through the larger canyon fill along the canyon wall in this area and "conceded" with the wash. This feature is covered by the larger canyon fill and citrus groves which may conceal this fault.

Fault "I"

Along the very far southwestern corner of the site there is relatively faint aerial photo lineament which runs to the northwest. While no evidence of this feature was noted during our field mapping of the site, this lineament does approximately correlate with the dotted, or "concealed" fault at the far southwest end of the site on the mapping

conducted by Gray (1961) and Weber (1976). However it should be noted that the areas where this feature is thought to cross the site was predominately covered by heavy brush which may conceal the fault.

Historical Seismicity

In order to obtain a general perspective of the historical seismicity of the site and surrounding region a search was conducted for seismic events at and around the area within various radii. This search was conducted utilizing the historical seismic search program by EPI Software, Inc. This program conducts a search of a user selected cataloged seismic events database, within a specified radius and selected magnitudes, and then plots the events onto an overlay map of known faults. For this investigation the database of seismic events utilized by the EPI program was obtained from the Southern California Seismic Network (SCSN) available from the Southern California Earthquake Center. At the time of our search the data base contained data from January 1, 1932 through February 28, 2002.

In our first search the general seismicity of the region was analyzed by selecting an epicenter map listing all events of magnitude 4.0 and greater, recorded since 1932, within a 100 kilometer (62 mile) radius of the site, in accordance with guidelines of the California Division of Mines and Geology. This map illustrates the regional seismic history of moderate to large events. As noted on Enclosure A-5, within Appendix A, the site lies within a relatively active region associated with the Elsinore fault trending northwest-southwest. Of these events, the closest was a magnitude 4.2 located approximately 8 kilometers (5 miles) to the southeast of the site.

In the second search, the micro seismicity of the area lying within a 10 kilometer (6.2 mile) radius of the site was examined by selecting an epicenter map listing events on the order of 0.0 and greater since 1975. In addition, only the "A" events, or most accurate events were selected. Caltech indicates the accuracy of the "A" events to be approximately 1 km. The results of this search is a map that presents the seismic history around the area of the site with much greater detail, not permitted on the larger map. The reason for limiting the events to the last 25 years on the detail map is to enhance the accuracy of the map. Events recorded prior the mid 1970's are generally considered to be less accurate due to advancements in technology. As noted on this map, Enclosure A-6, the Elsinore fault zone appears to be the source of numerous

events. It should be noted that the cluster of events to the northwest of the site are believed to be associated with the quarry operations in that area.

In summary, the historical seismicity of the site entails numerous small to medium magnitude earthquake events occurring around the subject site, predominately associated with the presence of the Elsinore fault zone. Any future developments at the subject site should anticipate that moderate to large seismic events could occur very near the site.

Secondary Seismic Hazards

Other secondary seismic hazards generally associated with severe ground shaking during an earthquake include liquefaction, seiches and tsunamis, earthquake induced flooding, landsliding and rockfalls, and seismic-induced settlement.

Liquefaction. The potential for liquefaction generally occurs during strong ground shaking within relatively cohesionless loose, sediments where the groundwater is usually less than 50-feet. The Bedford Canyon portion of the site is underlain by relatively unconsolidated coarse grained materials. However, our borings data indicates that this depth to groundwater levels is in excess of 50 feet. The elevated portions of the site ar underlain by dense materials of older alluvium which generally preclude liquefaction. In addition these materials are relatively dense, therefore, the possibility of liquefaction at the site is considered very low.

Seiches/Tsunamis. The potential for the site to be effected by a seiche or Tsunamis (earthquake generated wave) is considered nil due to absence of any large bodies of water near the site.

Flooding (Water Storage Facility Failure). There are no large water storage facilities located on or near the site which could possibly rupture during in earthquake and effect the site by flooding.

Seismically-Induced Landsliding.

The existing over steepened slope located along the southwestern side of Bedford Canyon appears to be subject to sluffing and landsliding. Any significant shaking of

the ground, such as during a large event on the Elsinore fault adjacent to the site, may increase this activity.

Rockfalls. No large, exposed, loose or unrooted boulders are present above the site that would affect the integrity of the site.

Seismically-Induced Settlement. Settlement generally occurs within areas of loose, granular soils with relatively low density. Since the site is underlain by relatively dense alluvial and dense sedimentary bedrock materials, the potential for settlement is considered low, however the earthwork operations during the development of the site most probably mitigated any such loose soil conditions.

CONCLUSIONS

General

This investigation provides a broad overview of the preliminary geotechnical and geologic factors which are expected to influence future site planning and development. On the basis of our field investigation and testing program, it is the opinion of LOR Geotechnical Group, Inc. that the proposed development is feasible from a geotechnical standpoint, provided the recommendations presented in this report are incorporated into design and implemented during grading and construction. In addition, site specific preliminary soils and other investigations as recommended within should be conducted for the individual tracts/development areas within the final project area once specific development plans are made available.

The subsurface conditions encountered in our exploratory trenches and borings are indicative of the locations explored. The subsurface conditions presented here are not to be construed as being present the same everywhere on the site. If conditions are encountered during the construction of the project which differ significantly from those presented in this report. This firm should be notified immediately so we may assess the impact to the recommendations provided.

Foundation Support

Based upon the field investigation and test data, it is our opinion that the upper native soils and existing fills will not, in their present condition, provide uniform and/or adequate support for the proposed structures. Our compaction test and Standard Penetration Test (SPT) data indicated variable in-situ conditions of the upper native and fill soils, ranging from loose to medium dense states. This condition may cause unacceptable differential and/or overall settlements upon application of the anticipated foundation loads.

To provide adequate support for the proposed residential and commercial/industrial structures, we recommend a compacted fill mat be constructed beneath footings and slabs. This compacted fill mat will provide a dense, high-strength soil layer to uniformly distribute the anticipated foundation loads over the underlying soils. In addition, the construction of this compacted fill mat will allow for the removal of any old fill material, and recompaction of existing upper disturbed soils within building pad areas.

Conventional spread foundations, either individual spread footings and/or continuous wall footings, will provide adequate support for the anticipated downward and lateral loads when utilized in conjunction with the recommended fill mat.

Geologic Mitigations

One of the goals of this feasibility study was to identify if there is a potential for the hazard of fault rupture at the site by one of the subsidiary faults located at the site associated with the Elsinore fault system. Our studies have noted the presence of eight various fault splays which exist at or cross the site. The State of California considers a fault to be "active" if it displays evidence of activity within the last 11,000 years. This would typically be conducted by noting the age of the youngest materials broken by the fault. Several of the faults described within this report were noted to offset alluvial units which may be younger than 11,000 years, such as the splays labeled as "A" "B-E". The precise age of these materials, such as through carbon dating of the units, was not conducted during our study. Therefore, the activity rating of these faults is not yet known. However, there is some indication that at least some of the faults onsite may have already been studied by other firms (Leigthon 1989).

The stability of the large, near vertical cliffs noted along the southwestern side of Bedford Canyon were not evaluated during this study. However, evidence was noted that the recent change in the drainage course along the canyon bottom is rapidly eroding back this wall, perhaps as much as 5 feet per year. While this rate is anticipated to slow, if the current stream course is not controlled these canyon walls will potentially continue eroding back. This process will most likely be associated with and aided by sluffing of the walls and other failures. However, even if the stream course is diverted away from the base of the existing cliffs, the sluffing of these materials is still expected due to the over-steepened nature of these slopes.

Seismicity

Due to the site's close proximity to the Elsinore fault system, it is reasonable to expect a strong ground motion seismic event to occur during the lifetime of the proposed development on the site. Large earthquakes could occur on other faults in the general area, but because of their lesser anticipated magnitude and/or greater distance, they are considered less significant from a ground motion standpoint.

The effects of ground shaking anticipated at the subject site, should be mitigated by the seismic design requirements and procedures outlined in Chapter 16 of the Uniform Building Code. However, it should be noted that the current building code requires the minimum design to allow a structure to remain standing after a seismic event, in order to allow for safe evacuation. A structure built to code may still sustain damage which might ultimately result in the demolishing of the structure (Larson and Slosson 1992).

RECOMMENDATIONS

Geologic Recommendations

Due to the potential for seismic hazards at the site, it is our recommendations that prior to the development of specific design plans, a specific fault hazard study should be conducted to evaluate the potential for fault rupture at the site. This study should include an in-depth search of past documents, which were not readily available during this study. This search may reveal data to help to further refine the scope of future studies. However additional studies will must likely involve the trenching of some the

fault strands noted on the site and age dating of the materials to analyze the activity rating of these features and determine the extent of faulting at the site.

The rapid erosion of the canyon walls along the southwestern side of Bedford Canyon could be mitigated by controlling the run-off waters. This could be done by either diverting the flow away from this area, or into a lined channel. However the existing near vertical canyon walls may need to be graded into less steep angles and/or setbacks may be required.

Review of Specific Plans

Future development plans should be reviewed by the geotechnical consultant to ensure that the proposed development has been designed and grading will be performed in accordance with the following recommendations as well as applicable portions of Appendix Chapter 33 of the Uniform Building Code, and/or applicable local ordinances.

Initial Site Preparation

All loose, compressible alluvial and fill materials should be removed from areas to receive engineered compacted fill. For preliminary design purposes, the data developed during this investigation indicates that the majority of the removals required from currently planned fill areas are on the order of 2 to 5 feet. However, larger removals on the order of 10 feet will be required in areas as indicated previously. In addition, removals on the order of 60+ feet will be required within the previously filled canyon area of the site. The actual depths of removal should be verified during future site specific preliminary soils investigations and ultimately during the grading operation by observation and in-place density testing.

Preliminary Foundation Design

For planning purposes we anticipate that if the site is prepared as recommended, the proposed residential and commercial/industrial structures may be safely founded on conventional spread foundations, either individual spread footings and/or continuous wall footings, bearing either on a minimum of 24 inches of engineered compacted fill or bearing entirely on competent native materials. All foundations should have a

minimum width of 12 inches and should be established a minimum of 12 inches below lowest adjacent grade.

Final foundation design considerations obtained from the site specific preliminary soils investigations conducted for the individual tracts/development areas once specific grading/development plans are made available.

Engineered Compacted Fill

The on-site soils should provide adequate quality fill material, provided they are free from organic matter and other deleterious materials. Unless approved by the geotechnical engineer, rock or similar irreducible material with a maximum dimension greater than 6 inches should not be buried or placed in fills. Oversized material may be stockpiled for landscaping purposes or placed in a rock disposal area as approved by the owner, developer, geotechnical engineer, and local agency having jurisdiction.

Import fill should be inorganic, non-expansive granular soils free from rocks or lumps greater than 6 inches in maximum dimension. Sources for import fill should be approved by the geotechnical engineer prior to their use.

Fill should be spread in maximum 8 inch uniform, loose lifts, each lift brought to near optimum moisture content, and compacted to a relative compaction of at least 90 percent in accordance with ASTM D 1557.

Based upon the relative compaction of the near surface soils determined during this investigation and the relative compaction anticipated for compacted fill soil, we estimate a compaction shrinkage of approximately 10 to 15 percent. Therefore, 1.10 cubic yards to 1.15 cubic yards of in-place materials would be necessary to yield one cubic yard of properly compacted fill material. In addition, we would anticipate subsidence of approximately 0.10 feet. These values are for estimating purposes only, and are exclusive of losses due to stripping or the removal of subsurface obstructions. These values may vary due to differing conditions within the project boundaries and the limitations of this investigation. Shrinkage should be monitored during construction. If percentages vary, provisions should be made to revise final grades or adjust quantities of borrow or export.

Slope Construction

Preliminary data indicates that cut and fill slopes should be planned at gradients no steeper than two horizontal to one vertical. Preliminary evidence indicates that the steep, near vertical cliffs of the site may not be grossly stable. Additional information regarding any proposed cut slopes and the existing natural slope stability should be addressed within the site specific preliminary soils investigations when actual grading/development plans are made available for the specific tracts/development areas.

Where fills are to be placed against existing slopes steeper than five horizontal to one vertical, the fill should be properly keyed and benched into competent native materials. The key, constructed across the toe of the slope, should be a minimum of 12 to 15 feet wide, a minimum of two feet deep at the toe, and sloped back at two percent. Benches should be constructed at approximately two to four feet vertical intervals. Typical keying and benching operations are presented on Enclosure D-1, within Appendix D.

Slope Protection

Since the native materials are susceptible to erosion by running water, measures should be provided to prevent surface water from flowing over slope faces. Slopes at the project should be planted with a deep rooted ground cover as soon as possible after completion. The use of succulent ground covers such as iceplant or sedum is not recommended. If watering is necessary to sustain plant growth on slopes, then the watering operation should be monitored to assure proper operation of the irrigation system and to prevent over watering.

Soil Expansiveness

The upper materials encountered during this investigation were generally observed to be granular and considered to have a very low expansion potential. However, one area was noted to contain clayey fines and are considered to have a medium expansion potential when tested in accordance with Uniform Building Code, Standard 18-2. This medium expansive soil is considered to be an anomaly since it was observed within two of fifty-four excavations placed at the site. Therefore, specialized construction

procedures to specifically resist expansive soil activity are not anticipated at this time. In order to verify this, additional evaluation of on-site and any imported soils for their expansion potential should be conducted during the specific preliminary soils investigations conducted for the individual tracts/development areas and ultimately following completion of the grading operation.

Settlement

Total settlement of individual foundations will vary depending on the width of the foundation and the actual load supported. Maximum settlement of shallow foundations designed and constructed in accordance with the preceding recommendations are estimated to be on the order of 0.5 inch. Differential settlements between adjacent footings should be about one-half of the total settlement. Settlement of all foundations is expected to occur rapidly, primarily as a result of elastic compression of supporting soils as the loads are applied, and should be essentially completed shortly after initial application of the loads.

Slabs-On-Grade

To provide adequate support, concrete slabs-on-grade should bear on a minimum of 12 inches of compacted soil. The final pad surfaces should be rolled to provide smooth, dense surfaces upon which to place the concrete.

Slabs to receive moisture-sensitive coverings should be provided with a moisture vapor barrier. This barrier may consist of an impermeable membrane. Two inches of sand over the membrane will reduce punctures and aid in obtaining a satisfactory concrete cure. The sand should be moistened just prior to placing of concrete.

The slabs should be protected from rapid and excessive moisture loss which could result in slab curling. Careful attention should be given to slab curing procedures, as the site area is subject to large temperature extremes, humidity, and strong winds.

Preliminary Pavement Design

Testing and design for preliminary on-site pavement was conducted in accordance with the California Highway Design Manual. Based upon our preliminary sampling and

testing, and upon assumed Traffic Indices, it appears that the structural sections tabulated below should provide satisfactory pavements within the subject development:

AREA	T.I.	PRELIMINARY SECTION	
		DESIGN R-VALUE	
		20	50
Local Streets and On-Site Parking	5.0	0.25'AC/0.6'AB	0.25'AC/0.35'AB
Local Collector Streets	7.0	0.30'AC/1.05'AB	0.30'AC/0.45'AB
Major Collector	8.0	0.40'AC/1.15'AB	0.40'AC/0.45'AB
Major Arterial	9.0	0.45'AC/1.30'AB	0.45'AC/0.55'AB
AC - Asphalt Concrete			
AB - Class 2 Aggregate Base			

The above structural sections are predicated upon 90 percent relative compaction (ASTM 1557) of all utility trench backfills and 95 percent relative compaction (ASTM 1557) of the upper 12 inches of street subgrade soils and of any aggregate base utilized. In addition, the aggregate base should meet Caltrans specifications for Class 2 Aggregate Base.

The above pavement designs were based upon the results of preliminary sampling and testing and should be verified by additional sampling and testing during the site specific preliminary soils investigations for the individual tracts/development areas and ultimately when the actual subgrade soils are exposed during site grading.

Chemical Protection

Electrical resistivity is a major factor in determining soil corrosivity. The electrical resistivity of a soil is a measure of its resistance to the flow of electrical current. Corrosion of buried metal is an electrochemical process in which the amount of metal loss due to corrosion is directly proportional to the flow of electrical current (DC) from

the metal to the soil. Following Ohm's Law, corrosion currents are inversely proportional to soil resistivity. Lower electrical resistivities result from higher moisture and chemical contents and indicate corrosive soil. Other soil characteristics that may influence corrosivity towards metals are pH, chemical content (sulfate, chloride, etc.), soil types, aeration, anaerobic conditions, and site drainage.

The results of the sulfate, pH, sulfide, redox potential, and electrical resistivity tests conducted on selected subgrade soils expected to be encountered at foundation levels are presented as Enclosures C-3 through C-27 within Appendix C.

Based on the test results, the sulfate exposures of on site soils is considered negligible to moderate by the UBC. Specific recommendations are given for concrete elements to be in contact with on site soils is shown on UBC Table 19-A-4.

Soil pH values varied from 7.1 to 7.6. This range is neutral to mildly alkaline and does not particularly increase soil corrosivity.

Sulfide, which is aggressive to copper and ferrous metals, showed no reaction in a qualitative test. The positive redox potential indicates oxidizing conditions in which anaerobic, sulfide producing bacteria are inactive.

Based on the test results of the electrical resistivity, the on site soils are considered to be moderately corrosive to corrosive. In addition, one sample tested was found to be severely corrosive and is considered to be an anomaly.

In addition soil corrosivity, the life of buried materials depends on thickness, strength, loads, construction details, soil moisture, etc. and is, therefore, difficult to predict. Of more practical value are corrosion control methods that will increase the life of materials that would be subject to significant corrosion.

Final chemical analysis should be verified by additional sampling and testing during the site specific preliminary soils investigations for the individual tracts/development areas and ultimately when the actual subgrade soils are exposed during site grading. A qualified corrosion engineer should evaluate the general corrosion potential with respect to construction materials at the site.

CLOSURE

The additional studies recommended in this report are an important and necessary continuation of this investigation. Site specific preliminary soils investigations for the individual tracts/development areas should be conducted and project plans and specifications should be reviewed prior to construction to confirm that the intent of the recommendations presented in the site specific preliminary soils investigations have been incorporated into the design.

In addition during construction, sufficient and timely geotechnical observation and testing should be provided to correlate the findings of this investigation with the actual subsurface conditions exposed during construction. For planning purposes, future items requiring observation and testing include, but are not necessarily limited to, the following:

1. Site preparation-stripping and removals.

2. Excavations, including approval of the bottom of excavation prior to backfilling.

3. Scarifying and recompacting prior to fill placement.

4. Subgrade preparation for pavements and slabs-on-grade.

5. Placement of engineered compacted fill and backfill, including approval of fill materials and the performance of sufficient density tests to evaluate the degree of compaction being achieved.

6. Foundation excavations, including footings, pile caps and pile installation as appropriate.

LIMITATIONS

This report contains preliminary geotechnical conclusions and recommendations developed solely for use by Bluestone Communities, and their design consultants, for the purposes described earlier. It may not contain sufficient information for other uses

or the purposes of other parties. The contents should not be extrapolated to other areas or used for other facilities without consulting LOR Geotechnical Group, Inc.

The recommendations are based on interpretations of the subsurface conditions concluded from information gained from subsurface explorations, and a surficial site reconnaissance. The interpretations may differ from actual subsurface conditions, which can vary horizontally and vertically across the site. Due to possible subsurface variations, all aspects of field construction addressed in this report should be observed and tested by the project geotechnical consultant.

If parties other than LOR Geotechnical Group, Inc. provide construction monitoring services, they must be notified that they will be required to assume responsibility for the geotechnical phase of the project being completed by concurring with the recommendations provided in this report or by providing alternative recommendations.

The report was prepared using generally accepted geotechnical engineering practices under the direction of a state licensed geotechnical engineer. No warranty, express or implied, is made as to conclusions and professional advice included in this report. Any persons using this report for bidding or construction purposes should perform such independent investigations as deemed necessary to satisfy themselves as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project.

It has been a pleasure to assist you with this project. We look forward to being of further assistance to you as construction begins. Should conditions be encountered during construction that appear to be different than indicated by this report, please contact this office immediately in order that we might evaluate their effect.

Should you have any questions regarding this report, please contact us.

Respectfully submitted,
LOR Geotechnical Group, Inc.

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REFERENCES

Gray Jr., C.H., 1961, Geology of the Corona South Quadrangle and the Santa Ana Narrows Area, Riverside, Orange, and San Bernardino Counties, California and Mines and Mineral Deposits of the Corona South Quadrangle, Riverside and Orange Counties, California, California Division of Mines, Bulletin 178.

