Ninyo & Moore
Geotechnical and Environmental Sciences Consultants

GEOTECHNICAL EVALUATION
ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

PREPARED FOR:
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PREPARED BY:
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December 15, 2015
Project No. 108059001

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Geotechnical and Environmental Sciences Consultants

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Mr. Ben Badiee
Badiee Development
P.O. Box 3111
La Jolla, California 92038

Subject: Geotechnical Evaluation
Escondido Industrial Park
2005 Harmony Grove Road
Escondido, California

Dear Mr. Badiee:

In accordance with your request and authorization, we have performed a geotechnical evaluation for the proposed Escondido Industrial Park project at 2005 Harmony Grove Road in Escondido, California. This report has been prepared in accordance with our proposal dated October 7, 2015 and presents our findings, conclusions, and recommendations regarding the geotechnical aspects of the proposed project.

We appreciate the opportunity to be of service on this project.

Sincerely,
NINYO & MOORE

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1. INTRODUCTION

In accordance with your request and our proposal dated October 7, 2015, we have performed a geotechnical evaluation for the proposed Escondido Industrial Park project at 2005 Harmony Grove Road in Escondido, California (Figure 1). This report presents the results of our field exploration and laboratory testing, our conclusions regarding the geotechnical conditions at the site, and our recommendations for the design and earthwork construction of the project.

2. SCOPE OF SERVICES

The scope of services for this study included the following:

- Reviewing readily available published and in-house geotechnical literature, topographic maps, geologic maps, fault maps, and stereoscopic aerial photographs.
- Performing a field reconnaissance to observe site conditions.
- Locating and marking proposed exploratory test pits. Underground Service Alert was notified to evaluate test pit locations for utility clearance.
- Performing a subsurface evaluation consisting of the excavation, logging and sampling of ten test pits and two infiltration test borings.
- Obtaining samples at selected intervals from the test pits.
- Performing infiltration testing within the infiltration test borings.
- Performing geotechnical laboratory testing on representative soil samples to evaluate soil characteristics and parameters for design purposes.
- Compiling and performing engineering analysis of the data obtained from our background, field, and laboratory evaluations.
- Preparing this report presenting our findings, conclusions, and recommendations regarding the geotechnical design and construction of the proposed project.

3. SITE AND PROJECT DESCRIPTION

The project site is an approximately 4.87-acre, triangular-shaped parcel located south of Harmony Grove Road in the Harmony Grove area of Escondido, California (Figure 1). The project site area is generally bounded to the northwest by commercially developed properties, to the northeast by an undeveloped property, and to the south by Escondido Creek. A berm that acts as a flood levee has been constructed between the site and the channel of Escondido Creek. Elevations across the project site range from approximately 610 feet above mean sea level (MSL) in the western portion to 625 feet MSL along the northern portions of the project area. A drainage channel, probably caused due to previous site grading and construction of adjacent berm, extends along the southern portion of the project site and is up to 10 feet lower than adjacent grades.

While the site is currently unoccupied, it previously supported several residential structures. Based on our review of historic aerial photographs, the structures were razed within the last approximately five years. The foundations of these structures remain onsite. In addition, trash and construction debris were observed at the surface. A cistern/well approximately 5 feet in diameter was also observed onsite; the depth of the cistern is unknown as it was filled with trash and debris at the time of our site reconnaissance.

The Escondido Industrial Park project generally consists of two proposed commercial/industrial buildings with footprints of approximately 30,000 square feet and 47,000 square feet (Ware Malcomb, 2015). The buildings are anticipated to be concrete tilt up structures. We understand that the proposed grading of the site will include raising existing site elevations to be approximately one foot above the 100-year flood plain. Based on this, we anticipate that compacted fill up to approximately 12 feet thick may be placed at the project site. Retaining walls up to approximately 12 feet high are also anticipated to be constructed. Ancillary construction will include driveways, loading docks, parking lots, detention basins, and utilities.

4. SUBSURFACE EXPLORATION AND LABORATORY TESTING

Our subsurface exploration was conducted on November 4, 2015 and consisted of excavating, logging, and sampling 10 exploratory test pits (designated TP-1 through TP-10). In addition, two borings (IT-1 and IT-2) were excavated manually with hand auger equipment to depths of up to approximately 4 feet. The test pits were excavated using a rubber-tire backhoe with an 18-inch bucket to depths up to approximately 10.5 feet. Bulk soil samples were obtained from the test pits. The samples were then transported to our in-house geotechnical laboratory for testing. The approximate locations of the exploratory test pits and infiltration borings are shown on Figure 2. Logs of the test pits and borings are included in Appendix A.

Geotechnical laboratory testing of representative soil samples included moisture content, gradation (sieve) analysis, soil corrosivity, and R-value. The results of the in-situ moisture content tests are presented on the test pit logs in Appendix A. The results of the other geotechnical laboratory tests performed are presented in Appendix B.

5. GEOLOGY AND SUBSURFACE CONDITIONS

Our findings regarding regional and local geology, including faulting and seismicity, landslides, rippability (excavatability), and groundwater conditions at the subject site are provided in the following sections. A geologic map and a fault location map are presented as Figures 3 and 4, respectively.