Gray, Jr., C.H., D. Morton, and E.H. Weber, 2002, Geologic Map of the Corona South 7.5' Quadrangle, Riverside and Orange Counties, California, v. 1.0, United States Geological Survey, Open File Report 02-21.

Hart, E.W. and W.A. Bryant, 1997, Fault-rupture hazard zones in California, California Dept. of Conservation Division of Mines and Geology Special Publication 42.

International Conference of Building Officials, 1997, Uniform Building Code, 1997 edition.

Larson, R., and Slosson, J., 1992, The role of seismic hazard evaluation in engineering reports, in engineering geology practice in southern California, AEG Special Publication Number 4, pp 191-194.

Morton, D., 2002, Personel Communication.

Petersen, M.D., W.A. Bryant, C.H. Cramer, T. Cao, M.S., Reichle, A.D. Frankel, J.J. Lienkaemper, P.A. McCrory, and D.P. Schwartz, 1996, Probabilistic seismic hazard assessment for the State of California, California Department of Conservation, Division of Mines and Geology, Open-File Report 96-08 and U.S. Geological Survey Open-File Report 96-706.

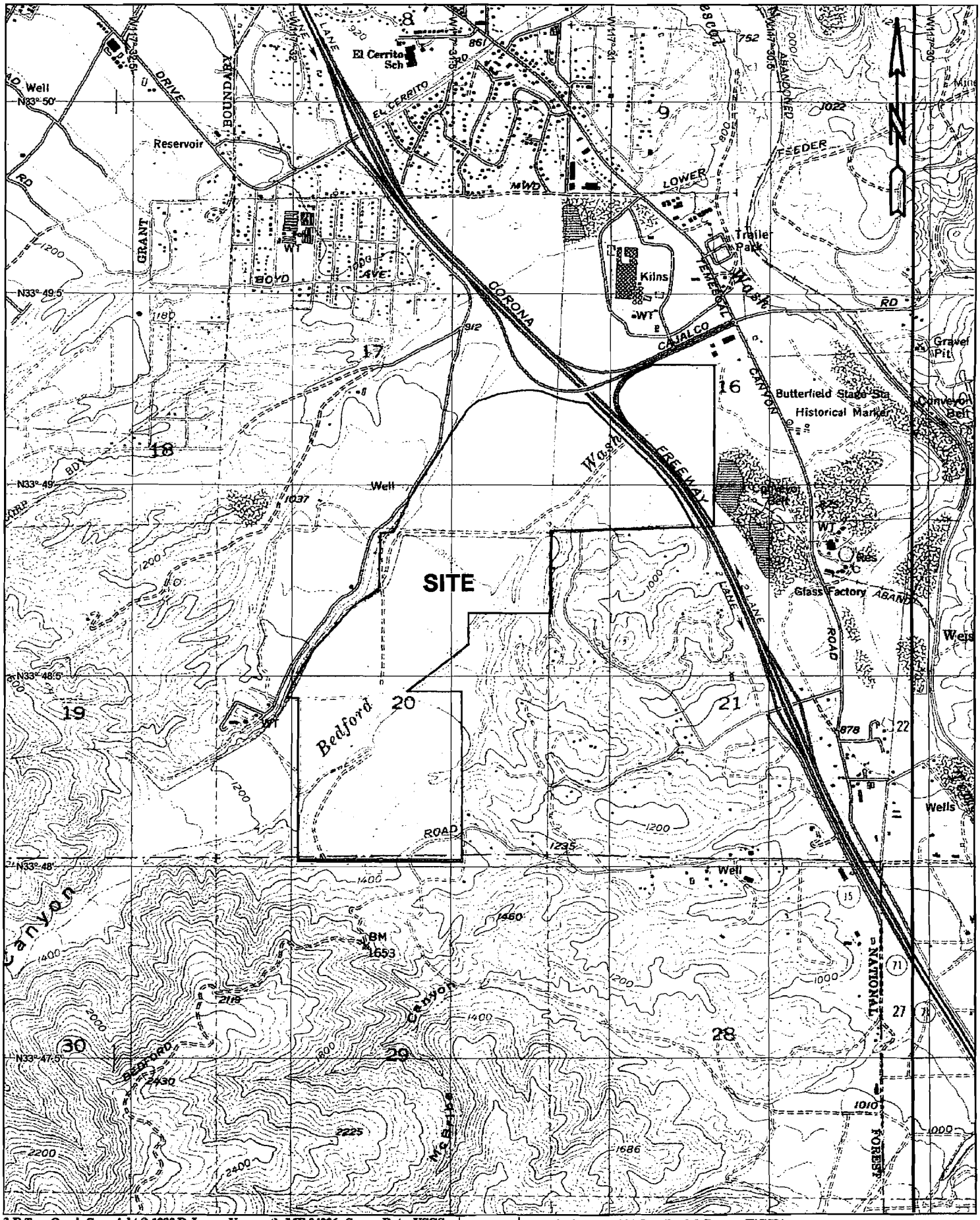
Reeder, W., 2000, Earthquake Plotting Program, EPI Software.

Weber Jr., F.H., 1977, Seismic Hazards Related to Geologic Factors, Elsinore and Chino Faults, Northwestern Riverside County, California, California Department of Conservation, Division of Mines and Geology, Open-File Report 77-4.

AERIAL PHOTOGRAPHS

DATE	PHOTO NOS.	SCALE
September 24, 1931	360 through 363	1" = 1,000'
January 30, 1962	503 and 504	1" = 2,000'
May 24, 1974	367 through 369	1" = 2,000'
April 10, 1980	385 and 386	1" = 2,000'
February 4, 1984	1130 through 1132	1" = 2,000'
January 21, 1990	8-7 and 8-8	1" = 2,000'
January 30, 1995	8-9 and 8-10	1" = 2,000'
March 11, 2000	8-8 through 8-10	1" = 2,000'

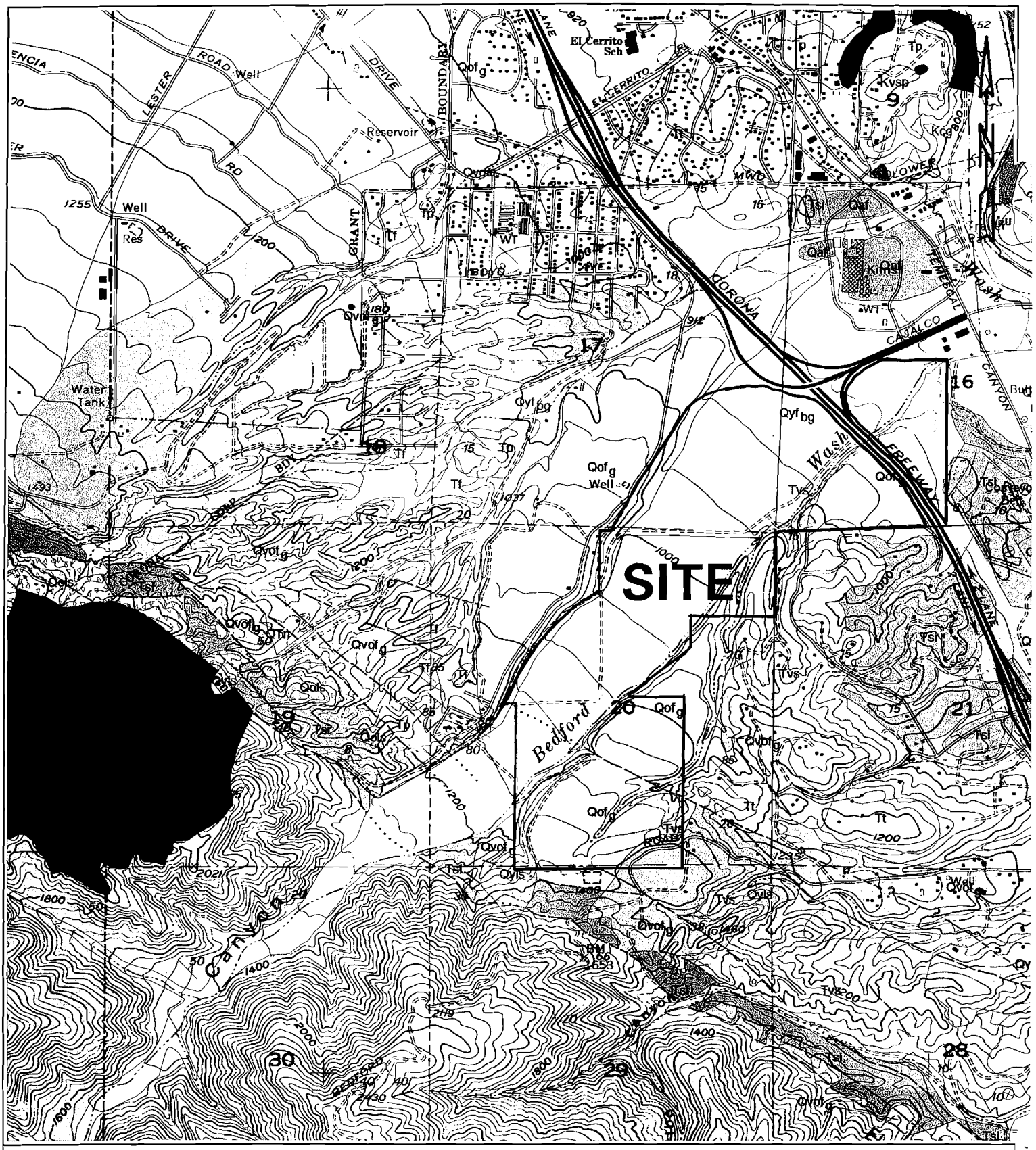
APPENDIX A
Index Map
Regional Geologic Map
Historical Seismicity Maps
Site Geologic Map



950 ft Scale: 1 : 24,000 Detail: 13-0 Datum: WGS84

Project No. 31558.1

Enclosure A-1



REGIONAL GEOLOGIC MAP

PROJECT: 580± ACRES, BEDFORD CANYON, CORONA AREA, RIVERSIDE CO., CA	PROJECT NO.: 31558.1
CLIENT: BLUESTONE COMMUNITIES	ENCLOSURE: A-2
LOR Geotechnical Group, Inc.	DATE: MARCH 2002
	SCALE: 1" = 2000'

DESCRIPTION OF MAP UNITS

MODERN SURFICIAL DEPOSITS—Sediment recently transported and deposited in channels and washes, on surfaces of alluvial fans and alluvial plains, and on hillslopes. Soil-profile development is non-existent. Includes:

Artificial fill (late Holocene)—Deposits of fill resulting from human construction or mining activities; includes numerous noncontiguous areas related to sand and gravel operations and flood control in and adjacent to Temescal Wash and to road grade and ramps along Corona Freeway segment of Interstate 15

YOUNG SURFICIAL DEPOSITS—Sedimentary units that are slightly consolidated to cemented and slightly to moderately dissected. Alluvial fan deposits (Qyf series) typically have high coarse:fine clast ratios. Younger surficial units have upper surfaces that are capped by slight to moderately developed pedogenic-soil profiles (A/C to A/AC/B/C_{ox} profiles). Includes:

Qyw — **Young wash deposits (Holocene and late Pleistocene)**—Sand, gravel and boulder deposits. Restricted to Silverado Canyon in southern part of quadrangle

Qyf — **Young alluvial fan deposits (Holocene and late Pleistocene)**—Gray-hued gravel and boulder deposits derived largely from volcanic and sedimentary units of Santa Ana Mountains. Fans consisting mainly of gravel emanate and coalesce from Tin Mine, Hagador, Main Street, and Eagle Canyons. Fan emanating from Bedford Canyon is coarser grained, containing a large component of boulders. All fans coarsen toward mountains. Locally, young alluvial fan deposits are divided into subunits based on sequential terrace development and other factors; one such unit is found in quadrangle:

Qyf1 — **Young alluvial fan deposits, Unit 1 (Holocene and late Pleistocene)**—Consists of pale-gray, unconsolidated, cobble- to granule- sized gravel. Restricted to single fan bisected by younger Qyf fan emanating from Main Street and Eagle Canyons. Forms older part of Qyf unit. Precise distance this unit may have been displaced from its source area by young faults terminating upper part of fan is unknown, but estimated to be small

Qya — **Young alluvial channel deposits (Holocene and late Pleistocene)**—Gray, unconsolidated alluvium. Found chiefly in Temescal Wash and its tributaries, where it consists of medium- to fine-grained sand in lower reaches and coarsens to gravel and cobbles up stream. Also found in Wardlaw Canyon and its tributaries, and in Ladd Canyon in southwestern part of quadrangle

Qyls — **Young landslide deposits (Holocene and late Pleistocene)**—Rock debris and rubble, unsorted. All or parts of many Qyls landslides subject to renewed movement; primary landslide morphology typically preserved. Found mainly on lower part of northeastern slope of Santa Ana Mountains

OLD SURFICIAL DEPOSITS—Sedimentary units that are moderately consolidated and slightly to moderately dissected. Older surficial deposits have upper surfaces that are capped by moderately to well-developed pedogenic soils (A/AB/B/C_{ox} profiles and Bt horizons as much as 1 to 2 m thick and maximum hues in the range of 10YR 5/4 and 6/4 through 7.5YR 6/4 to 4/4 and mature Bt horizons reaching 5YR 5/6). Includes:

Qof — **Old alluvial fan deposits (late to middle Pleistocene)**—Moderately indurated, gravel and cobble alluvial fan deposits. Flanks Qyf unit emanating from Bedford Canyon and Qyf_1 unit emanating from main Street and Eagle Canyons. Most of unit is slightly to moderately dissected and reddish-brown. Some Qof includes thin, discontinuous surface layer of Holocene alluvial fan material. Includes:

Qof1 — **Old alluvial fan deposits, Unit 1 (middle Pleistocene)**—Indurated, gravely alluvial fan deposits. Most are slightly to moderately dissected; reddish-brown. Some deposits include thin, discontinuous surface layer of Holocene alluvial fan material. In quadrangle, restricted to single occurrence flanking Qyf fan west of Corona

Qols — **Old landslide deposits (late to middle Pleistocene)**—Mostly fragmented rock debris. Landslide morphology moderately to greatly modified. Restricted to fault-bounded deposits at foot of Santa Ana Mountains between Eagle and Bedford Canyons

VERY OLD SURFICIAL DEPOSITS—Sediments that are slightly to well consolidated to indurated, and moderately to well dissected. Upper surfaces are capped by moderate to well developed pedogenic soils (A/AB/B/C_{ox} profiles having Bt horizons as much as 2 to 3 m thick and maximum hues in the range 7.5YR 6/4 and 4/4 to 2.5YR 5/6)

Qvof — **Very old alluvial fan deposits (early Pleistocene)**—Mostly well-dissected, well-indurated, reddish-brown cobble and gravel deposits. Commonly contains duripans and locally silcretes. Found scattered along foot of Santa Ana Mountains and extending out from foot for 3 km. Most are fault-bounded and probably displaced laterally, as they commonly do not head at major canyons. Includes:

Qvof1 — **Very old alluvial fan deposits, Unit 1 (early Pleistocene)**—Mostly well-dissected, well indurated, reddish-brown alluvial fan deposits. Grain size chiefly cobbles and gravel. Represents old part of Qvof. Found as fault slices and noncontiguous deposits resting on Paleocene Silverado Formation and on Cretaceous heterogeneous granitic rock in Temescal Valley

Qvoa — **Very old alluvial channel deposits (early Pleistocene)**—Gravel, sand, and silt; reddish-brown, well-indurated, surfaces well-dissected. Underlies large area between Santa Ana River and Temescal Wash

QTn — **Late Cenozoic sedimentary rocks in Norco area (early Pleistocene to late Pliocene?)**—Moderately indurated sandstone, conglomeratic sandstone, and conglomerate. In Norco area, unit includes locally derived clasts as well as clasts derived from San Bernardino Mountains

Tf — **Fernando Formation (Pliocene)**—Siltstone, sandstone, pebbly sandstone, and conglomerate. Name introduced by Eldridge and Arnold (1907) for marine deposits on northwest side of San Fernando Valley. Formalized by Kew (1923) for similar-appearing rocks in Ventura basin. Durham and Yerkes (1964) defined current usage in area around Santa Ana Mountains. In Puente Hills, Fernando Formation is about 1825 m thick (Yerkes, 1972). Lower part equivalent to Repetto Formation (Woodring, 1938). In other areas it has been subdivided into two members separated by regional erosional unconformity

Tvs — **Vaqueros and Sespe Formations, undifferentiated (early Miocene, Oligocene, and late Eocene)**—Interbedded marine and nonmarine sandstone and conglomerate assigned to the Sespe and Vaqueros Formations. Occurs in northwestern corner of quadrangle and as fault and alluvium bounded blocks south of El Cerrito. Locally, marine fossil-bearing strata of Vaqueros Formation are bed-by-bed interlayered with nonmarine rocks of Sespe Formation to degree that formations cannot be mapped as separate units. Undifferentiated unit locally includes boulder conglomerate (Woodford and others, 1973)

Tvss — **Vaqueros, Sespe, Santiago and Silverado Formations, undifferentiated (early Miocene, Oligocene, late Eocene, and Paleocene)**—Marine and nonmarine sandstone and conglomerate of Sespe, Vaqueros, and Silverado Formations. Found only on small hill between Home Gardens and El Cerrito.