5.1. Regional Geologic Setting

The project area is situated in the coastal foothill section of the Peninsular Ranges Geomorphic Province. This geomorphic province encompasses an area that extends approximately 900 miles from the Transverse Ranges and the Los Angeles Basin south to the southern tip of Baja California (Norris and Webb, 1990). The province varies in width from approximately 30 to 100 miles. In general, the province consists of rugged mountains underlain by Jurassic metavolcanic and metasedimentary rocks, and Cretaceous igneous rocks of the southern California batholith.

The Peninsular Ranges Province is traversed by a group of sub-parallel faults and fault zones trending roughly northwest. Several of these faults, which are shown on Figure 4, are considered active faults. The Elsinore, San Jacinto and San Andreas faults are active fault systems located northeast of the project area and the Rose Canyon, Coronado Bank, San Diego Trough, and San Clemente faults are active faults located west of the project area. The Rose Canyon Fault Zone has been mapped approximately 14 miles west of the project site. Major tectonic activity associated with these and other faults within this regional tectonic framework consists primarily of right-lateral, strike-slip movement. The project site is not within an Alquist-Priolo Earthquake Fault Zone or a locally-defined fault rupture hazard zone. Further discussion of faulting relative to the site is provided in the Faulting and Seismicity section of this report.

5.2. Site Geology

Geologic units encountered during our subsurface evaluation included fill, colluvium/topsoil, alluvium, and granitic rock. Generalized descriptions of the earth units encountered during our field reconnaissance and subsurface exploration are provided in the subsequent sections. Additional descriptions of the subsurface units are provided on the test pit logs in Appendix A.

5.2.1. Undocumented Fill

Fill materials were encountered in our test pits TP-1, TP-4, and TP-5 to depths of up to approximately 3.5 feet. As encountered, the fill materials generally consisted of light brown to brown, dry to moist, loose, silty sand with scattered gravel and cobbles. It should be noted that construction debris such as concrete and PVC and metal pipe fragments as well as trash, including paper, glass, and plastic bottles were observed across the site and may be encountered in other areas of fill. Documentation regarding placement of these fills was not available for review.

5.2.2. Colluvium/Topsoil

Materials identified as colluvium/topsoil were encountered in our test pits TP-2, TP-3, TP-6, TP-7, TP-8, and TP-9 overlying alluvium and granitic rock materials. These materials were observed to be approximately 1 to 2 feet thick, and generally consisted of light brown to brown, dry to wet, very loose to medium dense, silty sand.

5.2.3. Alluvium

Alluvium was encountered from the ground surface or underlying the fill or colluvial/topsoil materials in our test pits TP-1, TP-3, and TP-5 through TP-10. Alluvium was also encountered in our hand-auger borings. As encountered in our test pits and borings, the alluvium generally consisted of various shades of brown, moist, loose to dense, silty and clayey sand and stiff to very stiff, sandy clay.

5.2.4. Granitic Rock

Granitic rock was encountered in each of our exploratory test pits underlying fill, topsoil/colluvium, and alluvium. As encountered, the granitic rock generally consisted of brownish gray and grayish brown, moist, medium- to coarse-grained rock. The granitic rock varied in degree of weathering. Refusal to excavation was encountered in the granitic rock in test pits TP-1, TP-4, TP-5, TP-6, TP-7, and TP-10.

5.3. Excavation Characteristics

Based on our field exploration and experience, we anticipate that excavations within the fill, colluvium/topsoil, and alluvium may be accomplished with heavy-duty earthmoving equipment in good working condition. Difficult to very difficult excavation and heavy ripping including the use of rock breaking equipment and/or blasting should be anticipated in the underlying granitic rock. Depths of rippable material will vary across the site and the presence of resistant rock masses or core stones should be anticipated. Special handling of oversize materials should also be anticipated.

5.4. Infiltration Testing

As a means of evaluating the infiltration characteristics of near-surface materials, two infiltration tests (IT-1 and IT-2) were performed adjacent to our test pits TP-9 and TP-10, respectively. The locations of the tests are depicted on Figure 2. The procedure used was in general accordance with San Diego County Department of Environmental Health (DEH) guidelines (County of San Diego, 2013). Free-draining, pea gravel was placed in the bottom of the borings. Varying lengths of 2-inch diameter slotted casing was installed in an upright position and the annulus between pipe and boring sidewalls was backfilled with additional gravel to mitigate the potential for caving. Presoaking was performed by filling each boring with approximately 12 inches of clean water. This water level was maintained for four hours and was allowed to drop overnight. The following day the test holes were checked for undrained water. Several inches of water remained in IT-1. The holes were then filled with approximately 12-inches of water one hour prior to testing. At infiltration test location IT-1, two water level readings were taken at 30-minute intervals. At infiltration test location IT-2, the water level was adjusted to about 6 inches above the gravel. Due to the high infiltration rate in IT-2, water level readings were taken approximately every 10 minutes for three hours. Water levels were maintained at approximately 6 inches above the gravel during testing.

It is commonly accepted that infiltration rates less than 0.5 inches per hour (in/hr) are considered inappropriate for infiltration structures or measures (United Stated Environmental Protection Agency [EPA], 2010). Measurements and corrections are included in Appendix C. The adjusted infiltration rates are summarized in Table 1. Infiltration rates of site soils are anticipated to be poor due to the presence of shallow granitic rock.