Tsl — **Silverado Formation (Paleocene)**—Nonmarine and marine sandstone, siltstone, and conglomerate. Dickerson (1914) first recognized Paleocene rocks in Santa Ana Mountains, and based on faunal similarities, correlated strata with Martinez Formation of central California. Woodring and Popenoe (1945) described unit in detail and named it Silverado Formation. Formation was deposited on deeply weathered erosional surface. Rocks underlying Silverado are characteristically saprolitic. Silverado Formation consists of basal conglomerate, locally boulder-bearing, overlain by relatively thin sequence of sandstone and siltstone. Sandstone and siltstone sequence is overlain by thick sequence of sandstone, siltstone, and conglomerate which includes two distinctive clay beds of commercial importance. In addition to clay, upper part of section contains carbonaceous shale and lignite beds. Thicker lignite beds were locally mined for fuel. Upper part of unit also contains abundant marine mollusks. Some eastern exposures of formation contain distinctive and diagnostic Paleocene *Turritella pachecoensis*

Kwl — **Williams and Ladd Formations, undifferentiated (Upper Cretaceous)**—Sandstone, siltstone, conglomerate, and conglomeratic sandstone of Williams and Ladd Formations; all are feldspathic. Williams Formation typically conglomeratic throughout; Ladd Formation contains thick sequences of non-conglomeratic shale and siltstone. However, both formations contain rocks ranging from conglomerate to shale. Williams Formation typically resistant, cliff-forming, white to brownish-gray, massive-bedded, poorly sorted feldspathic sandstone, pebbly sandstone, and conglomeratic sandstone. Unconformity separates two formations

Kl — **Ladd Formation (Upper Cretaceous)**—Conglomerate, sandstone, siltstone, and shale. Named by Popenoe (1942) for exposures just west of mouth of Ladd Canyon, northern Santa Ana Mountains. Popenoe divided formation into older Baker Canyon Conglomerate Member and younger Holz Shale Member as follows:

Khs — **Holz Shale Member**—Interbedded marine shale, siltstone, sandstone, and localized conglomerate beds. Sandstone beds are mostly massive, but locally crossbedded. Unit contains 5 cm- to 1 m-wide calcite cemented concretions. Foraminifera are widespread and megafossils abundant in places. Except for resistant conglomerate beds, Holz Shale weathers to form smooth rounded slopes. Unit includes prominent zone of concentrated sandstone and conglomerate beds

Kbc — **Baker Canyon Conglomerate Member**—Marine and locally nonmarine(?) conglomerate. Lower part is gray conglomerate containing clasts up to 2 m across, derived mainly from granitic and volcanic rocks. Granitic clasts appear to be from Cretaceous Peninsular Ranges batholith and volcanic clasts from Cretaceous Santiago Peak Volcanics. Upper part of conglomerate is brown conglomeratic sandstone and pebble conglomerate. Sparse sandstone beds contain abundant mollusk shells. Conglomerate is similar to the Cretaceous Trabuco Formation and locally interfingers within the Trabuco Formation west of the quadrangle. Pelecypods indicate deposition in primarily shallow-water environment

Micropegmatite granite (Cretaceous)—Fine-grained, pink-tinted, leucocratic granite having distinctive micropegmatitic texture. In quadrangle, restricted to hill 1 km northwest of Home Gardens. Most of unit is in Corona North quadrangle where it forms elongate band of outcrops between Corona and Norco

Kcg — **Monzogranite of Cajalco pluton of Morton (1999) (Cretaceous)**—Mostly biotite and biotite-hornblende monzogranite ranging to granodiorite. Exposed north and east of El Cerrito; very extensive in Lake Mathews 7.5' quadrangle to east. Medium grained equigranular to subporphyritic. Informally named for exposures in Cajalco area, Lake Mathews 7.5' quadrangle (Morton, 1999). Rocks of Cajalco pluton were included within Cajalco quartz monzonite by Dudley (1935) and within Woodson Mountain granodiorite by Larsen (1948). Body is composite, shallow-level pluton emplaced by magmatic stoping within largely volcanic and volcanoclastic rocks. It was tilted eastward and eroded to progressively greater depths from west to east. East of quadrangle, upper part of pluton contains very prominent halo of highly tourmalinized rock. Zircon ages are 109.5 Ma_{cd} and 112.6 Ma_{tp}. Within quadrangle unit includes:

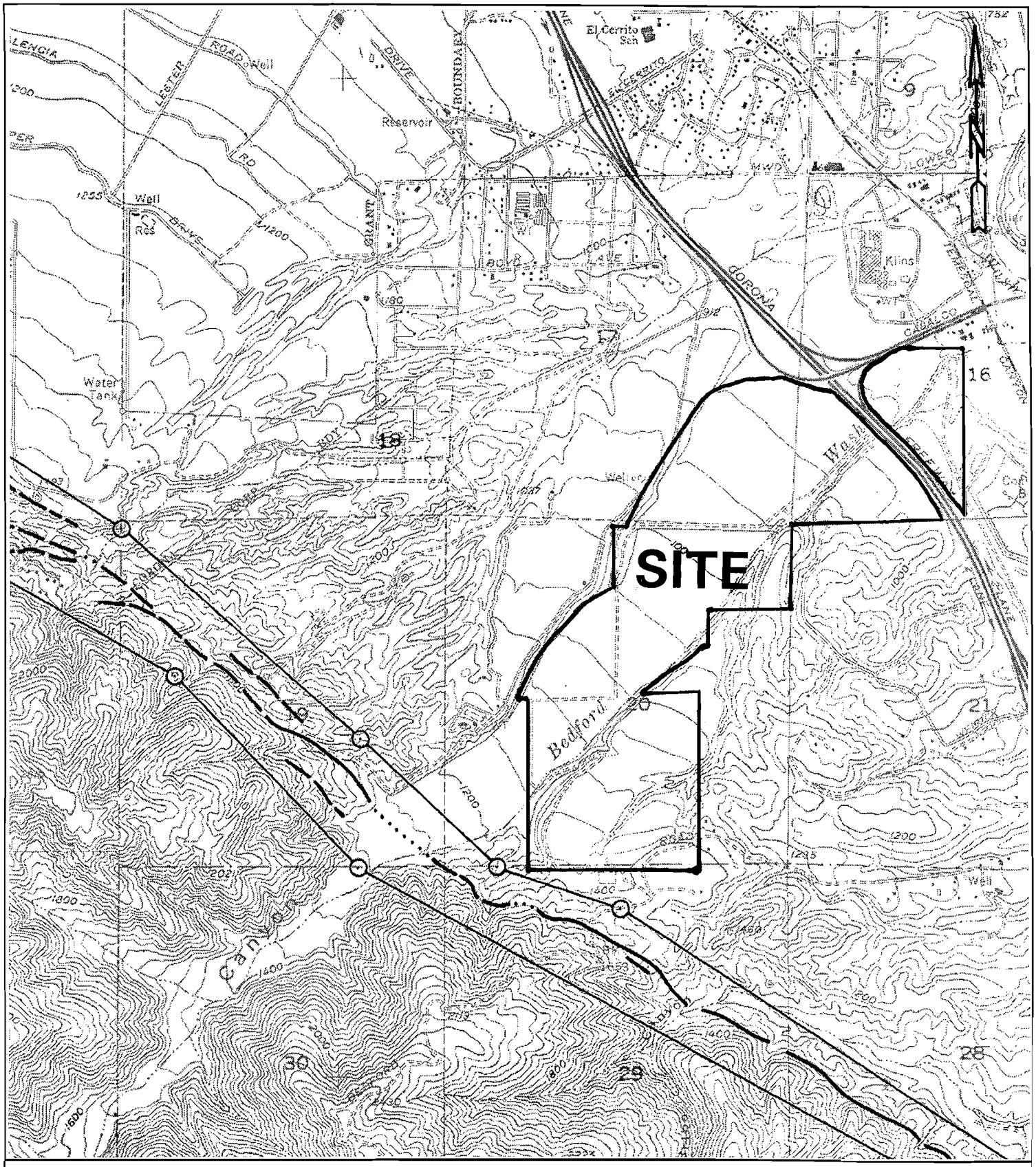
Kgr — **Granite, undifferentiated (Cretaceous)**—Equigranular, leucocratic fine-to coarse-grained massive granite and biotite monzogranite. Consists of quartz, alkali feldspars and sparse biotite. Forms elongate dike-like mass northeast of El Cerrito

Kh — **Heterogeneous granitic rocks (Cretaceous)**—Heterogeneous mixture of widely diverse granitic rocks types. Assemblage includes monzogranite, granodiorite, tonalite, and gabbro. Rocks of tonalite composition are most abundant. Mapped west of Temescal Valley in southeastern part of quadrangle

Kt — **Tonalite, undifferentiated (Cretaceous)**—Gray, medium-grained biotite-hornblende tonalite, typically foliated. Restricted to small, partially fault-bounded area south of Ladd Canyon in southwestern part of quadrangle

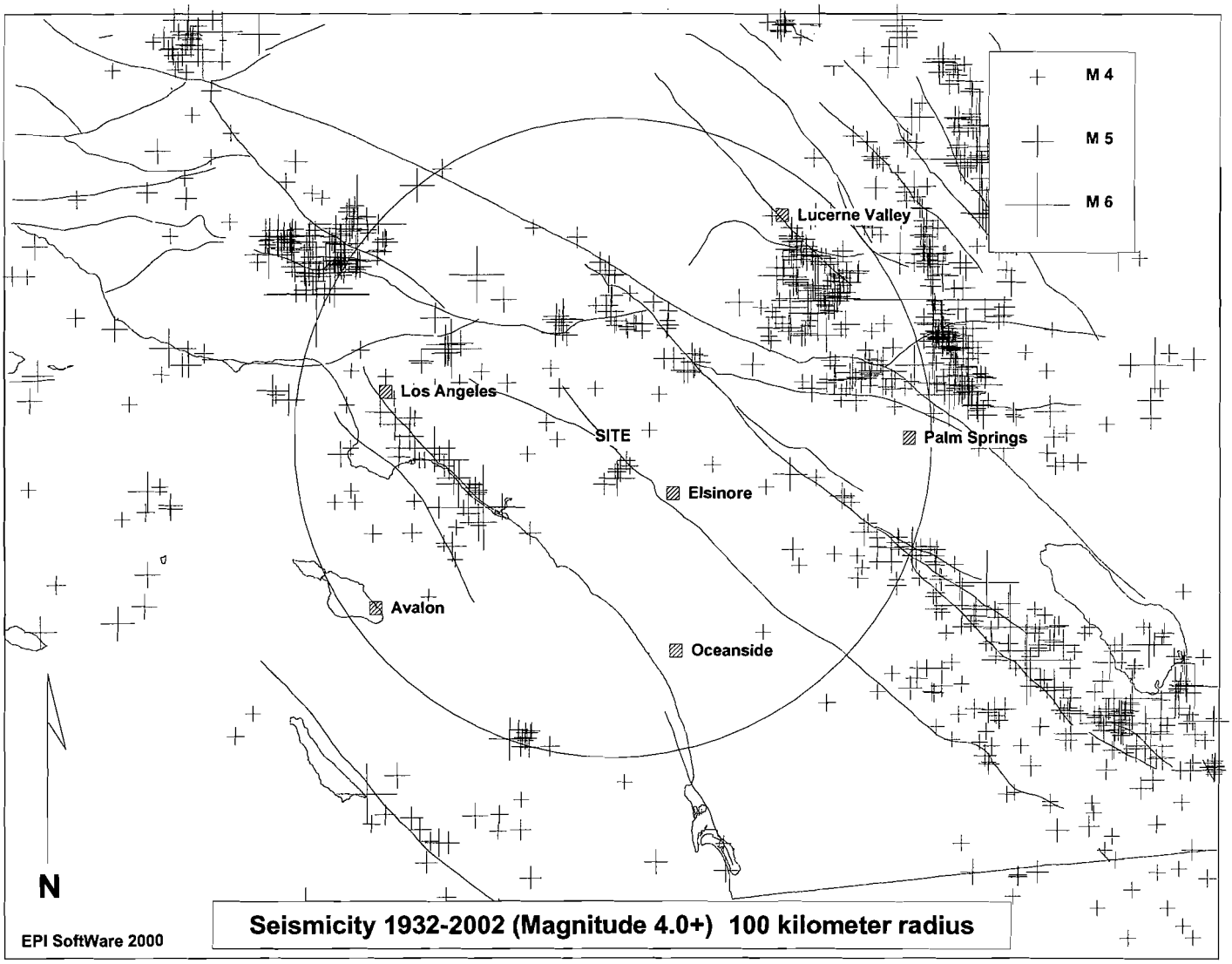
DESCRIPTION OF GEOLOGIC UNITS

PROJECT: 580 ± ACRES, BEDFORD CANYON, CORONA AREA, RIVERSIDE CO., CA	PROJECT NO.: 31558.1
CLIENT: BLUESTONE COMMUNITIES	ENCLOSURE: A-3
LOR Geotechnical Group, Inc.	DATE: MARCH 2002
	SCALE: NOT TO SCALE



STATE OF CALIFORNIA EARTHQUAKE FAULT ZONE

PROJECT: 580 ± ACRES, BEDFORD CANYON, CORONA AREA, RIVERSIDE CO., CA	PROJECT NO.: 31558.1
CLIENT: BLUESTONE COMMUNITIES	ENCLOSURE: A-4
LOR Geotechnical Group, Inc.	DATE: MARCH 2002
	SCALE: 1" = 2000'



SITE LOCATION: 33.81188 LAT. -117.52499 LONG.

MINIMUM LOCATION QUALITY: C

TOTAL # OF EVENTS ON PLOT: 1345

TOTAL # OF EVENTS WITHIN SEARCH RADIUS: 474

0 50 100
KILOMETERS

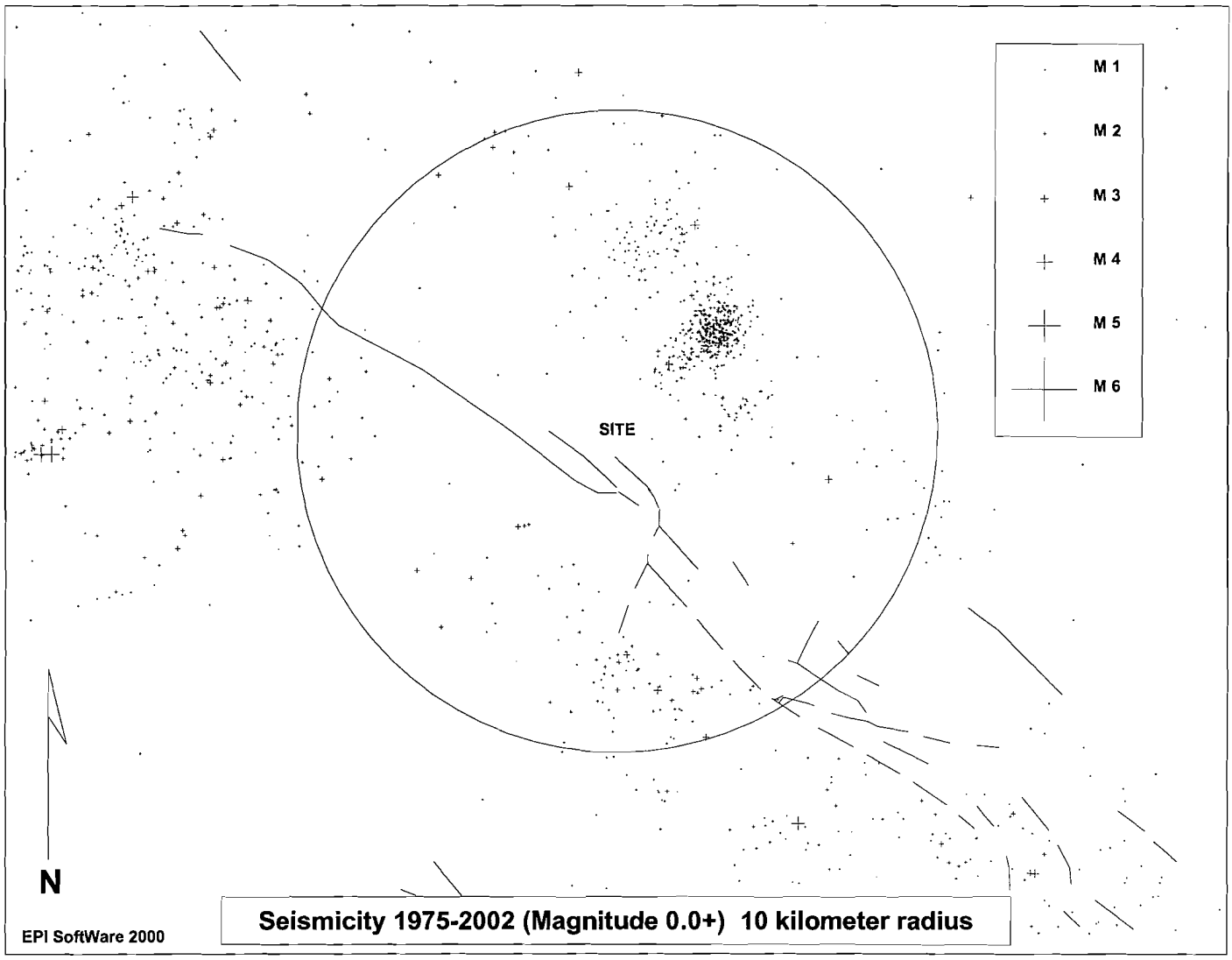
MAGNITUDE DISTRIBUTION OF SEARCH RADIUS EVENTS:

4.0- 4.9 : 433
5.0- 5.9 : 39
6.0- 6.9 : 2
7.0- 7.9 : 0
8.0- 8.9 : 0

CLOSEST EVENT: 4.2 ON TUESDAY, JUNE 22, 1971 LOCATED APPROX. 8 KILOMETERS SOUTHEAST OF THE SITE

LARGEST 5 EVENTS:

6.4 ON SUNDAY, JUNE 28, 1992 LOCATED APPROX. 77 KILOMETERS NORTHEAST OF THE SITE
6.4 ON SATURDAY, MARCH 11, 1933 LOCATED APPROX. 46 KILOMETERS SOUTHWEST OF THE SITE
5.9 ON THURSDAY, OCTOBER 01, 1987 LOCATED APPROX. 58 KILOMETERS NORTHWEST OF THE SITE
5.8 ON FRIDAY, JUNE 28, 1991 LOCATED APPROX. 66 KILOMETERS NORTHWEST OF THE SITE
5.6 ON TUESDAY, JULY 08, 1986 LOCATED APPROX. 87 KILOMETERS EAST OF THE SITE



SITE LOCATION: 33.81188 LAT. -117.52499 LONG.

MINIMUM LOCATION QUALITY: A

TOTAL # OF EVENTS ON PLOT: 1704

TOTAL # OF EVENTS WITHIN SEARCH RADIUS: 1197

0 5 10
KILOMETERS

MAGNITUDE DISTRIBUTION OF SEARCH RADIUS EVENTS:

0.0- .9 : 124
1.0- 1.9 : 1004
2.0- 2.9 : 63
3.0- 3.9 : 6
4.0- 4.9 : 0
5.0- 5.9 : 0
6.0- 6.9 : 0
7.0- 7.9 : 0
8.0- 8.9 : 0

CLOSEST EVENT: 1.4 ON WEDNESDAY, JULY 13, 1994 LOCATED APPROX. .2 KILOMETER OF THE SITE

LARGEST 5 EVENTS:

3.2 ON TUESDAY, JANUARY 20, 1998 LOCATED APPROX. 6 KILOMETERS NORTHEAST OF THE SITE
3.1 ON FRIDAY, OCTOBER 17, 1997 LOCATED APPROX. 2 KILOMETERS NORTHEAST OF THE SITE
3.1 ON MONDAY, NOVEMBER 20, 1989 LOCATED APPROX. 8 KILOMETERS SOUTH OF THE SITE
3.1 ON MONDAY, NOVEMBER 20, 1989 LOCATED APPROX. 8 KILOMETERS SOUTH OF THE SITE
3.1 ON TUESDAY, APRIL 18, 1978 LOCATED APPROX. 7 KILOMETERS NORTH OF THE SITE

APPENDIX B
Field Investigation Program
Boring and Trench Logs

APPENDIX B
FIELD INVESTIGATION

Subsurface Exploration

The site was investigated on January 31, February 1, 4 through 7, and 14 of 2002 and consisted of excavating a total of 31 trenches to depths between 4.5 to 15.0 feet below the existing ground surface and advancing a total of 23 borings to depths between 24.0 and 51.1 feet below the existing ground surface. The approximate locations of the trenches and borings are shown on Enclosures A-7 and A-8, within Appendix A.

The exploration was conducted using a FORD 555 E backhoe with a 24-inch bucket. The soil encountered were continuously logged by a geologist from this firm who visually observed the site, maintained detailed logs of the trenches, obtained disturbed soil samples for laboratory evaluation and testing, and classified the soils encountered by visual examination in accordance with the Unified Soil Classification System.

In-place density determinations were conducted at selected levels, within the trenches utilizing the Nuclear Gauge Method (ASTM D 2922). Disturbed soil samples were obtained at soil changes and other selected levels within the trenches. The samples were placed in sealed containers for transport to the laboratory.

The exploration was conducted using a CME-55 drill rig equipped with an 8-inch diameter hollow stem auger. The soils were continuously logged by a geologist from this firm who inspected the site, maintained detailed logs of the borings, obtained undisturbed, as well as disturbed, soil samples for evaluation and testing, and classified the soils by visual examination in accordance with the Unified Soil Classification System.

Relatively undisturbed samples of the subsoils were obtained at a maximum interval of 5 feet. The samples were recovered by using a California split barrel sampler of 2.50 inch inside diameter and 3.00 inch outside diameter from the ground surface to 35 feet deep. The samplers were driven by a 140 pound automatic trip hammer dropped from a height of 30 inches. The number of hammer blows required to drive the sampler into the ground the final 12 inches were recorded and further converted to an equivalent SPT N-value. Factors such as efficiency of the automatic trip hammer used during this investigation (80%), borehole diameter (8"), and rod length at the test depth were considered for further computing of equivalent SPT N-values corrected for

field procedures ($\approx N_{60}$) which are included in the boring logs, Enclosures B-1 through B-23.

The undisturbed soil samples were retained in brass sample rings of 2.42 inches in diameter and 1.00 inch in height, and placed in sealed plastic containers. Disturbed soil samples were obtained at selected levels within the borings and placed in sealed containers for transport to the laboratory.

All samples obtained were taken to our laboratory for storage and testing. Detailed logs of the trenches and borings are presented on the enclosed Trench and Boring Logs, Enclosures B-1 through B-54. A Sampling Key is presented on Enclosure B.

CONSISTENCY OF SOILS

SANDS

SPT BLOWS	CONSISTENCY
0 - 4	Very loose
4 - 10	Loose
10 - 30	Medium dense
30 - 50	Dense
Over 50	Very dense

COHESIVE SOILS

SPT BLOWS	CONSISTENCY
0 - 2	Very soft
2 - 4	Soft
4 - 8	Medium
8 - 15	Stiff
15 - 30	Very stiff
30 - 60	Hard
Over 60	Very Hard

SAMPLING KEY

Symbol	Description
	- INDICATES CALIFORNIA SPLIT SPOON SOIL SAMPLE
	- INDICATES SAND CONE OR NUCLEAR DENSITY TEST
	- INDICATES BAG SAMPLE
	- INDICATES STANDARD PENETRATION TEST (SPT) SOIL SAMPLE

MAJOR DIVISIONS			LITHOLOGY	U.S.C.S.	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS: MORE THAN 50% OF MATERIAL IS LARGER THAN 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS: MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GARVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS: MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SAND, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS: MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF RICH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS AND MANURE WITH HIGH ORGANIC MATERIALS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

PARTICLE SIZE LIMITS

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	

12" 3" ¾" No. 4 No. 10 No. 40 200

(U.S. STANDARD SIEVE SIZE)

SAMPLE KEY

PROJECT: 580± ACRES, BEDFORD CANYON, CORONA AREA, RIVERSIDE CO., CA	PROJECT NO.: 31558.1
CLIENT: BLUESTONE COMMUNITIES	ENCLOSURE: B
LOR Geotechnical Group, Inc.	DATE: MARCH 2002
	SCALE: NO SCALE

LOG OF BORING B-1

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	U.S.C.S	DESCRIPTION
0		5.2		T	SM	TOPSOIL/FERTILIZER 2 inches thick.
	16	3.7	102.0		SM	@ 0.2 feet TOPSOIL: SILTY SAND with gravel, approximately 15% angular gravel to 2", 10% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 30% silty fines, dark brown, damp.
						@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 15% angular gravel to 2", 15% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 20% silty fines, grayish brown, damp.
5		9.2	113.1			
10	27	8.1	92.7			@ 10 feet becomes finer grained, approximately 70% fine grained sand, 30% silty fines, dark brown, damp.
15	36	2.8	121.2			@ 15 feet becomes coarser grained, approximately 20% fine gravel, 10% coarse grained sand, 20% medium grained sand, 35% fine grained sand, 15% silty fines, brown, damp.
20	50-6"	1.6	115.8			END OF BORING DUE TO REFUSAL ON BOULDER
25						No fill No caving No groundwater No bedrock
30						
35						

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA		PROJECT NUMBER:	31558.1
CLIENT:	Bluestone Communities	ELEVATION:	904
		DATE DRILLED:	January 31, 2002
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	CME 55
		HOLE DIA.: 8"	ENCLOSURE: B-1

LOG OF BORING B-2

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
	TEST DATA								
0			6.3					SM	TOPSOIL/FILL: **SILTY SAND, approximately 5% gravel, 5% coarse grained sand, 10% medium grained sand, 45% fine grained sand, 35% silty fines, damp, brown, loose.**
	21		12.1		96.5			SM	**@ 2 feet** ALLUVIUM: **SILTY SAND with angular gravel, approximately 20% fine angular gravel, 5% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 30% silty fines, brown, damp.**
5									
10	33		4.5		122.1				
15	27		5.0		109.8				
20	55		7.2		124.6				**@ 20 feet approximately 20% medium to fine grained angular gravel, 10% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 25% fines with trace clay, porous.**
25	44		7.1		117.7				**@ 24 feet very difficult drilling on cobbles.** **@ 2 5 feet slight amount of caliche, damp to moist.**
30									
35	50-6"								**END OF BORING DUE TO REFUSAL ON COBBLES**
40									**Fill 0-2'** **No caving** **No groundwater** **No bedrock**

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**945**
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	**January 31, 2002**
		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-2**

LOG OF BORING B-3

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0			5.4					SM	FERTILIZER 1 inch of cattle manure.
	19		4.0		119.6			SM	@ .1 feet TOPSOIL: SILTY SAND, approximately 5% gravel to 2", 5% coarse grained sand, 10% medium grained sand, 45% fine grained sand, 35% silty fines, brown, loose, damp.
5	40		4.0		111.6				@ 2 feet ALLUVIUM: SILTY SAND with gravel, approximately 20% angular gravel to 1", 10% coarse grained sand, 15% medium grained sand, 25% fine grained sand, 20% silty fines, grayish brown, damp.
10	21		6.1		128.7				
15	49								@ 15 feet color changes to brown, damp to moist.
20									END OF BORING DUE TO REFUSAL ON COBBLES
25									No fill No caving No groundwater No bedrock
30									
35									

TEST DATA

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER:	**31558.1**	
CLIENT: **Bluestone Communities**	ELEVATION:	**924**	
	DATE DRILLED:	**February 1, 2002**	
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT:	**CME 55**	
	HOLE DIA.: **8"**	ENCLOSURE:	**B-3**

LOG OF BORING B-4

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
		TEST DATA					
0		3.8				SM	FERTILIZER Cattle manure to 1 inch.
	14	5.1	105.9			SM	@ 0.1 feet TOPSOIL: SILTY SAND with angular gravel, approximately 25% angular gravel to 2", 5% coarse grained sand, 10% medium grained sand, 30% fine grained sand, 30% silty fines, brown, damp, loose.
5	22	3.3	118.4				@ 2 feet ALLUVIUM: SILTY SAND, approximately 10% fine gravel, 15% coarse grained sand, 20% medium grained sand, 35% fine grained sand, 20% silty fines, grayish brown, damp.
10	28	7.2	118.6				
15	44	6.2	122.0				
20	22	7.2	110.4				@ 20 feet becomes finer grained, approximately 35% medium grained sand, 45% fine grained sand, 30% silty fines, grayish brown, damp to moist.
25	52	5.6	122.8				@ 25 feet becomes coarser grained with approximately 15% fine gravel, 15% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 25% silty fines, grayish brown.
30	81	9.3	123.9				
35	41	15.4	117.5				@ 35 feet approximately 1% fine gravel, 4% coarse grained sand, 5% medium grained sand, 50% fine grained sand, 40% silty fines, yellowish brown, damp.
40	51-6"	5.7	117.6				
45	51-6"	7.5	124.0			SW SM	@ 45 feet WELL GRADED SAND with silt, approximately 5% angular gravel, 15% coarse grained sand, 25% medium grained sand, 40% fine grained sand, 15% silty fines, yellowish brown.
50	73	9.6	125.4				@ 46 feet SILTY SAND with gravel, approximately 10% fine gravel, 10% coarse grained sand, 15% medium grained sand, 40% fine grained sand, 25% silty fines, brown, damp.
55							@ 50 feet approximately 10% medium grained sand, 55% fine grained sand, 35% fines with trace of secondary clay, strong to yellowish brown, damp, dense, may be older alluvium.
60							END OF BORING
							No fill No caving No groundwater No bedrock

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**912**
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	**February 1, 2002**
		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-4**

LOG OF BORING B-5

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
		TEST DATA					
0		3.1		I		SM	ALLUVIUM: **SILTY SAND with gravel, approximately 20% fine gravel, 10% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 20% silty fines, grayish brown, damp, loose, caving.**
	21	2.9	115.4	■			
5	8	3.5	106.1	■			**@ 5 feet damp to dry.**
10	18			■			
				I			**@ 12 feet becomes slightly finer grained.**
15	43-6"			■			**@ 15 feet becomes coarser grained.**
							@ 17 feet difficult drilling on gravel and cobbles.
20	59	3.0	118.1	■			**@ 20 feet approximately 25% gravel, 5% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 20% silty fines, brown, damp.**
							END OF BORING
25							**No fill** **Slight caving** **No groundwater** **No bedrock**
30							
35							

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**990**
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	**February 1, 2002**
		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-5**

LOG OF BORING B-6

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
	TEST DATA								
0			2.9					SM	LEVEE FILL: **SILTY SAND with gravel, approximately 5% cobbles to 4", 15% gravel of angular metamorphic rocks, 10% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 20% silty fines, light grayish brown, damp, loose.**
5	35								
10	37		4.3					SM	@ 10 feet ALLUVIUM: **SILTY SAND with gravel, approximately 15% gravel, 15% coarse grained sand, 20% medium grained sand, 20% fine grained sand, 30% silty fines, brown, damp to dry.**
15	52		2.1		128.4				@ 15 feet becomes slightly coarser grained, approximately 20% gravel, 15% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 15% silty fines.
20	59		3.1		115.8				
25	37		3.2		115.5				
30	70		4.2						
35	51-3"								
40	51-3"		12.3		103.9				@ 40 feet BEDROCK: **Vaqueros Sandstone, medium to fine grained, yellowish tan, damp, hard.**
45									**END OF BORING**

Fill 0-10'
No caving
No groundwater
Bedrock 40-41.5'

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**1000**
		DATE DRILLED:	**February 1, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-6**

LOG OF BORING B-7

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
		TEST DATA					
0		4.5				SM	FERTILIZER **Cattle manure 1 inch thick.**
	10					SM	@ **0.1 feet** TOPSOIL: **SILTY SAND with gravel, approximately 20% gravel, 10% coarse grained sand, 20% medium grained sand, 25% fine grained sand, 25% silty fines, grayish brown, damp.**
5	23	3.7	112.3				@ **2 feet** ALLUVIUM: **SILTY SAND with gravel, approximately 20% fine angular gravel, 15% coarse grained sand, 20% medium grained sand, 45% fine grained sand, 20% silty fines, grayish brown, damp to moist.**
10	30	5.9	121.1				
15	21	5.5	119.0				
20	47	4.7	125.8				@ **20 feet slight amount of tan clay in pores.**
25	43	3.8	116.5				
30	60	3.0	130.7				@ **30 feet becomes finer grained with approximately 15% fine gravel, 20% medium grained sand, 40% fine grained sand, 25% silty fines, grayish brown, damp, dense.**
							END OF BORING
35							**No fill** **No caving** **No groundwater** **No bedrock**

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**1060**
		DATE DRILLED:	**February 1, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-7**

LOG OF BORING B-8

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
	TEST DATA								
0			3.9					SM	ALLUVIUM: **SILTY SAND with gravel, approximately 20% fine angular gravel, 10% coarse grained sand, 20% medium grained sand, 25% fine grained sand, 25% silty fines, damp, loose, grayish brown.**
	20		3.4		106.0	■			
5	37		3.7		120.6	■			**@ 5 feet slightly coarser grained with approximately 20% angular gravel to 2", 10% coarse grained sand, 25% medium grained sand, 25% fine grained sand, 20% silty fines, grayish brown.**
10	19		4.9		110.4	■			
15	21		5.5		121.1	■			
20	43-6"		5.4		108.3	■			**@ 20 feet slight trace of clay coating on grains and in pores.**
25	31		8.7		117.4	■			
30	31		4.8		108.6	■			**@ 30 feet becomes finer grained with approximately 5% fine gravel, 10% medium grained sand, 50% fine grained sand, 35% silty fines, brown, damp to slightly moist.**
35									**@ 38 feet slightly difficult drilling on gravel.**
40	41		2.5		124.2	■			
45									**END OF BORING DUE TO REFUSAL ON COBBLES**
50									**No fill** **No caving** **No groundwater** **No bedrock**
55									

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**1120**
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	**February 1, 2002**
		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-8**

LOG OF BORING B-9

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
	TEST DATA								
0			2.2					SM	FILL: SILTY SAND with gravel, approximately 10% angular cobbles to 4", 20% gravel, 10% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 15% silty fines.
	38-6"		4.2		117.3				
5	38-6"		5.3		106.7				
10	36		3.9		117.6			SM	@ 10 feet ALLUVIUM: SILTY SAND, approximately 10% fine gravel, 20% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 25% silty fines, grayish brown, damp. @ 11 feet near refusal on cobbles.
15	22		5.1		113.2				@ 16 feet difficult drilling on cobbles.
20	36		4.4		126.2				@ 20 feet approximately 5% gravel, 15% coarse grained sand, 20% medium grained sand, 30% fines with trace of brown clay in pores, damp to slightly moist.
25	59		4.8		119.8				
30	48								END OF BORING
35									Fill 0-10' No caving No groundwater No bedrock

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**1156**
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	**February 4, 2002**
		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-9**

LOG OF BORING B-10

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
	TEST DATA								
0			4.3			▼		SM	FILL: SILTY SAND with large blocks of concrete nails and other trash.
5	12					■			
10	7					■			
15	9					■			
20	17					■			
25	12					■			@ 25 feet some brick and other trash.
30	14					■			
35									
40	15		9.3		97.0	■			
45									
50	31-6"		5.9		117.1	■		SM	@ 48 feet OLDER ALLUVIUM/COLLUVIUM: SILTY SAND with gravel, approximately 5% fine gravel, 10% coarse grained sand, 20% medium grained sand, 30% silty fines, grayish brown, damp.
55									END OF BORING DUE TO REFUSAL/MAY BE TRASH WRAPPING ON AUGER
60									Fill 0-48' No caving No groundwater No bedrock

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**1248**
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	**February 4, 2002**
		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-10**

LOG OF BORING B-11

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
	TEST DATA								
0			7.4					SM	TOPSOIL/FILL: **SILTY SAND, approximately 5% coarse grained sand, 5% medium grained sand, 55% fine grained sand, 35% silty fines, orange brown, damp, loose.**
	38-6"		7.7		116.8				
									@ 4 feet difficult drilling due to hard nest and on large gravel/small cobbles.
5	38-6"		6.0		123.2			SM	**@ 5 feet** OLDER ALLUVIUM: **SILTY SAND with angular metamorphic gravel, approximately 25 % gravel, 10% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 35% silty fines, orange brown to brown, damp, dense.**
10	38		9.0		120.6				**@ 10 feet difficult to slow drilling due to dense material.**
15	64		8.7		125.3				
20	35		8.1		117.4				**@ 20 feet water added to facilitate drilling.**
									@ 23 feet very difficult drilling.
25	73		8.0		119.2				
									END OF BORING DUE TO SLOW PROGRESS
30									**Fill 0-5'** **No caving** **No groundwater** **No bedrock**
35									

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**1348**
		DATE DRILLED:	**February 4, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-11**

LOG OF BORING B-12

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
		TEST DATA					
0		7.2		I		SM	FILL: SILTY SAND, approximately 5% medium grained sand, 60% fine grained sand, 35% silty fines, orange brown, damp, loose.
	15	8.7	119.6	■			@ 2 feet slight trace of small pores.
5	18	11.3	108.8	■		SM	@ 5 feet OLDER ALLUVIUM: SILTY SAND, approximately 5% fine gravel, 5% coarse grained sand, 10% medium grained sand, 40% fine grained sand, 40% silty fines, trace of clay, reddish brown, damp, dense, highly weathered.
							@ 8 feet difficult drilling to due to dense materials.
10	36	7.7	124.4	■			
15	46	6.6	113.4	■			@ 15 feet becomes coarser grained with clayey matrix, approximately 20% highly weathered angular gravel sized clasts of metamorphic rocks, 5% coarse grained sand, 10% medium grained sand, 30% fine grained sand, 35% fines, yellowish brown, damp, very dense.
							@ 16 feet water added due slow progress to facilitate drilling.
20	43	9.3	117.6	■			END OF BORING DUE TO SLOW PROGRESS
							Fill 0-5'
							No caving
							No groundwater
							No bedrock
25							
30							
35							

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **1380**
	DATE DRILLED: **February 4, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **CME 55**
	HOLE DIA.: **8"** ENCLOSURE: **B-12**

LOG OF BORING B-13

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
	TEST DATA								
0			6.3			T		SM	TOPSOIL/FILL: **SILTY SAND, approximately 5% medium grained sand, 55% fine grained sand, 40% silty fines, brown, dry, loose.**
	21		5.1		97.9	■			
5	18					■		SM	**@ 5 feet** OLDER ALLUVIUM: **SILTY SAND, approximately 10% subgangular metamorphic gravel sized clasts, 15% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 30% silty fines, reddish to grayish brown, damp, dense.**
10	16		4.7		107.0	■			
15	17		9.3		120.3	■			**@ 15 feet becomes finer grained, approximately 5% medium grained sand, 50% fine grained sand, 45% silty fines, damp to moist, brown.**
20	33		6.8		123.1	■			**@ 20 feet approximately 5% fine gravel, 15% coarse grained sand, 25% medium grained sand, 30% fine grained sand, 25% silty fines, grayish brown, damp.**
25	36		7.0		113.4	■			
30	22		5.2		115.5	■			
35									**END OF BORING**

Fill 0-5'
No caving
No groundwater
No bedrock

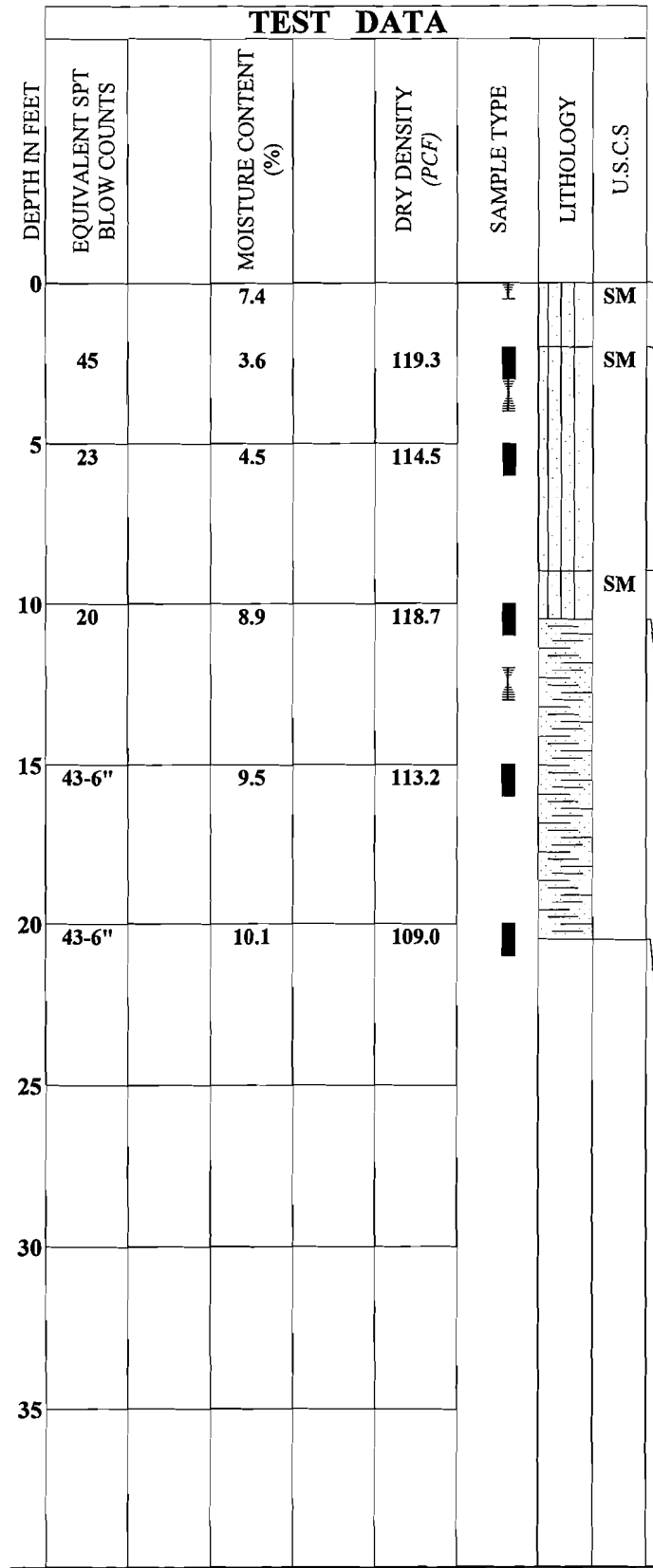
PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**924**
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	**February 4, 2002**
		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-13**

LOG OF BORING B-14

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
		TEST DATA					
0		4.6				SM	TOPSOIL/FILL: **SILTY SAND with gravel, approximately 15% subrounded gravel, 5% coarse grained sand, 10% medium grained sand, 35% fine grained sand, 35% silty fines, brown, damp.**
						SM	**@ 2 feet ALLUVIUM: SILTY SAND, approximately 5% gravel, 20% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 25% silty fines, grayish brown, damp.**
5	21	4.8	115.2				
10	48	3.2	116.7				**@ 10 feet becomes slightly coarser grained, approximately 15% gravel, 15% coarse grained sand, 20% medium grained sand, 25% fine grained sand, 25% silty fines.**
15	40	3.8					**@ 17 feet some difficulty drilling on dense gravel.**
20	30						
25							**@ 25 feet too gravelly to sample.**
30	48-6"	3.2	115.7				
35							
40							**END OF BORING DUE TO REFUSAL** **Fill 0-2'** **No caving** **No groundwater** **No bedrock**

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**856**
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	**February 4, 2002**
		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-14**

LOG OF BORING B-15



DESCRIPTION

FILL: **SILTY SAND, approximately 10% coarse grained sand, 15% medium grained sand, 50% fine grained sand, 35% silty fines, reddish brown, loose, damp.**

@ 2 feet ALLUVIUM: **SILTY SAND with gravel, approximately 5% fine cobbles of subangular metamorphic rocks, 20% gravel, 5% coarse grained sand, 15% medium grained sand, 25% fine grained sand, 30% silty fines, brown, damp, dense.**

@ 5 feet approximately 15% fine gravel, 20% coarse grained sand, 30% medium grained sand, 15% fine grained sand, 20% silty fines, brown, damp, dense.
@ 6 feet slight difficulty drilling on cobbles.