Table 1 – Infiltration Test Results Summary

Infiltration Test	**Depth below ground surface (feet)**	**Designation**	**Adjusted Infiltration Rate**
			in/hr
IT-1	4.0	Silty Sand	<0.4
IT-2	3.1	Silty Sand	>10.0
Note: in/hr= inches per hour			

5.5. Groundwater

Groundwater was not encountered in our exploratory test pits. However, as a drainage traverses the southern portion of the site, groundwater may be present at the ground surface during certain times of the year. Additionally, seepage or perched water may be encountered overlying the granitic bedrock, or within fractures in the granitic rock. Fluctuations in the groundwater level and local perched conditions may occur due to variations in ground surface topography, subsurface geologic conditions and structure, rainfall, irrigation, and other factors.

5.6. Flood Hazards

As shown on reviewed Federal Emergency Management Agency (FEMA) flood insurance rate maps (FIRM) the site is protected by a levee from the 100-year floodplain. While the site is at an approximate elevation of 610 to 625 feet MSL, the nearby delineated floodplain is designated to have flood elevations of 615 to 618 feel MSL. Based on the existing grades, there is potential for significant flooding along portions of the existing site. However, as noted, we understand that the site grades will be raised to be higher than the 100-year flood elevations to mitigate the potential for flooding at site. Additional erosion protection measures, such as riprap, should be considered along the south and southeast edge of the site to mitigate erosion of fill materials due to potential for flooding of the adjacent Escondido Creek.

5.7. Faulting and Seismicity

The project area is considered to be seismically active. Based on our review of the referenced geologic maps and stereoscopic aerial photographs, as well as on our geologic field mapping, the subject site is not underlain by known active or potentially active faults (i.e., faults that exhibit evidence of ground displacement in the last 11,000 years and 2,000,000 years, respectively). However, the site is located in a seismically active area, as is the majority of southern California, and the potential for strong ground motion is considered significant during the design life of the proposed structure. The closest known active fault, the Rose Canyon fault, has been mapped approximately 14 miles west of the site (Figure 4). In general, hazards associated with seismic activity include strong ground motion, ground surface rupture, liquefaction, seismically induced settlement, and lateral spread. These hazards are discussed in the following sections.

5.7.1. Strong Ground Motion

The 2013 California Building Code (CBC) recommends that the Risk-Targeted, Maximum Considered Earthquake (MCE_R) ground motion response accelerations be used to evaluate seismic loads for design of buildings and other structures. The MCE_R ground motion response accelerations are based on spectral response accelerations for 5 percent damping in the direction of maximum horizontal response and incorporate a target risk for structural collapse equivalent to 1 percent in 50 years with deterministic limits for near-source effects. The horizontal peak ground acceleration (PGA) that corresponds to the MCE_R for the site was calculated as 0.40g using the USGS (2015) seismic design tool (web-based). Spectral response acceleration parameters, consistent with the 2013 CBC, are also provided in Section 7.4, for the evaluation of seismic loads on the proposed structures.

The 2013 CBC specifies that the potential for liquefaction and soil strength loss be evaluated, where applicable, for the Maximum Considered Earthquake Geometric Mean (MCE_G) peak ground acceleration with adjustment for site class effects in accordance with the American Society of Civil Engineers (ASCE) 7-10 Standard. The MCE_G peak ground acceleration is based on the geometric mean peak ground acceleration with a 2 percent probability of exceedance in 50 years. The MCE_G peak ground acceleration with adjustment for site class effects (PGA_M) was calculated as 0.37g using the USGS (USGS, 2015) seismic design tool that yielded a mapped MCE_G peak ground acceleration of 0.38g for the site and a site coefficient (F_{PGA}) of 1.026 for Site Class C.

5.7.2. Ground Surface Rupture

Based on our review of the referenced literature and our site reconnaissance, no active faults are known to cross the project vicinity. Therefore, the potential for ground rupture due to faulting at the site is considered low. However, lurching or cracking of the ground surface as a result of nearby seismic events is possible.

5.7.3. Liquefaction, Seismically Induced Settlement, and Lateral Spread

Liquefaction of cohesionless soils can be caused by strong vibratory motion due to earthquakes. Research and historical data indicate that loose granular soils and non-plastic silts that are saturated by a relatively shallow groundwater table are susceptible to liquefaction. Based on the relatively dense nature of the underlying granitic materials and the absence of shallow groundwater, it is our opinion that liquefaction, seismically induced settlement, and lateral spread at the subject site are not design considerations.

5.8. Landsliding

Per Tan (1995), the majority of the site is mapped as “marginally susceptible” to landsliding. However, based on our review of published landslide hazard maps, geologic maps, and stereoscopic aerial photographs, as well as our site reconnaissance and subsurface exploration, landslides or indications of deep-seated slope instability have not been mapped and were not observed at the project site.

6. CONCLUSIONS

Based on our review of the referenced background data, subsurface evaluation, and laboratory testing, it is our opinion that construction of the proposed Escondido Industrial Park project is feasible from a geotechnical standpoint provided the recommendations presented in this report are incorporated into the design and construction of the project. In general, the following conclusions were made:

- The project site is underlain by fill, colluvium/topsoil, alluvium, and granitic bedrock. The fill colluvium, and alluvium are not considered suitable for structural support in their present condition. Recommendations are presented herein for remedial grading of this material. The granitic bedrock is considered suitable for support of foundations and structural fill.