@ 9 feet OLDER ALLUVIUM: **SILTY SAND, approximately 5% fine gravel of highly decomposed metamorphic rock, 5% coarse grained sand, 10% medium grained sand, 40% fine grained sand, 40% silty fines, strong brown, damp.**

@ 10.5 feet BEDROCK: **Vaqueros Formation (?), SANDSTONE, composed of approximately 40% medium grained sand, 40% fine grained sand, 20% silty fines, greenish tan, damp, moderately hard, weathered.**

@ 20 feet becomes coarser grained, approximately 20% coarse grained sand, 40% medium grained sand, 25% fine grained sand, 15% silty fines, less weathered.

END OF BORING DUE TO DENSE BEDROCK

Fill 0-2'
No caving
No groundwater
Bedrock 10.5-20.5'

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **1000**
	DATE DRILLED: **February 14, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **CME 55**
	HOLE DIA.: **8"** ENCLOSURE: **B-15**

LOG OF BORING B-16

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
		TEST DATA					
0		13.6				SM	FILL: SILTY SAND, approximately 15% medium grained sand, 45% fine grained sand, 40% silty fines, trace of clay, reddish brown, damp, loose.
	38	3.5	128.5			SM	@ 2 feet OLDER ALLUVIUM: SILTY SAND with gravel, approximately 15% fine angular gravel of metamorphic rocks, 10% coarse grained sand, 10% medium grained sand, 35% fine grained sand, 30% silty fines, reddish to strong brown, damp, dense.
5	30	5.9	118.0				@ 6 feet slight difficulty drilling on gravel and/or cobbles.
10	27	6.9	122.9				@ 10 feet approximately 20% coarse grained sand, 35% medium grained sand, 20% fine grained sand, 25% silty fines, orange brown.
15	48	50.5	91.7				
							@ 18 feet approximately 5 to 15% fine gravel, trace of clay.
20	49	9.5	121.8				
25	54	7.5	127.4				@ 25 feet slight trace of moisture in sampler.
30	61	7.4	129.4				
35							END OF BORING Fill 0-2' No caving No groundwater No bedrock

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**1200**
		DATE DRILLED:	**February 14, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-16**

LOG OF BORING B-17

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
	TEST DATA								
0			6.7			T		SM	FILL: SILTY SAND, approximately 5% gravel, 5% coarse grained sand, 10% medium grained sand, 40% fine grained sand, 40% silty fines, brown, damp.
	20		6.9		126.7				
5	55		3.8		113.3			SM	@ 5 feet OLDER ALLUVIUM: SILTY SAND with gravel, approximately 15% fine gravel, 10% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 30% silty fines, brown to orange brown, damp, dense. @ 7 feet very difficult drilling on gravel or cobbles.
10	62		6.0		127.6				
15	58		6.2		130.1				@ 15 feet slightly coarser grained, approximately 20% subangular gravel sized clasts of weathered metamorphic rocks, 10% coarse grained sand, 20% medium grained sand, 20% fine grained sand, 30% silty fines, orange brown, damp, dense.
20	60		6.4		127.2				@ 20 feet composition varies with some thin lenses of coarse grained sand, these porous lenses are saturated with moisture.
25	72		7.3		126.1			SC	@ 25 feet CLAY with fines, moist. @ 26 feet difficult drilling on cobbles and gravel.
30									END OF BORING Fill 0-5' No caving No groundwater No bedrock
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 1278
	DATE DRILLED: February 14, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: CME 55
	HOLE DIA.: 8" ENCLOSURE: B-17

LOG OF BORING B-18

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
		TEST DATA					
0		5.2				SM	FILL: SILTY SAND, approximately 5% fine gravel, 10% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 35% silty fines, brown, damp, loose.
	18	5.5	92.2				
						SM	@ 3 feet ALLUVIUM: SILTY SAND, approximately 5% fine subrounded gravel, 15% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 30% silty fines, dark brown, damp.
5	23	2.8	117.3				
10	7	7.3	122.6				@ 10 feet becomes finer grained, approximately 10% coarse grained sand, 15% medium grained sand, 40% fine grained sand, 35% silty fines, brown, damp. @ 11 feet very difficult drilling on cobbles or gravel.
15	17	2.8	113.2				
20	26	5.0	121.8				@ 20 feet becomes coarser grained, approximately 10% fine gravel, 15% coarse grained sand, 30% medium grained sand, 20% fine grained sand, 25% silty fines, brown, damp. @ 22 feet very difficult drilling on gravel and/or cobbles.
							END OF BORING DUE TO SLOW PROGRESS
25							Fill 0-3' No caving No groundwater No bedrock
30							
35							

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**921**
		DATE DRILLED:	**February 14, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-18**

LOG OF BORING B-19

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
	TEST DATA								
0			5.0					SM	FILL: SILTY SAND, approximately 10% very fine gravel, 10% medium grained sand, 45% fine grained sand, 35% silty fines, brown, loose, damp.
	15		5.7		108.7				
5	17		3.4		112.1			SM	@ 4 feet ALLUVIUM: SILTY SAND with gravel, approximately 20% gravel to 1 inch, 10% coarse grained sand, 15% medium grained sand, 30% fine grained sand, 25% silty fines, brown, damp.
10	33		4.1		120.3				
15	25		4.8		118.9				
20	56		3.4		124.8				
25	46		3.5		127.6				
30									END OF BORING Fill 0-4' No caving No groundwater No bedrock
35									

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA		PROJECT NUMBER:	31558.1
CLIENT:	Bluestone Communities	ELEVATION:	892
		DATE DRILLED:	February 14, 2002
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	CME 55
		HOLE DIA.: 8"	ENCLOSURE: B-19

LOG OF BORING B-20

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
	TEST DATA								
0			7.2					SM	FILL: SILTY SAND, approximately 2% fine gravel, 3% coarse grained sand, 5% medium grained sand, 55% fine grained sand, 35% silty fines, orange brown, dry, loose.
	38-6"		6.6		86.6				
5	27		6.3		124.1			SM	@ 3 feet OLDER ALLUVIUM: SILTY SAND with gravel, approximately 15% fine gravel of subangular metamorphic rock, 20% coarse grained sand, 20% medium grained sand, 15% fine grained sand, 30% silty fines, orange brown, damp, dense.
10	30		5.5		121.4				@ 10 feet approximately 10% gravel to 1.5 inches, 20% coarse grained sand, 25% medium grained sand, 30% fine grained sand, 25% silty fines, orange grayish brown.
15	62		4.9		134.5				
20	73		5.6		122.4				@ 23 feet difficult drilling on cobbles.
25									END OF BORING
									Fill 0-3'
									No caving
									No groundwater
30									No bedrock
35									

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**960**
		DATE DRILLED:	**February 14, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-20**

LOG OF BORING B-21

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
		TEST DATA					
0		7.6				SM	FILL: SILTY SAND, approximately 15% medium grained sand, 50% fine grained sand, 35% silty fines, brown, dry, dense.
	22	8.5	123.9				@ 0.1 feet damp and loose.
5	12	9.5	122.5				
							@ 6.5 feet BEDROCK: Vaqueros Formation, SANDSTONE, fine to medium grained, tan to greenish tan, damp, soft.
10		10.1	107.8				@ 10 feet becomes moderately hard.
15		21.1	104.4				@ 15 feet SILTSTONE, approximately 40% fine grained sand, 60% silts, greenish gray to tan, damp, hard.
							@ 18 feet slow drilling.
20		13.0	112.2				@ 20 feet SANDSTONE, approximately 20% coarse grained sand, 30% medium grained sand, 35% fine grained sand, 15% fines, tan, damp, hard.
							END OF BORING
25							Fill 0-6.5' No caving No groundwater Bedrock 6.5-21'
30							
35							

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **924**
	DATE DRILLED: **February 14, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **CME 55**
	HOLE DIA.: **8"** ENCLOSURE: **B-21**

LOG OF BORING B-22

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
	TEST DATA								
0			2.6					SM	FILL/TOPSOIL: **SILTY SAND with gravel, approximately 15% gravel, 10% coarse grained sand, 20% medium grained sand, 35% fine grained sand, 20% silty fines, grayish brown, dry, loose.**
	18		4.4		123.0				
5	24		5.1		109.4			SM	@ 5 feet ALLUVIUM: **SILTY SAND with gravel, approximately 5% cobbles to 4 inches, 20% gravel, 10% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 15% silty fines, dark yellowish brown, damp.**
10	17		8.4		113.2				
15	33		3.7		115.8				@ 15 feet becomes better sorted with approximately 30% coarse grained sand, 35% medium grained sand, 20% fine grained sand, 15% silty fines, brown, damp.
20	57		4.2		120.5				@ 23 feet difficulty drilling on gravels.
25	31								
30	48-6"		9.2		118.8				@ 30 feet BEDROCK: **Vaqueros Formation, SANDSTONE, approximately 5% coarse grained sand, 25% medium grained sand, 45% fine grained sand, 25% fines, greenish tan, damp, moderately hard.**
									END OF BORING
35									**Fill 0-5'** **No caving** **No groundwater** **Bedrock 30-31.5'**

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**872**
		DATE DRILLED:	**February 14, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-22**

LOG OF BORING B-23

DEPTH IN FEET	EQUIVALENT SPT BLOW COUNTS		MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
	TEST DATA								
0			5.2					SM	FILL: SILTY SAND, approximately 15% medium grained sand, 50% fine grained sand, 35% silty fines, orange brown, damp.
	25		3.0		127.5			SM	@ 2 feet OLDER ALLUVIUM: SILTY SAND, approximately 5% fine gravel, 15% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 30% silty fines, orange brown, damp, dense.
5	28		3.5		118.1				@ 5 feet approximately 10% fine gravel, 20% coarse grained sand, 30% medium grained sand, 25% fine grained sand, 15% silty fines.
10									
15									@ 15 feet difficult drilling on cobbles.
20	71		9.2		127.5				
25									
30	48-2"								
35									END OF BORING Fill 0-2' No caving No groundwater No bedrock

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**848**
LOR GEOTECHNICAL GROUP INC.		DATE DRILLED:	**February 14, 2002**
		EQUIPMENT:	**CME 55**
		HOLE DIA.: **8"**	ENCLOSURE: **B-23**

LOG OF TRENCH T-1

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		6.0				SM	FILL: SILTY SAND, approximately 5% gravel to 1/2", 10% coarse grained sand, 30% medium grained sand, 30% fine grained sand, 25% silty fines, dark brown, moist, loose.
	81	12.6	106.6			SM	@ 1 foot ALLUVIUM: SILTY SAND, trace gravel to 1/2", approximately 5% coarse grained sand, 10% medium grained sand, 50% fine grained sand, 35% silty fines, dark brown, moist, roots.
	85	4.8	111.6				@ 3 feet approximately 20% gravel to 1", 20% coarse grained sand, 20% medium grained sand, 25% fine grained sand, 15% silty fines, dark brown, moist.
							@ 3.5 feet trace cobbles to 10".
5						ML	@ 5 feet SANDY SILT, trace gravel to 1", trace coarse grained sand, approximately 5% medium grained sand, 40% fine grained sand, 55% silty fines with trace clay of low plasticity, dark brown, moist.
10							@ 11 feet occasional cobble to 5".
						SM	@ 13 feet SILTY SAND, approximately 20% gravel to 2", 20% coarse grained sand, 30% medium grained sand, 10% fine grained sand, 20% silty fines, red brown, moist.
15							END OF TRENCH
							Fill 0-1'
							No caving
							No groundwater
							No bedrock

TEST DATA

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA		PROJECT NUMBER:	31558.1
CLIENT: Bluestone Communities		ELEVATION:	916
		DATE EXCAVATED:	February 4, 2002
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	Ford 555E
		BUCKET W.: 24"	ENCLOSURE: B-24

LOG OF TRENCH T-2

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	U.S.C.S	DESCRIPTION
0		4.4		SM	FILL: **SILTY SAND with gravel, approximately 10% gravel to 1", 10% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 30% silty fines, brown, moist, loose.**
				SW	**@ 1 foot ALLUVIUM: WELL GRADED SAND with gravel, approximately 15% gravel to 6", 20% coarse grained sand, 30% medium grained sand, 5% silty fines, brown, moist.**
	89	3.3	116.1		
5	84	5.8	109.7		**@ 4 feet approximately 5% gravel to 1", 35% coarse grained sand, 35% medium grained sand, 20% fine grained sand, 55% silty fines, brown, moist.** **@ 5 feet occasional cobble to 10".**
10					
15					**END OF TRENCH**

Fill 0-1'
No caving
No groundwater
No bedrock

PROJECT:	**500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**914**
		DATE EXCAVATED:	**February 4, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**Ford 555E**
		BUCKET W.: **24"**	ENCLOSURE: **B-25**

LOG OF TRENCH T-3

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	U.S.C.S	DESCRIPTION
0		18.3		SM	FILL: **SILTY SAND with trace clay, approximately 5% coarse grained sand, 15% medium grained sand, 45% fine grained sand, 35% silty fines with trace clay of low plasticity, brown, moist, loose.**
	80	10.7	104.8	SW	**@ 1.5 feet** ALLUVIUM: **WELL GRADED SAND with silt, approximately 10% gravel to 1", 30% coarse grained sand, 35% medium grained sand, 20% fine grained sand, 10% silty fines, brown, moist.**
	90	4.9	118.7		
5					**@ 5 feet occasional cobble to 10".**
					@ 7 feet approximately 30% gravel to 10", 25% coarse grained sand, 25% medium grained sand, 20% fine grained sand, 5% silty fines, brown, moist.
10					
15					**END OF TRENCH**
					Fill 0-1.5' **No caving** **No groundwater** **No bedrock**

PROJECT:	**500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**896**
		DATE EXCAVATED:	**February 4, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**Ford 555E**
		BUCKET W.: **24"**	ENCLOSURE: **B-26**

LOG OF TRENCH T-4

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		2.4				SM	FILL: SILTY SAND, trace gravel to 1/2", approximately 5% coarse grained sand, 15% medium grained sand, 55% fine grained sand, 25% silty fines, red brown, dry.
						SM	@ 0.5 feet OLDER ALLUVIUM: SILTY SAND with gravel, approximately 40% gravel to 12", 15% coarse grained sand, 15% medium grained sand, 15% fine grained sand, 15% silty fines, red brown, damp.
	90	4.6	118.6				
	91	5.5	120.7				
5							@ 5 feet becomes yellowish red brown.
						GM	@ 6 feet SANDY GRAVEL with silt, approximately 60% gravel to 12", 10% coarse grained sand, 10% medium grained sand, 10% fine grained sand, 10% silty fines, difficult to excavate.
10							
							END OF TRENCH
							Fill 0-0.5'
							No caving
							No groundwater
							No bedrock
15							

TEST DATA

PROJECT:	500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER:	31558.1
CLIENT:	Bluestone Communities	ELEVATION:	948
		DATE EXCAVATED:	February 4, 2002
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	Ford 555E
		BUCKET W.: 24"	ENCLOSURE: B-27

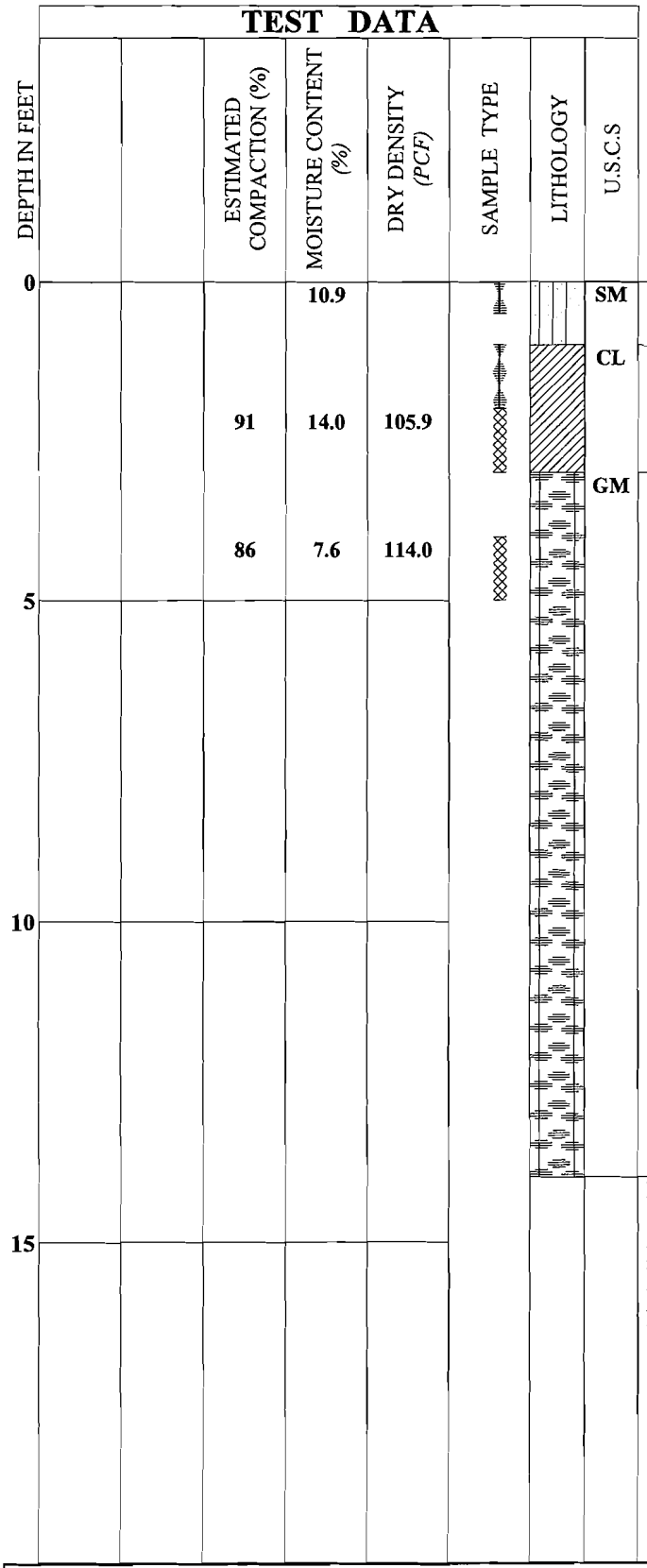
LOG OF TRENCH T-5

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		12.1				SM	FILL: SILTY SAND, approximately 10% medium grained sand, 60% fine grained sand, 30% silty fines, dark brown, moist, loose, roots.
	86	19.5	100.6			CL	@ 1 foot OLDER ALLUVIUM: SANDY CLAY, approximately 5% medium grained sand, 30% fine grained sand, 65% clayey fines of medium plasticity, red brown, moist.
							@ 2.5 feet BEDROCK: Vaqueros Formation, silty sandstone, fine grained, greenish gray with iron oxide staining, damp.
5							@ 4 feet no iron oxide staining, relatively easy to excavate.
10							END OF TRENCH
							Fill 0-1'
							No caving
							No groundwater
							Bedrock 2.5-10'
15							

TEST DATA

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA		PROJECT NUMBER:	31558.1
CLIENT: Bluestone Communities		ELEVATION:	944
		DATE EXCAVATED:	February 5, 2002
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	Ford 555E
		BUCKET W.: 24"	ENCLOSURE: B-28

LOG OF TRENCH T-6



PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**996**
LOR GEOTECHNICAL GROUP INC.		DATE EXCAVATED:	**February 5, 2002**
		EQUIPMENT:	**Ford 555E**
		BUCKET W.: **24"**	ENCLOSURE: **B-29**

LOG OF TRENCH T-7

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		5.7				SM	FILL: SILTY SAND, trace gravel to 1", approximately 5% coarse grained sand, 30% medium grained sand, 45% fine grained sand, 20% silty fines, dark brown, damp, loose.
	85	5.5	111.3			SM	@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 20% gravel to 3", 15% coarse grained sand, 25% medium grained sand, 35% fine grained sand, 15% silty fines, dark brown, moist.
	84	6.2	109.7				@ 4 feet occasional cobble to 8".
5							
10							
							END OF TRENCH
							Fill 0-1' No caving No groundwater No bedrock
15							

TEST DATA

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA		PROJECT NUMBER:	31558.1
CLIENT: Bluestone Communities		ELEVATION:	934
		DATE EXCAVATED:	February 5, 2002
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	Ford 555E
		BUCKET W.: 24"	ENCLOSURE: B-30

LOG OF TRENCH T-8

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		7.7				SM	FILL: **SILTY SAND, approximately 5% gravel to 1", 10% coarse grained sand, 25% medium grained sand, 45% fine grained sand, 15% silty fines, brown, damp, loose, roots.**
	75	3.0	101.8			SM	**@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 35% gravel to 3", 20% coarse grained sand, 15% medium grained sand, 10% fine grained sand, 15% silty fines, brown gray, damp.**
	84	3.3	113.7				**@ 2 feet occasional cobble to 10".**
5							
10							
15							**END OF TRENCH**

Fill 0-1'
No caving
No groundwater
No bedrock

PROJECT:	**500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**870**
		DATE EXCAVATED:	**February 5, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**Ford 555E**
		BUCKET W.: **24"**	ENCLOSURE: **B-31**

LOG OF TRENCH T-9

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		2.6				GM	FILL: **SANDY GRAVEL with silt, approximately 60% gravel to 3", 10% coarse grained sand, 10% medium grained sand, 10% fine grained sand, 10% silty fines, brown, dry, loose.**
							@ 1 foot barbed wire fence, some boulders to 16".
							@ 2 feet steel debris, occasional boulder to 16" to total depth.
5							**@ 6 feet barbed wire fence, difficult to excavate.**
						GM	**@ 8 feet ALLUVIUM: SANDY GRAVEL with silt, approximately 40% gravel to 3", 15% cobbles, 5% boulders to 18", 10% coarse grained sand, 10% medium grained sand, 10% fine grained sand, 10% silty fines, gray brown.**
10							**END OF TRENCH**
							Fill 0-8'
							No caving
							No groundwater
							No bedrock
15							

TEST DATA

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **874**
	DATE EXCAVATED: **February 5, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **Ford 555E**
	BUCKET W.: **24"** ENCLOSURE: **B-32**

LOG OF TRENCH T-10

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		10.9				SM	FILL: SILTY SAND, approximately 5% coarse grained sand, 15% medium grained sand, 55% fine grained sand, 25% silty fines, dark brown, damp, loose, roots.
	72	9.9	93.3			SM	@ 1 foot OLDER ALLUVIUM: SILTY SAND, approximately 5% gravel to 2", trace coarse grained sand, 20% medium grained sand, 45% fine grained sand, 30% silty fines, dark brown, moist, roots.
	92	6.1	119.2			SM	@ 3 feet SILTY SAND with gravel and cobbles, approximately 10% subangular cobbles to 8", 15% gravel to 3", 15% coarse grained sand, 15% medium grained sand, 25% fine grained sand, 20% silty fines, red brown, moist.
5							
10							END OF TRENCH
							Fill 0-1'
							No caving
							No groundwater
							No bedrock
15							

TEST DATA

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 862
	DATE EXCAVATED: February 5, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" ENCLOSURE: B-33

LOG OF TRENCH T-11

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		14.7				SM	FILL: SILTY SAND, approximately 5% gravel to 1/2", 15% coarse grained sand, 15% medium grained sand, 45% fine grained sand, 20% silty fines, dark brown, moist, loose.
	84	5.5	111.2			SM	@ 1 foot OLDER ALLUVIUM: SILTY SAND with gravel, approximately 20% gravel to 1/2", 15% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 15% silty fines, brown, moist.
5	84	9.6	111.4				@ 3 feet occasional cobble to 8".
10							END OF TRENCH
15							Fill 0-1' No caving No groundwater No bedrock

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER: 31558.1
CLIENT: Bluestone Communities	ELEVATION: 834
	DATE EXCAVATED: February 5, 2002
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: Ford 555E
	BUCKET W.: 24" ENCLOSURE: B-34

LOG OF TRENCH T-12

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		8.6				SM	FILL: SILTY SAND, approximately 5% gravel to 1/2", 10% coarse grained sand, 15% medium grained sand, 55% fine grained sand, 15% silty fines, brown, damp, loose.
	79	12.8	101.3			SM	@ 1 foot OLDER ALLUVIUM: SILTY SAND, approximately 5% gravel to 1/2", 10% coarse grained sand, 15% medium grained sand, 40% fine grained sand, 30% silty fines, brown, moist, trace pinhole porosity.
	92	6.9	118.5			SM	@ 3 feet SILTY SAND with gravel, approximately 30% gravel to 3", 5% angular cobbles to 6", 15% coarse grained sand, 10% medium grained sand, 25% fine grained sand, 15% silty fines, red brown, moist.
5							
10							END OF TRENCH Fill 0-1' No caving No groundwater No bedrock
15							

TEST DATA

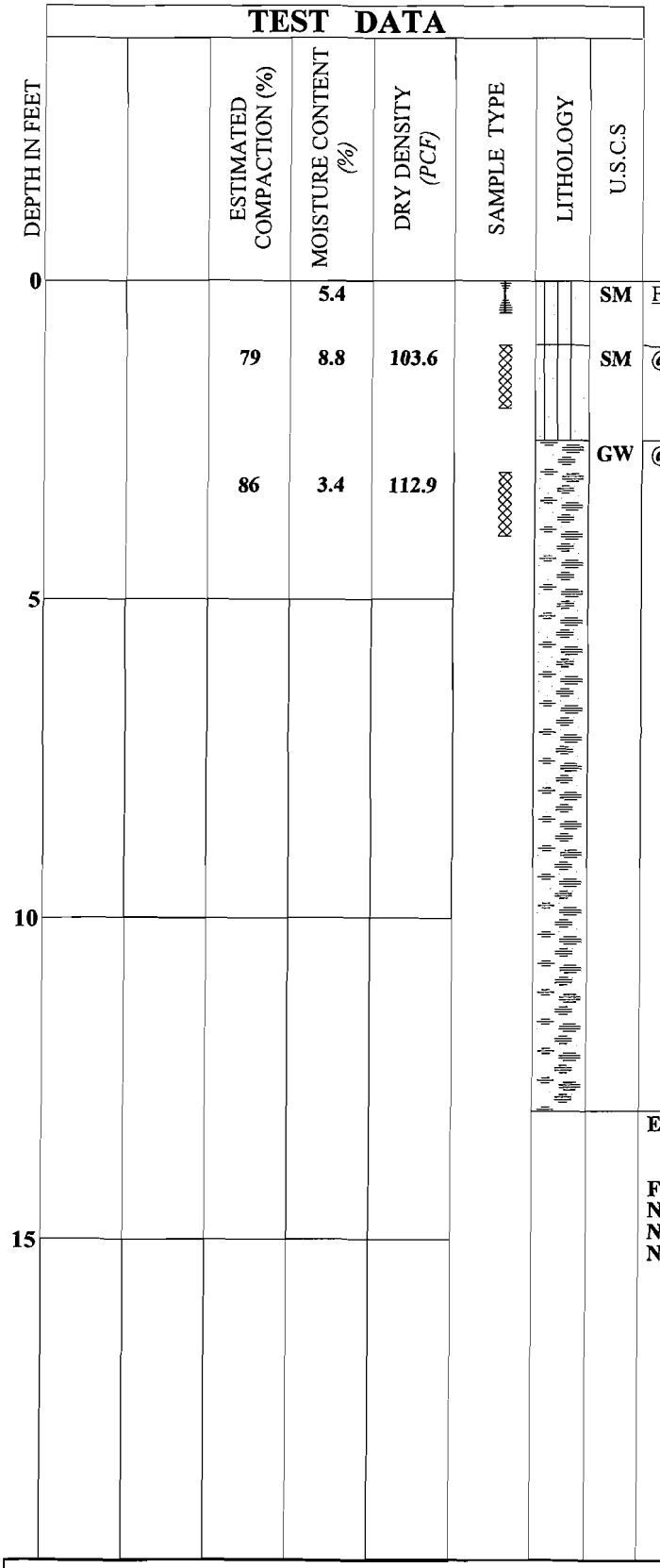
PROJECT: 500+ Acres in Bedford Canyon, Corona, CA		PROJECT NUMBER:	31558.1
CLIENT: Bluestone Communities		ELEVATION:	898
		DATE EXCAVATED:	February 5, 2002
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	Ford 555E
		BUCKET W.: 24"	ENCLOSURE: B-35

LOG OF TRENCH T-13

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		4.5				SM	FILL: **SILTY SAND with gravel, approximately 15% gravel to 1/2", 15% coarse grained sand, 25% medium grained sand, 15% fine grained sand, 30% silty fines, dark brown, damp, loose, roots.**
	78	4.1	102.7			SM	**@ 2 feet ALLUVIUM: SILTY SAND with gravel, approximately 30% gravel to 3" of which 5% cobbles to 8", 10% coarse grained sand, 20% medium grained sand, 20% fine grained sand, 20% silty fines, gray brown, moist.**
	89	3.4	116.6				**@ 4 feet occasional boulder to 14" to total depth.**
5							
10							
							END OF TRENCH
15							**Fill 0-2'** **No caving** **No groundwater** **No bedrock**

PROJECT:	**500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**932**
		DATE EXCAVATED:	**February 5, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**Ford 555E**
		BUCKET W.: **24"**	ENCLOSURE: **B-36**

LOG OF TRENCH T-14



DESCRIPTION

FILL: **SILTY SAND, approximately 5% gravel to 1/2", 10% coarse grained sand, 25% medium grained sand, 45% fine grained sand, 15% silty fines, dark brown, damp, loose, roots.**

@ 1 foot ALLUVIUM: **SILTY SAND, *trace medium grained* sand, 70% fine grained sand, 30% silty fines, brown, moist, some pinhole porosity.**

@ 2.5 feet WELL GRADED GRAVEL, approximately 60% gravel to 3", trace cobbles to 8", 15% coarse grained sand, 10% medium grained sand, 10% fine grained sand, 5% silty fines, gray brown, damp.

END OF TRENCH

Fill 0-1'
No caving
No groundwater
No bedrock

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **954**
	DATE EXCAVATED: **February 6, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **Ford 555E**
	BUCKET W.: **24"** ENCLOSURE: **B-37**

LOG OF TRENCH T-15

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		10.7				SM	FILL: SILTY SAND, approximately 10% gravel to 2", 10% coarse grained sand, 30% medium grained sand, 35% fine grained sand, 15% silty fines, dark brown, moist, loose, roots.
						SM	@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 10% gravel to 3", 25% coarse grained sand, 25% medium grained sand, 25% fine grained sand, 15% silty fines, brown, moist, caving.
	78	5.1	101.9			SW	@ 2 feet WELL GRADED SAND, approximately 35% coarse grained sand, 35% medium grained sand, 30% fine grained sand, brown, damp.
	74	11.2	97.5			SM	@ 4 feet SILTY SAND with gravel, approximately 5% gravel to 1", 5% coarse grained sand, 15% medium grained sand, 40% fine grained sand, 35% silty fines, dark brown, moist, trace pinhole porosity.
5							@ 5 feet approximately 35% gravel to 3" with some cobbles to 8", 15% coarse grained sand, 15% medium grained sand, 20% fine grained sand, 15% silty fines, brown, moist.
10							END OF TRENCH DUE TO CAVING FROM 0-5'
							Fill 0-1'
							Caving 0-5'
							No groundwater
							No bedrock
15							

TEST DATA

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA		PROJECT NUMBER:	31558.1
CLIENT: Bluestone Communities		ELEVATION:	980
		DATE EXCAVATED:	February 6, 2002
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	Ford 555E
		BUCKET W.: 24"	ENCLOSURE: B-38

LOG OF TRENCH T-16

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		9.1				SM	FILL: SILTY SAND, approximately 5% gravel to 3", 10% coarse grained sand, 40% medium grained sand, 30% fine grained sand, 15% silty fines, dark brown, moist, loose.
	77	8.5	100.6			SM	@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 30% gravel to 2", 10% coarse grained sand, 25% medium grained sand, 20% fine grained sand, 15% silty fines, brown, moist.
	85	3.8	110.8			GW	@ 3 feet WELL GRADED GRAVEL with cobbles, approximately 5% cobbles to 8", 60% gravel to 3", 15% coarse grained sand, 15% medium grained sand, 10% fine grained sand, trace silt, brown.
5							@ 8 feet some minor sloughing.
10							END OF TRENCH
							Fill 0-1'
							Minor caving
							No groundwater
							No bedrock
15							

TEST DATA

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA	PROJECT NUMBER:	31558.1	
CLIENT: Bluestone Communities	ELEVATION:	1022	
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED:	February 6, 2002	
	EQUIPMENT:	Ford 555E	
	BUCKET W.: 24"	ENCLOSURE:	B-39

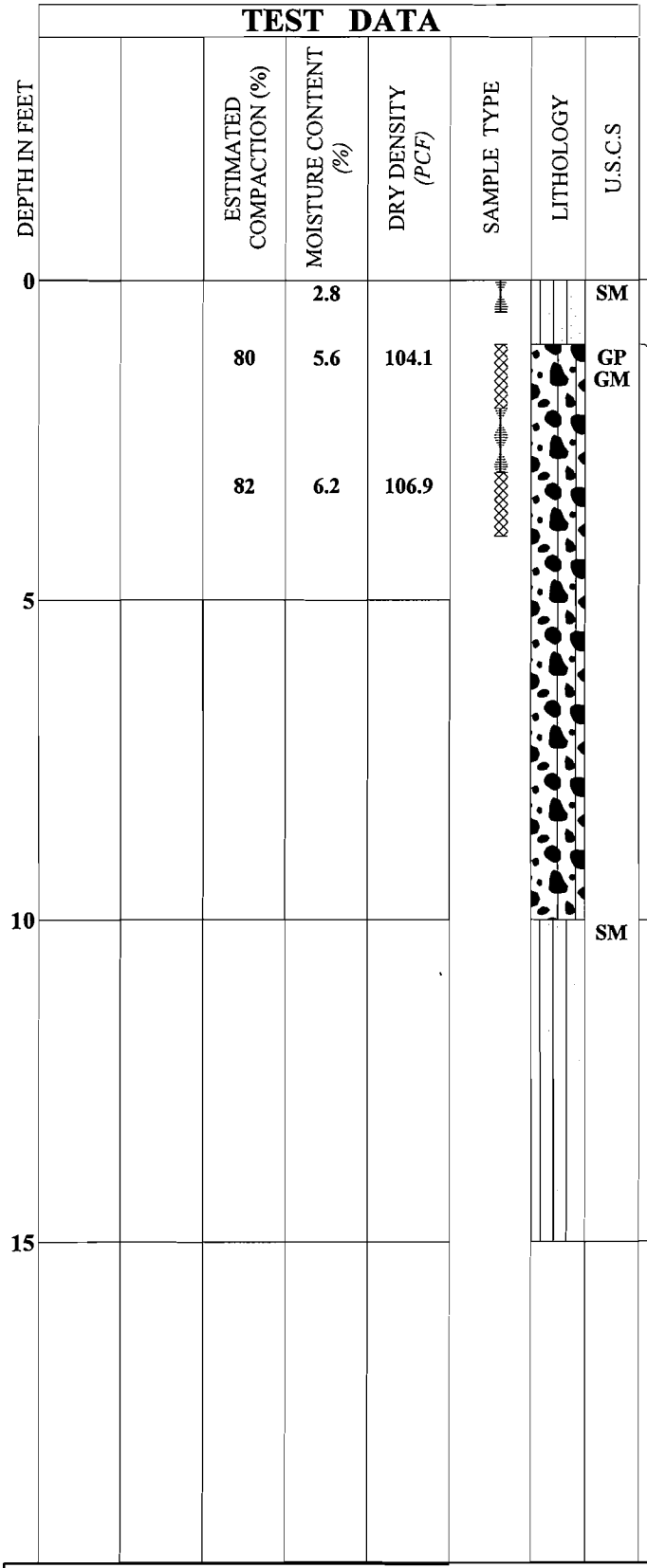
LOG OF TRENCH T-17

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		5.7				SM	FILL: **SILTY SAND, approximately 10% medium grained sand, 60% fine grained sand, 30% silty fines, brown, dry, loose.**
	81	2.3	105.8			SM	**@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 40% gravel to 3", 15% coarse grained sand, 10% medium grained sand, 20% fine grained sand, 15% silty fines, brownish gray, dry.**
	87	2.4	113.7			GW	**@ 4 feet WELL GRADED GRAVEL, approximately 10% cobbles to 3", 40% gravel to 3", 15% coarse grained sand, 25% medium grained sand, 10% fine grained sand, brown, calcite cementation, trace pinhole porosity.**
5							
							@ 8 feet becomes difficult to excavate due to cobbles.
10							
							END OF TRENCH
							Fill 0-1'
							No caving
							No groundwater
15							**No bedrock**

TEST DATA

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER:	**31558.1**	
CLIENT: **Bluestone Communities**	ELEVATION:	**1040**	
	DATE EXCAVATED:	**February 6, 2002**	
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT:	**Ford 555E**	
	BUCKET W.: **24"**	ENCLOSURE:	**B-40**

LOG OF TRENCH T-18



DESCRIPTION

FILL: **SILTY SAND with gravel, approximately 30% gravel to 1", 20% coarse grained sand, 20% medium grained sand, 15% fine grained sand, 15% silty fines, brown gray, dry, loose.**

@ 1 foot ALLUVIUM: **POORLY GRADED GRAVEL with silt and sand, approximately 50% gravel to 2", 10% coarse grained sand, 20% medium grained sand, 10% fine grained sand, 10% silty fines, brown, moist.**

@ 3 feet occasional cobble to 6".

@ 10 feet SILTY SAND, approximately 10% gravel to 1/2", 15% coarse grained sand, 15% medium grained sand, 35% fine grained sand, 25% silty fines, trace of clay of low plasticity, red brown, damp.