- The excavations within the fill, colluvium/topsoil, and alluvium may be accomplished with heavy-duty earthmoving equipment in good working condition. Difficult to very difficult excavation and heavy ripping including the use of rock breaking equipment and/or blasting should be anticipated in the underlying granitic rock. Depths of rippable material will vary across the site and the presence of resistant rock masses or core stones should be anticipated. Special handling of oversize materials should also be anticipated.

- As a drainage is present at the site, groundwater may be present at the ground surface during certain times of the year. Additionally, seepage or perched water may be encountered overlying the granitic bedrock, or within fractures in the granitic rock.

- Cut-fill transitions and differential fill depths beneath improvements are anticipated at the site after the proposed earthwork. Recommendations for treatment of these conditions are provided herein.

- On-site materials may be suitable for reuse as compacted fill, provided that they are free of deleterious material and organic content, screened of oversized materials, and meet the criteria for compacted fill materials presented in the following earthwork recommendations.

- Oversized materials will be generated from excavations performed at the site. Oversized materials should be screened, crushed, or otherwise processed prior to reuse as compacted fill.

- Due to the relatively dense nature of the underlying granitic bedrock materials and the absence of shallow groundwater, the project site is not considered susceptible to liquefaction. Seismically induced settlement and lateral spread are not design considerations for the project.

- No active faults are reported underlying the subject site. Therefore, the potential for ground rupture due to faulting at the site is considered low. However, the potential for relatively strong seismic ground motions should be considered in the project design as recommended in this report.

- Based on the results of our soil corrosivity tests and Caltrans corrosion guidelines (2012), the site would be classified as a corrosive site.

7. RECOMMENDATIONS

Based on our understanding of the project, the following recommendations are provided for the design and construction of the proposed Escondido Industrial Park project. The proposed site improvements should be constructed in accordance with the requirements of the applicable governing agencies.

7.1. Earthwork

In general, earthwork should be performed in accordance with the recommendations presented in this report. The geotechnical consultant should be contacted for questions regarding the recommendations or guidelines presented herein.

7.1.1. Site Preparation

Site preparation should begin with the removal of asphalt, concrete, existing foundations, utility lines, vegetation, and other deleterious debris from areas to be graded. Tree stumps and roots should be removed to such a depth that organic material is generally not present. Clearing and grubbing should extend to the outside of the proposed excavation, fill areas, and limits of proposed improvements. The debris and unsuitable material generated during clearing and grubbing should be removed from areas to be graded and disposed of at a legal dumpsite away from the project area.

As noted, a cistern/well was observed onsite and the depth is unknown. The cistern, including loose and wet soils beneath, should be removed and the resulting excavation should be backfilled with compacted fill materials as recommended in this report. As an alternative, the cistern may be backfilled with lean concrete and capped in-place in accordance with the requirements of the applicable governing agencies.

7.1.2. Remedial Grading – Building Pads and Retaining Walls

From a geotechnical standpoint, we recommend the existing fill, colluvium/topsoil, and alluvium should be removed beneath building pads, retaining walls, and settlement sensitive improvements to competent bedrock materials and replaced as compacted fill.

The removal area should extend 5 feet or more beyond the outer edge of the structural improvement. Ninyo & Moore should observe the excavation prior to filling to evaluate the need for deeper removals. Deeper removals may be needed if loose, compressible or otherwise unsuitable materials are exposed during grading.

7.1.3. Remedial Grading – Pavement

In areas to receive pavements or concrete flatwork, we recommend that the existing soils be removed to a depth of 2 feet below finished subgrade elevation. The resultant removal surfaces should then be scarified to a depth of 8 inches or more, moisture conditioned and recompacted. The excavation should then be filled with soils that meet the recommendations for fill materials presented in following sections.

7.1.4. Treatment of Cut/Fill Transitions beneath Buildings/Retaining Walls

Based on our understanding of the project, the building pads and retaining walls may be underlain by cut/fill transition or shallow/deep fill transition. In order to mitigate the potential for differential settlement, we recommend that where a cut/fill or shallow/deep fill transition line extends beneath the proposed building/wall locations, the cut or shallow fill portion of the pad should be undercut/overexcavated. The undercut/overexcavation should be 5 feet below finish grade or to a depth one-third or more of the deepest fill depth (including remedial grading depths) beneath the structure, whichever is greater, and replaced with compacted fill. The undercut/overexcavation should be extended outward a distance of 5 feet beyond the limits of the structure. Alternatively, if feasible, separate retaining walls may be constructed where there is a transition.

7.1.5. Rippability and Excavatability

Based on our field exploration and experience, we anticipate that excavations within the fill, colluvium/topsoil, and alluvium may be accomplished with heavy-duty earthmoving equipment in good working condition. Excavations that encounter seepage or groundwater conditions in these materials may cave or slough.

Difficult to very difficult excavation and heavy ripping including the use of rock breaking equipment and/or blasting should be anticipated in the underlying granitic rock. Depths of rippable material will vary across the site and the presence of resistant rock masses or core stones should be anticipated. Rippability of a mass will also be dependent on the excavation equipment used and the skill and experience of the equipment operator. Special handling of oversize materials should also be anticipated.