END OF TRENCH

Fill 0-1'
No caving
No groundwater
No bedrock

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **1084**
	DATE EXCAVATED: **February 6, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **Ford 555E**
	BUCKET W.: **24"** ENCLOSURE: **B-41**

LOG OF TRENCH T-19

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		4.1				SM	FILL: **SILTY SAND with gravel, approximately 40% gravel to 2", 15% coarse grained sand, 15% medium grained sand, 15% fine grained sand, 15% silty fines, brown, moist, loose.**
	86	6.4	112.9			GW	**@ 2 feet ALLUVIUM: WELL GRADED GRAVEL with silt, approximately 5% cobbles to 6", 40% gravel to 3", 30% coarse grained sand, 10% medium grained sand, 10% fine grained sand, 5% silty fines, moist, brown.**
5	85	5.6	111.7				
10							
15							**END OF TRENCH** **Fill 0-2'** **No caving** **No groundwater** **No bedrock**

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **1096**
LOR GEOTECHNICAL GROUP INC.	DATE EXCAVATED: **February 6, 2002**
	EQUIPMENT: **Ford 555E**
	BUCKET W.: **24"** ENCLOSURE: **B-42**

LOG OF TRENCH T-20

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		3.8				GW	FILL: **WELL GRADED GRAVEL with silt, approximately 5% cobbles to 6", 55% gravel to 3", 15% coarse grained sand, 15% medium grained sand, 10% fine grained sand, brown, moist, loose.**
	78	11.0	101.9			GW	**@ 1 foot ALLUVIUM: WELL GRADED GRAVEL with sand and silt, approximately 5% cobbles to 8", 55% gravel to 3", 15% coarse grained sand, 10% medium grained sand, 10% fine grained sand, 5% silty fines, brown gray, moist.**
	92	5.2	120.1				
5							
10							
							END OF TRENCH
15							**Fill 0-1'** **No caving** **No groundwater** **No bedrock**

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**1160**
LOR GEOTECHNICAL GROUP INC.		DATE EXCAVATED:	**February 6, 2002**
		EQUIPMENT:	**Ford 555E**
		BUCKET W.: **24"**	ENCLOSURE: **B-43**

LOG OF TRENCH T-21

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		6.5				SM	FILL: **SILTY SAND with gravel, approximately 15% gravel to 1", 20% coarse grained sand, 20% medium grained sand, 20% medium grained sand, 30% fine grained sand, 15% silty fines, damp, loose.**
						SM	@ 1 foot ALLUVIUM: **SILTY SAND with gravel, trace cobbles to 6", approximately 40% gravel to 3", 15% coarse grained sand, 20% medium grained sand, 10% fine grained sand, 15% silty fines, gray brown, damp.**
	85	2.2	111.5				
	90	2.9	118.1				
5							
10							
15							**END OF TRENCH** **Fill 0-1'** **No caving** **No groundwater** **No bedrock**

TEST DATA

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER:	**31558.1**	
CLIENT: **Bluestone Communities**	ELEVATION:	**1020**	
	DATE EXCAVATED:	**February 6, 2002**	
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT:	**Ford 555E**	
	BUCKET W.: **24"**	ENCLOSURE:	**B-44**

LOG OF TRENCH T-22

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		8.0				SM	FILL: SILTY SAND, trace gravel to 1/2", 5% coarse grained sand, 15% medium grained sand, 60% fine grained sand, 20% silty fines, brown, moist, loose.
	85	12.8	109.0			SM	@ 0.5 feet OLDER ALLUVIUM: SILTY SAND, trace gravel to 1/2", approximately 10% coarse grained sand, 10% medium grained sand, 55% fine grained sand, 25% silty fines, brown, moist, trace pinhole porosity.
	81	8.0	104.2				@ 2.5 feet becomes reddish brown.
5						GW	@ 6 feet WELL GRADED GRAVEL, approximately 5% cobbles to 8", 50% gravel to 3", 10% coarse grained sand, 15% medium grained sand, 10% fine grained sand, 5% silty fines, red brown, moist.
10							END OF TRENCH
							Fill 0-0.5'
							No caving
							No groundwater
							No bedrock
15							

TEST DATA

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER:	**31558.1**	
CLIENT: **Bluestone Communities**	ELEVATION:	**1300**	
	DATE EXCAVATED:	**February 7, 2002**	
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT:	**Ford 555E**	
	BUCKET W.: **24"**	ENCLOSURE:	**B-45**

LOG OF TRENCH T-23

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		10.8				SM	FILL: SILTY SAND, approximately 20% coarse grained sand, 20% medium grained sand, 40% fine grained sand, 20% silty fines, brown, moist, loose.
	75	11.7	96.6			ML	@ 1 foot OLDER ALLUVIUM: SANDY SILT with gravel, approximately 15% gravel to 3", 5% coarse grained sand, 15% medium grained sand, 15% fine grained sand, 50% silty fines, brown, moist.
5	84	7.7	108.7			SM	@ 3.5 feet SILTY SAND with gravel, approximately 5% angular cobbles to 6", 40% gravel to 3", 10% coarse grained sand, 15% medium grained sand, 15% fine grained sand, 15% silty fines, red brown, moist.
10							END OF TRENCH Fill 0-1' No caving No groundwater No bedrock
15							

TEST DATA

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER:	**31558.1**	
CLIENT: **Bluestone Communities**	ELEVATION:	**1324**	
	DATE EXCAVATED:	**February 7, 2002**	
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT:	**Ford 555E**	
	BUCKET W.: **24"**	ENCLOSURE:	**B-46**

LOG OF TRENCH T-24

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		15.1				SM	FILL: **SILTY SAND, approximately 5% coarse grained sand, 5% medium grained sand, 55% fine grained sand, 35% silty fines, dark brown, moist, loose.**
	73	6.9	96.0				
						SM	**@ 2 feet** OLDER ALLUVIUM: **SILTY SAND, approximately 5% coarse grained sand, 10% medium grained sand, 55% fine grained sand, 30% silty fines, red brown, damp, trace pinhole porosity.** **@ 3 feet becomes hard.**
	89	7.2	114.3				
5						GW	**@ 7 feet WELL GRADED GRAVEL, approximately 10% angular cobbles, 45% gravel to 3", 10% coarse grained sand, 15% medium grained sand, 10% fine grained sand, 5% silty fines, red brown, damp, slightly difficult to excavate.**
10							**END OF TRENCH**
							Fill 0-2'
							No caving
							No groundwater
							No bedrock
15							

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**1324**
		DATE EXCAVATED:	**February 7, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**Ford 555E**
		BUCKET W.: **24"**	ENCLOSURE: **B-47**

LOG OF TRENCH T-25

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		14.1				SM	FILL: **SILTY SAND, approximately 5% coarse grained sand, 5% medium grained sand, 60% fine grained sand, 30% silty fines, brown, moist, loose.**
	85	8.6	112.9			GW	**@ 1 foot OLDER ALLUVIUM: WELL GRADED GRAVEL, approximately 5% angular cobbles to 10", 55% gravel to 3", 10% coarse grained sand, 10% medium grained sand, 5% fine grained sand, 5% silty fines, red brown, moist.**
5	91	7.4	120.1				
							END OF TRENCH DUE TO UPPER 4 FEET CAVING
							Fill 0-1' **Caving 0-4'** **No groundwater** **No bedrock**
10							
15							

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **1254**
	DATE EXCAVATED: **February 7, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **Ford 555E**
	BUCKET W.: **24"** ENCLOSURE: **B-48**

LOG OF TRENCH T-26

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		8.3				SM	FILL: SILTY SAND, approximately 5% coarse grained sand, 10% medium grained sand, 60% fine grained sand, 25% silty fines, dark brown, moist, loose, roots.
	72	10.2	94.6				
						SM	@ 2.5 feet OLDER ALLUVIUM: SILTY SAND with gravel, approximately 5% angular cobbles to 6", 25% gravel to 3", 15% coarse grained sand, 15% medium grained sand, 25% fine grained sand, 15% silty fines, red brown, moist.
	84	6.3	111.6				
5							
10							@ 10 feet fines become clayey, soft.
15							END OF TRENCH

Fill 0-2.5'
No caving
No groundwater
No bedrock

PROJECT: 500+ Acres in Bedford Canyon, Corona, CA		PROJECT NUMBER:	31558.1
CLIENT:	Bluestone Communities	ELEVATION:	1236
LOR GEOTECHNICAL GROUP INC.		DATE EXCAVATED:	February 7, 2002
		EQUIPMENT:	Ford 555E
		BUCKET W.: 24"	ENCLOSURE: B-49

LOG OF TRENCH T-27

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
		TEST DATA					
0		12.3				SM	FILL: **SILTY SAND, approximately 5% coarse grained sand, 5% medium grained sand, 65% fine grained sand, 25% silty fines, dark brown, moist.**
	76	9.3	97.6			SM	**@ 1 foot OLDER ALLUVIUM: SILTY SAND, trace coarse grained sand, 5% medium grained sand, 65% fine grained sand, 30% silty fines, brown, moist, trace pinhole porosity.**
	90	8.4	119.4			SM	**@ 3 feet SILTY SAND with gravel, approximately 5% angular cobbles to 10", 35% gravel to 3", 15% coarse grained sand, 10% medium grained sand, 20% fine grained sand, 15% silty fines with trace clay, red brown, moist.**
5							
							@ 8 feet minor caving to total depth of 13'.
10							
							END OF TRENCH
							Fill 0-3' **Minor caving from 8-13'** **No groundwater** **No bedrock**
15							

PROJECT:	**500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**1204**
		DATE EXCAVATED:	**February 7, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**Ford 555E**
		BUCKET W.: **24"**	ENCLOSURE: **B-50**

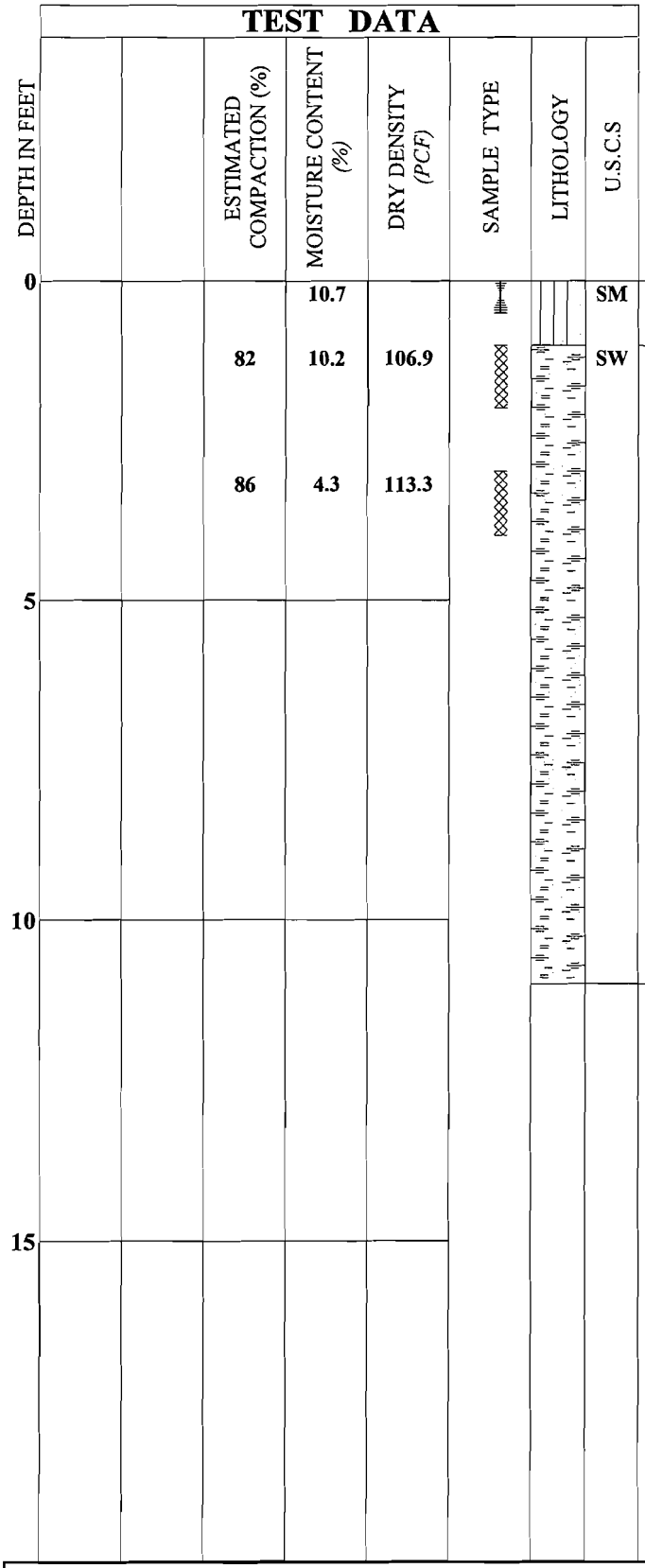
LOG OF TRENCH T-28

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0						SM	FILL: **SILTY SAND with trash consisting primarily of brick and concrete debris with steel and other trash. In southeast end of trench fill is approximately 1.5 feet thick and in northwest end of trench fill is approximately 4.5 feet and getting thicker steeply.**
5							**END OF TRENCH** **Fill 0-4.5'** **No caving** **No groundwater** **No bedrock**
10							
15							

TEST DATA

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT: **Bluestone Communities**		ELEVATION:	**1244**
LOR GEOTECHNICAL GROUP INC.		DATE EXCAVATED:	**February 7, 2002**
		EQUIPMENT:	**Ford 555E**
	BUCKET W.: **24"**	ENCLOSURE:	**B-51**

LOG OF TRENCH T-29



PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER: **31558.1**
CLIENT: **Bluestone Communities**	ELEVATION: **1132**
	DATE EXCAVATED: **February 7, 2002**
LOR GEOTECHNICAL GROUP INC.	EQUIPMENT: **Ford 555E**
	BUCKET W.: **24"** ENCLOSURE: **B-52**

LOG OF TRENCH T-30

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	U.S.C.S	DESCRIPTION
0		2.4			GW	FILL: **WELL GRADED GRAVEL with sand, approximately 55% gravel to 2", 20% coarse grained sand, 15% medium grained sand, 5% fine grained sand, 5% silty fines, brown, dry, loose.**
	83	1.4	108.5		SM	**@ 1 foot ALLUVIUM: SILTY SAND with gravel, approximately 30% gravel to 2 1/2", 15% coarse grained sand, 25% medium grained sand, 15% fine grained sand, 15% silty fines, gray brown, dry.**
5	84	1.3	109.8			
10						**END OF TRENCH**
						Fill 0-1' **No caving** **No groundwater** **No bedrock**
15						

PROJECT: **500+ Acres in Bedford Canyon, Corona, CA**		PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**1056**
LOR GEOTECHNICAL GROUP INC.		DATE EXCAVATED:	**February 7, 2002**
		EQUIPMENT:	**Ford 555E**
		BUCKET W.: **24"**	ENCLOSURE: **B-53**

LOG OF TRENCH T-31

DEPTH IN FEET	ESTIMATED COMPACTION (%)	MOISTURE CONTENT (%)	DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S	DESCRIPTION
0		3.7				SM	TOPSOIL: **SILTY SAND, trace gravel to 1/2", 5% coarse grained sand, 5% medium grained sand, 55% fine grained sand, 35% silty fines, red brown, dry, loose.**
	81	4.7	104.3			SM	**@ 0.5 feet OLDER ALLUVIUM: SILTY SAND, approximately 10% coarse grained sand, 15% medium grained sand, 45% fine grained sand, 30% silty fines, red brown, slightly massive, abundant pinhole and larger pores.**
	88	4.1	113.8				**@ 3 feet approximately 10% angular cobbles to 10", 10% gravel to 3", 15% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 15% silty fines, red brown, some pinhole porosity.**
5							
10							**END OF TRENCH**
							Fill 0-0.5'
							No caving
							No groundwater
							No bedrock
15							

PROJECT:	**500+ Acres in Bedford Canyon, Corona, CA**	PROJECT NUMBER:	**31558.1**
CLIENT:	**Bluestone Communities**	ELEVATION:	**1070**
		DATE EXCAVATED:	**February 7, 2002**
LOR GEOTECHNICAL GROUP INC.		EQUIPMENT:	**Ford 555E**
		BUCKET W.: **24"**	ENCLOSURE: **B-54**

APPENDIX C
Laboratory Testing Program and Results

APPENDIX C
LABORATORY TESTING

General

Selected soil samples obtained from the trenches and borings were tested in our laboratory to evaluate the physical properties of the soils affecting foundation design and construction procedures. The laboratory testing program performed in conjunction with our investigation included moisture content, dry density, laboratory compaction, direct shear, sieve analysis, sand equivalent, R-value, percent passing No. 200 sieve, expansion index, and chemical analysis. The chemical analysis testing was performed by E.S. Babock & Sons, Inc. and are attached as Enclosures C-3 through C-27. Descriptions of the laboratory tests are presented in the following paragraphs.

Moisture-Density Tests

The moisture content and dry density information provides an indirect measure of soil consistency for each stratum, and can also provide a correlation between soils on this site. The dry unit weight and field moisture content were determined for selected undisturbed samples, and the results are shown on the boring logs, Enclosures B-1 through B-54, for convenient correlation with the soil profile.

Direct Shear Tests

Shear tests are performed with a direct shear machine at a constant rate-of-strain (usually 0.05 inches/minute). The machine is designed to test a sample partially extruded from a sample ring in single shear. Samples are tested at varying normal loads in order to evaluate the shear strength parameters, angle of internal friction and cohesion. Samples are tested in a remolded condition (90% relative compaction per ASTM 1557) at field moisture content and soaked, according to conditions existing or expected in the field.

The results of the shear tests are presented in the following table:

DIRECT SHEAR TESTS				
Trench Number	**Sample Depth (feet)**	**Soil Description**	**Angle of Internal Friction (degrees)**	**Apparent Cohesion (psf)**
T-4	4	(SM) Silty Sand w/ gravel	36	200
T-5	2	(SC) Clayey Sand	26	1,000
T-22	3	(SM) Silty Sand	31	200

Sieve Analysis

A quantitative determination of the grain size distribution was performed for selected samples in accordance with the ASTM D 422 laboratory test procedure. The determination is performed by passing the soil through a series of sieves, and recording the weights of retained particles on each screen. The results of the sieve analyses are presented graphically on Enclosures C-1 through C- 2.

Percent Passing No. 200 Sieve Tests

A quantitative determination of the percentage of soil passing the No. 200 sieve was performed for selected samples. The results indicate the percentage of fines in the soil. The results are presented in the following table:

PERCENT PASSING NO. 200 SIEVE TESTS			
Boring Number	**Sample Depth (feet)**	**Soil Description**	**Percent by Weight Passing No. 200 Sieve (%)**
1	11	(SM) Silty Sand w/ gravel	16
4	38	(SM) Silty Sand	49
11	6	(SM) Silty Sand w/ gravel	25

Expansion Index Tests

Remolded samples are tested to determine their expansion potential in accordance with the Expansion Index (EI) test. The test is performed in accordance with the Uniform Building Code Standard 18-2. The test results are presented in the following table:

EXPANSION INDEX TESTS				
Trench Number	**Sample Depth (feet)**	**Soil Description**	**Expansion Index (EI)**	**Expansion Potential**
5	2	(CL) Sandy Clay	80	Medium
Expansion Index:		0-20	21-50	51-90	91-130
Expansion Potential:		Very low	Low	Medium	High

R-Value Test

Soil samples were obtained at probable pavement subgrade level and sieve analysis and sand equivalent tests were conducted. Based on these indicator tests, a selected soil sample was tested to determine its R-value using the California R-Value Test Method, Caltrans Number 301. The results of the sieve analysis, sand equivalent, and R-value tests are presented on Enclosures C-1 and C-2.