Based on the refusal encountered in granitic rock in several of our test pits at depth, it is anticipated that trenches in hard granitic rock may not be excavatable with conventional trenching equipment. In order to facilitate trenching for utilities, consideration should be given to overexcavating portions of the site to aid in the installation and construction of proposed improvements. In general, overexcavations in hard rock should extend to depths of 5 feet below building pad subgrades and 1 foot below anticipated depth of utilities, whichever is deeper. The resulting excavations should be backfilled with compacted fill soils. In areas where no buildings or utilities are planned, this overexcavation may not be necessary.

7.1.6. Materials for Fill

In general, on-site earth materials, other than the materials classified as clay (CL or CH), with an organic content of less than approximately 3 percent by volume (or 1 percent by weight) should be suitable for reuse as fill provided they are in general compliance with the recommendations presented in this report. Fill material should exhibit a low expansion potential (i.e., an expansion index [EI] of 50 or less based on American Society for Testing and Materials [ASTM] D 4829). Fill material should not contain asphalt, concrete, rocks or lumps over approximately 3 inches, and not more than approximately 30 percent larger than ¾-inch. Fill materials up to 6 inches in size may be used outside of structural areas. Trash, as encountered in the fill materials during our exploration, is not suitable for reuse as fill. Excavations in granitic rock are anticipated to generate oversize materials which may not be suitable for reuse as fill without special handling. Larger fragments may be crushed into acceptably sized pieces or disposed of off-site. Imported fill material should generally be granular soils with a very low to low expansion potential, with an organic content of less than approximately 3 percent by volume (or 1 percent by weight). Import material should also be non-corrosive in accordance with the Caltrans (2012) and the American Concrete Institute (ACI) corrosion guidelines. Materials for use as fill should be evaluated by Ninyo & Moore's representative prior to filling or importing.

Retaining wall backfill material should conform to characteristics in the following table based on the Public Works Standards ("Greenbook") specifications for Structure Backfill (Building News, 2012).

Table 2 – Retaining Wall Backfill Material Criteria

Test (Designation)		Criteria
Sieve Analysis (ASTM D 422)	Passing 3-inch sieve, percent	100
	Passing No. 4 sieve, percent	35 – 100
	Passing No. 30 sieve, percent	20 – 100
Sand Equivalent (ASTM D 2419)		≥ 20
Corrosivity Testing	pH (CT 643)	> 5.5
	Chloride Content (CT 417), ppm	≤ 500
	Sulfate Content (CT 422), ppm	≤ 1,000

Note:
CT = California Test Method

7.1.7. Use of Concrete and Asphalt as Fill

Portland cement concrete and asphalt concrete generated by on-site demolition may be reused in new structural fill not underlying buildings and retaining walls if processed in accordance with the following recommendations. Concrete and asphalt to be used in structural fills should not have painted, stained, or coated surfaces, contain rebar or other metal reinforcement, vegetation, or other debris. The concrete and asphalt should be crushed to sizes of 6 inches or less, should not be used within 5 feet of finish grades, and should not be used as retaining wall backfill. Crushed concrete and asphalt to be used as fill should be stockpiled and blended with soil prior to placement to meet the requirements of Materials for Fill Section above and should be placed in accordance with Compacted Fill Section below.

7.1.8. Compacted Fill

Prior to placement of compacted fill, the contractor should request an evaluation of the exposed ground surface by Ninyo & Moore. Unless otherwise recommended, the exposed ground surface should then be scarified to a depth of approximately 8 inches and watered or dried, as needed, to achieve moisture contents generally above the optimum moisture content. The scarified materials should then be compacted to a relative compaction of 90 percent as evaluated in accordance with the ASTM D 1557. The evaluation of compaction by the geotechnical consultant should not be considered to preclude any requirements for observation or approval by governing agencies. It is the contractor's responsibility to notify the geotechnical consultant and the appropriate governing agency when project areas are ready for observation, and to provide reasonable time for that review.

Fill materials should be moisture conditioned to generally above the laboratory optimum moisture content prior to placement. The optimum moisture content will vary with material type and other factors. Moisture-conditioning of fill soils should be generally consistent within the soil mass.

Prior to placement of additional compacted fill material following a delay in the grading operations, the exposed surface of previously compacted fill should be prepared to receive fill. Preparation may include scarification, moisture conditioning, and recompaction.

Compacted fill should be placed in horizontal lifts of approximately 8 inches in loose thickness. Prior to compaction, each lift should be watered or dried as needed to achieve a moisture content generally above the laboratory optimum, mixed, and then compacted by mechanical methods, using sheepsfoot rollers, multiple-wheel pneumatic-tired rollers or other appropriate compacting rollers, to a relative compaction of 90 percent as evaluated by ASTM D 1557. Successive lifts should be treated in a like manner until the desired finished grades are achieved. The upper 12 inches of the subgrade and aggregate base materials underneath the pavements should be compacted to a relative compaction of 95 percent relative density as evaluated by the current version of ASTM D 1557.

7.1.9. Temporary Excavations, Braced Excavations, and Shoring

For temporary excavations, we recommend that the following Occupational Safety and Health Administration (OSHA) soil classifications be used:

Fill, Colluvium, and Alluvium	*Type C*
Granitic Rock	*Type B*

Upon making the excavations, the soil classifications and excavation performance should be evaluated in the field by the geotechnical consultant in accordance with the OSHA regulations. Temporary excavations should be constructed in accordance with OSHA recommendations. For trench or other excavations, OSHA requirements regarding personnel safety should be met using appropriate shoring (including trench boxes) or by laying back the slopes to no steeper than 1.5:1 (horizontal:vertical) in fill, colluvium, and alluvium and 1:1 (horizontal:vertical) for granitic bedrock materials. Temporary excavations that encounter seepage may be shored or stabilized by placing sandbags or gravel along the base of the seepage zone. Excavations encountering seepage should be evaluated on a case-by-case basis. On-site safety of personnel is the responsibility of the contractor.

7.1.10. Utility Trench Backfill

We recommend that trench backfill materials be in conformance with the "Greenbook" (Standard Specifications for Public Works) specifications for structure backfill. Granitic rock excavated for utility trenches may contain oversize materials (greater than 3 inches) and may not be suitable for reuse as fill or backfill without special handling. Soils classified as silts or clays (CL, CH, ML, and MH) should not be used for backfill in the pipe zone. Fill should be moisture-conditioned to generally above the laboratory optimum. Trench backfill should be compacted to a relative compaction of 90 percent as evaluated by ASTM D 1557 except for the upper 12 inches of the backfill which should be compacted to a relative compaction of 95 percent as evaluated by ASTM D 1557. Lift thickness for backfill will depend on the type of compaction equipment utilized, but fill should generally be placed in lifts not exceeding 8 inches in loose thickness. Special care should be exercised to avoid damaging the pipe during compaction of the backfill.

7.2. Slopes

Unless otherwise recommended by Ninyo & Moore and approved by the regulating agencies, cut and fill slopes should not be steeper than 2:1 (horizontal:vertical).

Compaction of the face of fill slopes should be performed by backrolling at intervals of 4 feet or less in vertical slope height or as dictated by the capability of the available equipment, whichever is less. Fill slopes should be backrolled utilizing a sheepsfoot-type roller. Care should be taken in maintaining the desired moisture conditions and/or reestablishing them, as needed, prior to backrolling. Sheepsfoot compacted fill slopes should be track walked and trimmed to finish grade or overfilled and cutback. The placement, moisture conditioning, and compaction of fill slope materials should be done in accordance with the recommendations presented in the Compacted Fill section of this report.

Site runoff should not be permitted to flow over the tops of slopes. Positive drainage should be established away from the slopes. This may be accomplished by incorporating brow ditches placed at the top of the slopes to divert surface runoff away from the slope face where drainage devices are not otherwise available.

The on-site soils are likely to be susceptible to erosion; therefore, the project plans and specifications should contain design features and construction requirements to mitigate erosion of on-site soils during and after construction. Imported fill materials should be evaluated for suitability by Ninyo & Moore prior to their use in constructing fill slopes.

7.3. Drainage

Roof, pad, and slope drainage should be such that runoff water is diverted away from slopes and structures to suitable discharge areas by nonerodible devices (e.g., gutters, downspouts, concrete swales, etc.). Positive drainage adjacent to structures should be established and maintained. Positive drainage may be accomplished by providing drainage away from the foundations of the structure at a gradient of 2 percent or steeper for a distance of 5 feet or more outside the building perimeter, and further maintained by a graded swale leading to an appropriate outlet, in accordance with the recommendations of the project civil engineer and/or landscape architect.

Surface drainage on the site should be provided so that water is not permitted to pond. A gradient of 2 percent or steeper should be maintained over the pad area and drainage patterns should be established to divert and remove water from the site to appropriate outlets.

Care should be taken by the contractor during final grading to preserve any berms, drainage terraces, interceptor swales or other drainage devices of a permanent nature on or adjacent to the property. Drainage patterns established at the time of final grading should be maintained for the life of the project. The property owner and the maintenance personnel should be made aware that altering drainage patterns might be detrimental to slope stability and foundation performance.

7.4. Seismic Design Parameters

The proposed improvements should be designed in accordance with the requirements of governing jurisdictions and applicable building codes. Table 3 presents the seismic design parameters for the site in accordance with CBC (2013) and adjusted MCE spectral response acceleration parameters (USGS, 2015).

Table 3 – Seismic Design Factors

Factors	Values
Site Class	C
Site Coefficient, F_a	1.000
Site Coefficient, F_v	1.410
Mapped Short Period Spectral Acceleration, S_S	1.002g
Mapped One-Second Period Spectral Acceleration, S_1	0.390g
Short Period Spectral Acceleration Adjusted For Site Class, S_{MS}	1.002g
One-Second Period Spectral Acceleration Adjusted For Site Class, S_{M1}	0.550g
Design Short Period Spectral Acceleration, S_{DS}	0.668g
Design One-Second Period Spectral Acceleration, S_{D1}	0.367g

7.5. Foundations

We recommend that the proposed buildings and retaining walls be supported on shallow, spread or continuous footings bearing on compacted fill materials. Foundations should be designed in accordance with structural considerations and the following recommendations. In addition, requirements of the appropriate governing jurisdictions and applicable building codes should be considered in the design of the structures.