Soluble Sulfate Content Tests

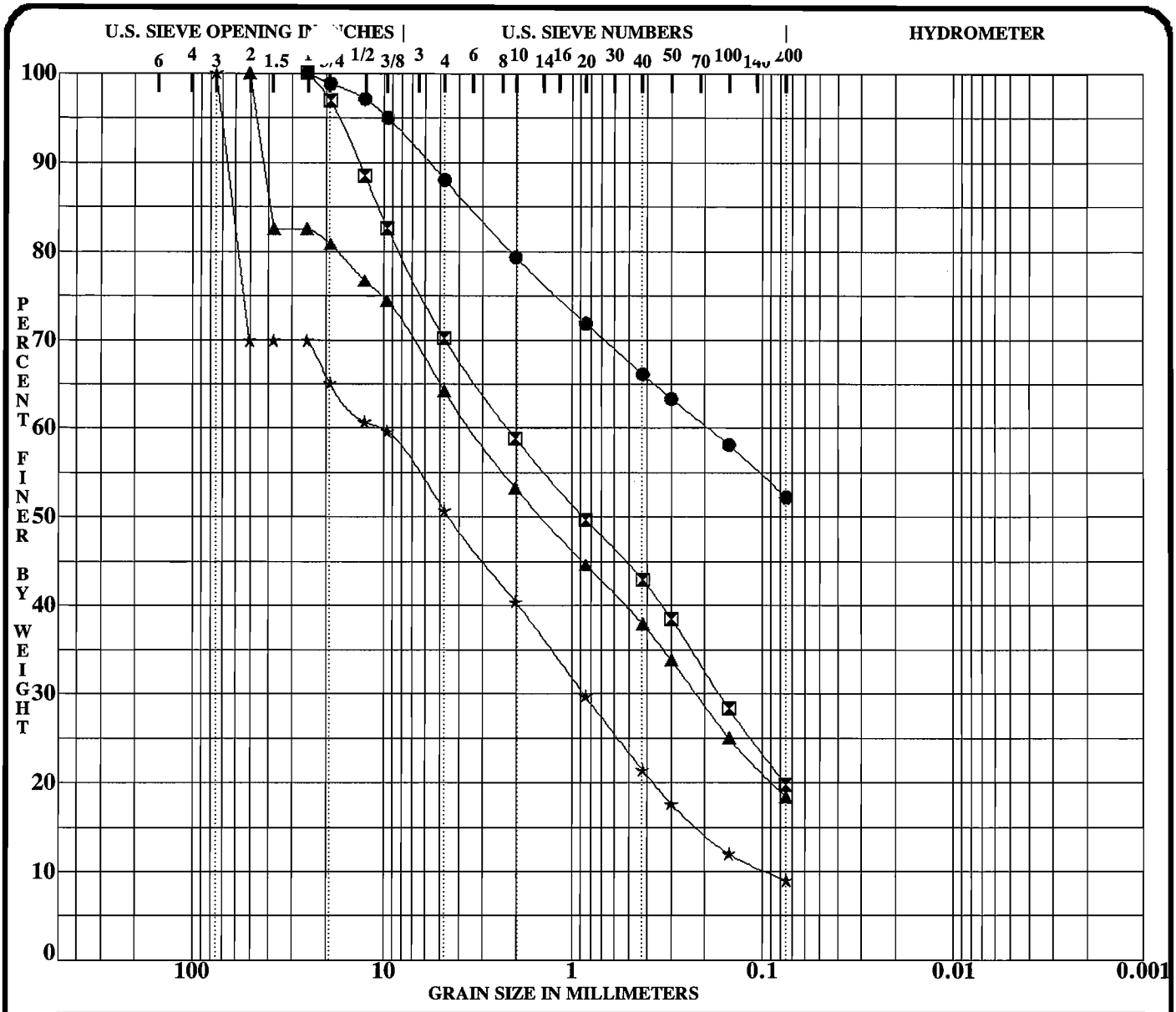
The soluble sulfate content of selected subgrade soils were evaluated. The concentration of soluble sulfates in the soils was determined by measuring the optical density of a barium sulfate precipitate. The precipitate results from a reaction of barium chloride with water extractions from the soil samples. The measured optical density is correlated with readings on precipitates of known sulfate concentrations. The test results are presented on the attached sheets by E.S. Babcock & Sons, Enclosures C-3 through C-27 and on the following table:

SOLUBLE SULFATE CONTENT TESTS			
Boring Number	**Sample Depth (feet)**	**Soil Description**	**Sulfate Content (ppm)**
B-16	surface	(SM) Silty Sand	<150
B-17	surface	(SM) Silty Sand	<75

Laboratory Compaction

Selected soil samples were tested in the laboratory to determine compaction characteristics using the ASTM D 1557-91 compaction test method. The results are presented in the following table:

LABORATORY COMPACTION				
Boring/ Trench Number	**Sample Depth (feet)**	**Soil Description**	**Maximum Dry Density (pcf)**	**Optimum Moisture Content (percent)**
B-4	38	(SM) Silty Sand	132.5	8.5
B-15	12	Sandstone	132.0	8.5
T-1	1	(SM) Silty Sand	131.0	8.5
T-4	4	(SM) Silty Sand w/ gravel	132.5	8.5
T-5	2	(CL) Sandy Clay	116.5	15.0
T-8	2	(SM) Silty Sand w/ gravel	136.0	7.0
T-22	3	(SM) Silty Sand	129.0	9.0



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	SE	RV			Cc	Cu
● T-06	@ 1-3 ft	(SC) Sandy Clay	10	--				
⊠ T-07	@ 1-3 ft	(SM) Silty Sand w/ gravel	19	74				
▲ T-13	@ 1-3 ft	(SM) Silty Sand w/ gravel	19	--				
★ T-18	@ 1-3 ft	(GM) Poorly Graded Gravel w/ silt and sand	25	--			0.76	111.1

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● T-06	@ 1-3 ft	25.00	0.19			12.0	35.8	52.2	
⊠ T-07	@ 1-3 ft	25.00	2.19	0.168		29.9	50.3	19.8	
▲ T-13	@ 1-3 ft	50.00	3.41	0.222		35.8	45.8	18.4	
★ T-18	@ 1-3 ft	75.00	10.50	0.871	0.0945	49.3	41.7	9.0	

PROJECT *580 ACRES, BEDFORD CANYON - CORONA AREA, CALIFORNIA*

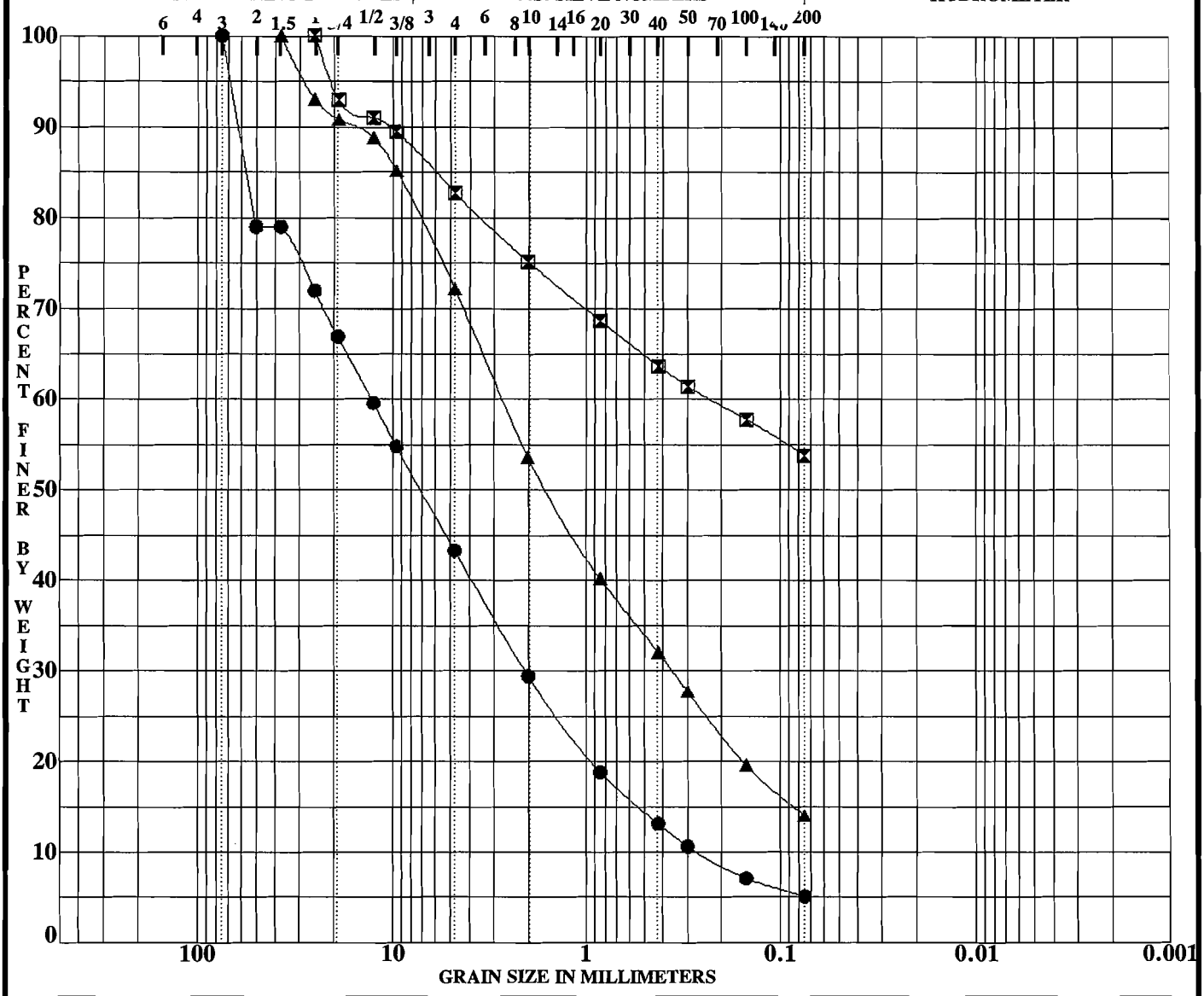
PROJECT NO. *31558.1*

DATE *3/26/02*

GRADATION CURVES

LOR Geotechnical Group, Inc.
Riverside, California

Enclosure C-1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification	SE	RV			Cc	Cu
● T-20	@ 1-3 ft	(GW) Well Graded Gravel w/ silt and sand	33	--			1.27	48.0
⊠ T-23	@ 1-3 ft	(ML) Sandy Silt w/ gravel	8	21				
▲ T-30	@ 1-3 ft	(SM) Silty Sand w/ gravel	25	65				

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● T-20	@ 1-3 ft	75.00	12.79	2.076	0.2664	56.7	38.2	5.1	
⊠ T-23	@ 1-3 ft	25.00	0.23			17.3	28.9	53.8	
▲ T-30	@ 1-3 ft	37.50	2.70	0.361		27.9	58.1	14.0	

PROJECT *580 ACRES, BEDFORD CANYON - CORONA AREA, CALIFORNIA*

PROJECT NO. *31558.1*

DATE *3/26/02*

GRADATION CURVES

LOR Geotechnical Group, Inc.

Riverside, California

Enclosure C-2

E.S. BABCOCK & SONS, INC.
ESTABLISHED 1906

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PH (909) 653-3351 FAX (909) 653-1662
e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: TB-4
Site: T-4 @ 0
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-001

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	380	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-3

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e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: TB-11
Site: T-11 @ 0
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-002

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	79.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-4

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www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: TB-13
Site: T-13 @ 0
Description: Project #31558.1

Matrix: soil-ag

Page: 1 of 1
Lab No.: L96342-003

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	61.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-5

E.S. BABCOCK & SONS, INC.
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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: TB-15
Site: T-15 @ 0
Description: Project #31558.1

Matrix: soil-ag

Page: 1 of 1
Lab No.: L96342-004

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	75.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

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Enclosure C-6

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www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: TB-24
Site: T-24 @ 0
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-005

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	660	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-7

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www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: TB-27
Site: T-27 @ 0
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-006

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	34.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-8

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www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: TB-29
Site: T-30 @ 0
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-007

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	18.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-9

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www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: D-3
Site: T-2 @ 2
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-008

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	23.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

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Enclosure C-10

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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: D-17
Site: T-10 @ 1
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-009

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	230	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: D-33
Site: T-18 @ 1
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-010

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	14.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: D-47
Site: T-25 @ 2
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-011

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	61.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: B-1
Site: B-1 @ 0
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-012

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	130	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-14

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www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: B-4
Site: B-4 @ 0
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-013

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	17.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-15

E.S. BABCOCK & SONS, INC.
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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: B-8
Site: B-8 @ 0
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-014

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	ND	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-16

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www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: B-12
Site: B-12 @ 0
Description: Project #31558.1

Matrix: soil-ag

Page: 1 of 1
Lab No.: L96342-015

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	350	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-17

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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: B-13
Site: B-13 @ 0
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-016

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	57.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-18

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www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: B-14
Site: B-14 @ 0
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96342-017

Date Reported: 02/22/02

Collected By: MS
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Water Extractable Sulfate	66.	ppm	Ion Chrom.	10	020220/DT

ND = None detected at RL (Reporting Limit). RL units same as result.

Results reported in ppm are expressed on an air dried soil basis.

cc:

ESB Project Reviewer

Enclosure C-19

E.S. BABCOCK & SONS, INC.
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www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: D-8
Site: T-4 @ 4'
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96343-001

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.1	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	340	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	620	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-20

E.S. BABCOCK & SONS, INC.
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Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: D-20
Site: T-11 @ 4'
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96343-002

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.5	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	340	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	1200	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-21

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www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: D-28
Site: T-15 @ 4'
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96343-003

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.5	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	320	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	1900	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-22

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www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: D-44
Site: T-23 @ 4'
Description: Project #31558.1

Matrix: soil-ag

Page: 1 of 1
Lab No.: L96343-004

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.3	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	320	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	2100	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-23

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e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: R-2
Site: B-1 @ 5'
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96343-005

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.6	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	320	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	1300	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-24

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www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: R-54
Site: B-9 @ 5'
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96343-006

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.6	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	290	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	5500	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-25

E.S. BABCOCK & SONS, INC.
ESTABLISHED 1906

Envir ntal Laboratory Certification #1156
6100 Quail Valley Court Riverside, CA 92507-0704
P.O. Box 432 Riverside, CA 92502-0432
PH (909) 653-3351 FAX (909) 653-1662
e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: R-69
Site: B-12 @ 5'
Description: Project #31558.1

Matrix: soil-ag

Lab No.: L96343-008

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.1	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	270	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	2100	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

cc:

ESB Project Reviewer

Enclosure C-26

E.S. BABCOCK & SONS, INC.
ESTABLISHED 1906

Envir ›ntal Laboratory Certification #1156
6100 Quail Valley Court Riverside, CA 92507-0704
P.O. Box 432 Riverside, CA 92502-0432
PH (909) 653-3351 FAX (909) 653-1662
e-mail: esbsales@aol.com
www.babcocklabs.com

Laboratory Results

221
Client:
LOR Geotechnical Group, Inc.
Kevin Osmun
6121 Quail Valley Ct.

Riverside,CA 92507

Client I.D.: R-86
Site: B-14 @ 5'
Description: Project #31558.1

Matrix: soil-ag

Page: 1 of 1
Lab No.: L96343-007

Date Reported: 02/22/02

Collected By:
Date: 02/14/02
Time: 0000
Submitted By: Chris
Date: 02/14/02
Time: 1540

Constituent	Result		Method	RL	Date / Analyst
Saturated Paste pH	7.6	units	S-1.10 W.States	0.1	020221/JE
Redox Potential	250	mV	SM 2580	-	020221/JE
Sulfide	NEG	none	H2S elution	-	020221/JE
Saturated Resistivity	4200	ohm-cm	SM 2520B	-	020221/JE

ND = None detected at RL (Reporting Limit). RL units same as result.

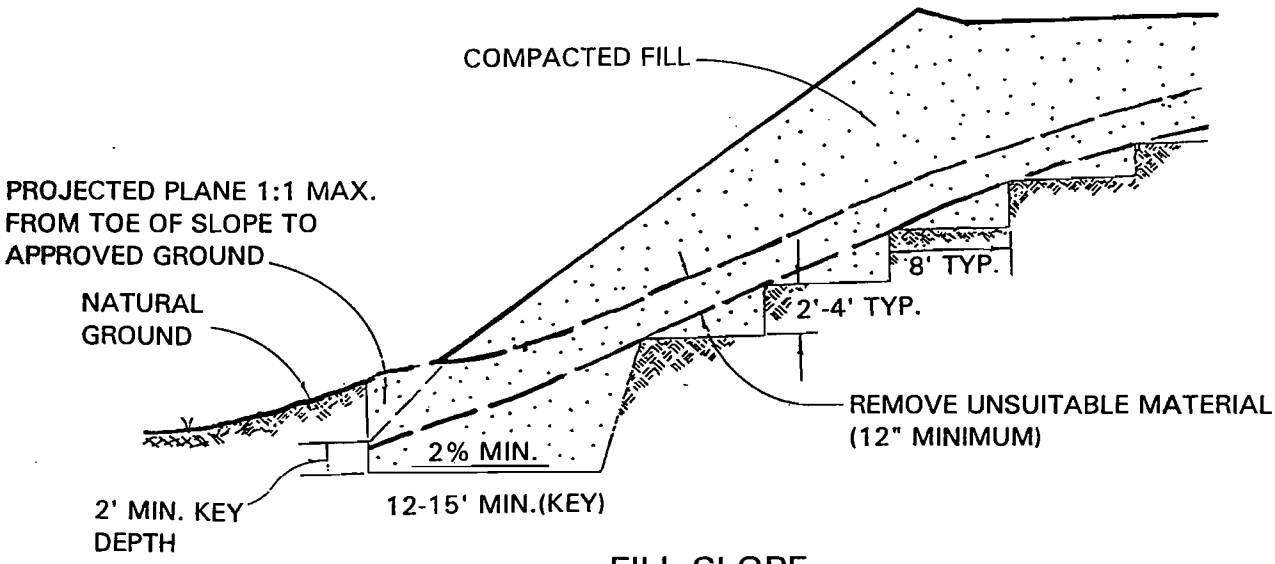
cc:

ESB Project Reviewer

Enclosure C-27

APPENDIX D
Geotechnical Sketches

TYPICAL KEYING AND BENCHING DETAIL



FILL SLOPE

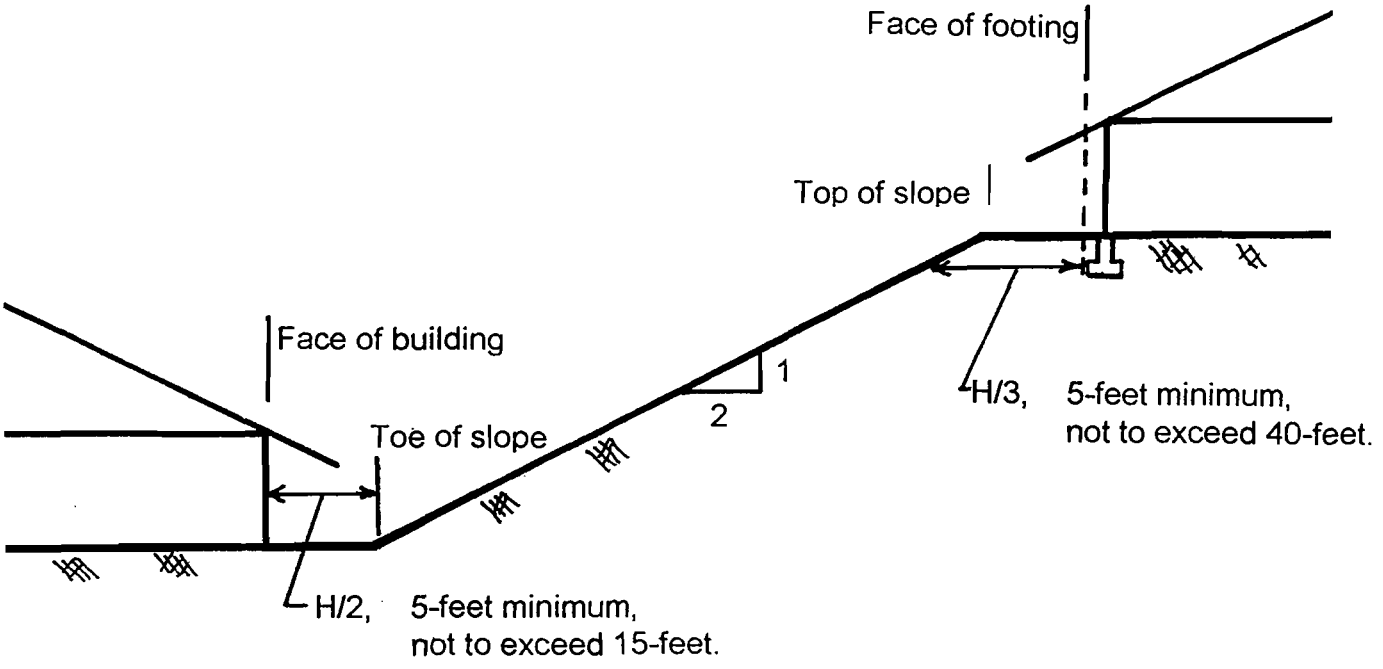
NOTES: 1) DIMENSIONS SHOWN SUBJECT TO FIELD CHANGE BASED ON ENGINEER'S JUDGEMENT

2) BENCHING REQUIRED WHEN FILLING OVER NATURAL GROUND STEEPER THAN 5H:1V

GEOTECHNICAL SKETCH

PROJECT: 580± ACRES, BEDFORD CANYON, CORONA AREA, RIVERSIDE CO., CA	PROJECT NO.: 31558.1
CLIENT: BLUESTONE COMMUNITIES	ENCLOSURE: D-1
LOR Geotechnical Group, Inc.	DATE: MARCH 2002
	SCALE: NOT TO SCALE

BUILDING SET-BACK REQUIREMENTS



GEOTECHNICAL SKETCH

PROJECT: 580± ACRES, BEDFORD CANYON, CORONA AREA, RIVERSIDE CO., CA	PROJECT NO.: 31558.1
CLIENT: BLUESTONE COMMUNITIES	ENCLOSURE: D-2
LOR Geotechnical Group, Inc.	DATE: MARCH 2002
	SCALE: NOT TO SCALE