7.5.1. Shallow Footings for Buildings and Retaining Walls

Shallow, spread or continuous footings, founded in compacted fill materials may be designed using an allowable bearing capacity of 2,500 pounds per square foot (psf). These allowable bearing capacities may be increased by one-third when considering loads of short duration such as wind or seismic forces. Spread footings should be founded 18 inches below the lowest adjacent grade. Continuous footings should have a width of 15 inches and isolated footings should be 24 inches in width. The spread footings should be reinforced in accordance with the recommendations of the project structural engineer.

7.5.2. Lateral Resistance

For resistance of footings to lateral loads, we recommend an allowable passive pressure of 350 psf per foot of depth be used with a value of up to 3,500 psf. This value assumes that the ground is horizontal for a distance of 10 feet, or three times the height generating the passive pressure, whichever is greater. We recommend that the upper 1 foot of soil not protected by pavement or a concrete slab be neglected when calculating passive resistance.

For frictional resistance to lateral loads, we recommend a coefficient of friction of 0.35 be used between soil and concrete. The allowable lateral resistance can be taken as the sum of the frictional resistance and passive resistance provided the passive resistance does not exceed one-half of the total allowable resistance. The passive resistance values may be increased by one-third when considering loads of short duration such as wind or seismic forces.

7.5.3. Static Settlement

We estimate that the proposed structures, designed and constructed as recommended herein, will undergo total settlement on the order of 1 inch. Differential settlement on the order of 1/2 inch over a horizontal span of 40 feet should be expected.

7.6. Slabs-on-Grade

We recommend that conventional, slab-on-grade floors, underlain by compacted fill materials of generally very low to low expansion potential, be 6 inches in thickness and be reinforced with No. 4 reinforcing bars spaced 18 inches on center each way. The reinforcing bars should be placed near the middle of the slab. As a means to help reduce shrinkage cracks, we recommend that the slabs be provided with expansion joints at intervals of approximately 12 feet each way. The slab reinforcement and expansion joint spacing should be designed by the project structural engineer.

If moisture sensitive floor coverings are to be used, we recommend that slabs be underlain by a vapor retarder and capillary break system consisting of a 10-mil polyethylene (or equivalent) membrane placed over 4 inches of medium to coarse, clean sand or pea gravel and overlain by an additional 2 inches of sand to help protect the membrane from puncture during placement and to aid in concrete curing. The exposed subgrade should be moistened just prior to the placement of concrete.

7.7. Concrete Flatwork

Exterior concrete flatwork should be 4 inches in thickness and should be reinforced with No. 4 reinforcing bars placed at 24 inches on-center both ways. No vapor retarder is needed for exterior flatwork. To reduce the potential manifestation of distress to exterior concrete flatwork due to movement of the underlying soil, we recommend that such flatwork be installed with crack-control joints at appropriate spacing as designed by the structural engineer. Exterior slabs should be underlain by 4 inches of clean sand. The subgrade soils should be scarified to a depth of 12 inches, moisture conditioned to generally above the laboratory optimum moisture content, and compacted to a relative compaction of 90 percent as evaluated by ASTM D 1557. Positive drainage should be established and maintained adjacent to flatwork.

7.8. Retaining Walls

As noted, we understand that retaining walls up to approximately 12 feet in height may be constructed at the project site. Retaining walls should be designed using the earth pressures in Figure 5 and discussed here. For the design of a yielding retaining wall that is not restrained against movement by rigid corners or structural connections, an active pressure represented by an equivalent fluid weight of 57 pounds per cubic foot (pcf) may be assumed for 2:1 backfill and 37 pcf for level backfill. Restrained walls (non-yielding) may be designed for at-rest pressure represented by an equivalent fluid weight of 82 pcf for 2:1 backfill and 57 pcf for level backfill. For dynamic earth pressures, a pressure represented by an equivalent fluid weight of 15 pcf and 25 pcf may be used for level backfill and 2:1 backfill, respectively. These pressures assume low-expansive, granular backfill as defined in the Fill Materials section of this report. Wall backfill should be moisture conditioned and compacted to a relative compaction of 90 percent at a moisture content near the optimum as evaluated by ASTM D 1557. A drain should be provided behind the wall as shown in Figure 6. The drain should be connected to an appropriate outlet.

The retaining wall should be supported on a continuous spread footing founded completely in compacted fill or completely in granitic bedrock materials. Transitional bearing conditions should be mitigated by overexcavation as recommended in earlier sections of this report or by deepening footings to bear on granitic rock. Allowable bearing capacity and lateral resistance values provided in Section 7.5 can be used for design of the retaining wall footings.

7.9. Corrosion

Laboratory testing was performed on representative samples of the on-site earth materials to evaluate pH and electrical resistivity, as well as chloride and sulfate contents. The pH and electrical resistivity tests were performed in accordance with California Test (CT) 643 and the sulfate and chloride content tests were performed in accordance with CT 417 and CT 422, respectively. These laboratory test results are presented in Appendix B.

The results of the corrosivity testing indicated electrical resistivity value of 620, soil pH values of 6.9, chloride content of 390 parts per million (ppm) and a sulfate content of 0.010 percent (i.e., 100 ppm). Based on the Caltrans corrosion (2012) criteria and ACI 318, the on-site soils would be classified as corrosive. Corrosive soils are defined as soils with electrical resistivities less than 1,000 ohm-cm, more than 500 ppm chlorides, more than 0.2 percent sulfates, or a pH less than 5.5.

7.10. Concrete

Concrete in contact with soil or water that contains high concentrations of soluble sulfates can be subject to chemical deterioration. As noted, laboratory testing indicated a sulfate content of 0.010 percent (i.e., 100 ppm) for the tested sample. According to the ACI 318, the potential for sulfate attack is negligible for water-soluble sulfate content of up to about 0.10 percent by weight (i.e., 1,000 ppm) in soils. Therefore, the site soils may be considered to have a negligible potential for sulfate attack. However, due to the variability of the on-site soils and the potential for use of imported soils, we recommend that Type II/V cement be used for concrete structures in contact with soil or granitic rock. In addition, we recommend a water-to-cement ratio of no more than 0.45.

7.11. Flexible Pavement Design

Laboratory testing of onsite materials indicated an R-value of 10 for subgrade materials. Actual pavement recommendations should be based on R-value tests performed on bulk samples of the soils that are exposed at the finished subgrade elevations across the site at the completion of the mass grading operations.

We understand that traffic will consist primarily of automobiles, light trucks, and occasional heavy trucks and fire trucks. For design we have assumed Traffic Indices (TI) of 6.0 and 7.0 for site pavements. The preliminary recommended pavement sections are as follows:

Table 4 – Recommended Preliminary Pavement Sections

Traffic Index (Location)	Design R-Value	Asphalt Concrete (in)	Class 2 Aggregate Base (in)
6.0 (Parking Lot)	10	4.0	10.5
7.0 (Fire Lane/Truck Access)	10	4.0	14.5

As indicated, these values assume traffic indices of 6.0 and 7.0 for site pavements. If traffic loads are different from those assumed, the pavement design should be re-evaluated. In addition, we recommend that the Class 2 aggregate base and the upper 12 inches of the subgrade be compacted to a relative compaction of 95 or more percent relative density as evaluated by the current version of ASTM D 1557.

7.12. Concrete Pavement Design

We suggest that consideration be given to using Portland cement concrete pavements for areas where dumpsters will be stored and where refuse trucks will stop and load. Experience indicates that refuse truck traffic can significantly shorten the useful life of asphalt concrete sections. We recommend that in these areas, 6 inches of 600 psi flexural strength Portland cement concrete reinforced with No. 4 bars, 18 inches on center, be placed over 6 inches or more of Class 2 or crushed aggregate base compacted to a relative compaction of 95 percent, placed over 1 or more feet of very low to low expansive fill materials compacted to compacted to a relative compaction of 95 percent.

7.13. Pre-Construction Conference

We recommend that a pre-construction meeting be held prior to commencement of grading. The owner or his representative, the agency representatives, the architect, the civil engineer, Ninyo & Moore, and the contractor should attend to discuss the plans, the project, and the proposed construction schedule.

7.14. Plan Review and Construction Observation

The conclusions and recommendations presented in this report are based on analysis of observed conditions in widely spaced exploratory test pits. If conditions are found to vary from those described in this report, Ninyo & Moore should be notified, and additional recommendations will be provided upon request. Ninyo & Moore should review the final project drawings and specifications prior to the commencement of construction. Ninyo & Moore should perform the needed observation and testing services during construction operations.

The recommendations provided in this report are based on the assumption that Ninyo & Moore will provide geotechnical observation and testing services during construction. In the event that it is decided not to utilize the services of Ninyo & Moore during construction, we request that the selected consultant provide the client with a letter (with a copy to Ninyo & Moore) indicating that they fully understand Ninyo & Moore's recommendations, and that they are in full agreement with the design parameters and recommendations contained in this report. Construction of proposed improvements should be performed by qualified subcontractors utilizing appropriate techniques and construction materials.

8. LIMITATIONS

The field evaluation, laboratory testing, and geotechnical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request. Please also note that our evaluation was limited to assessment of the geotechnical aspects of the project, and did not include evaluation of structural issues, environmental concerns, or the presence of hazardous materials.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

This report is intended for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project areas. The independent evaluations may include, but not be limited to, review of other geotechnical reports prepared for the adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified, and additional recommendations, if warranted, will be provided upon request. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

9. REFERENCES

American Concrete Institute (ACI), 2011, ACI 318 Building Code Requirements for Structural Concrete and Commentary.

Boore, D.M., Joyner, W.B., and Fumal, T.E., 1997, Equations for Estimating Horizontal Response Spectra and Peak Acceleration from Western North American Earthquakes: A Summary of Recent Work, Seismological Research Letters, Vol. 68, No. 1, pp. 128-153.

Building News, 2012, "Greenbook," Standard Specifications for Public Works Construction: BNI Publications.

California Building Standards Commission, 2013, California Building Code, Title 24, Part 2, Volumes 1 and 2.

California Department of Transportation (Caltrans), 2012, Corrosion Guidelines (Version 2.0), Division of Engineering and Testing Services, Corrosion Technology Branch: dated November.

County of San Diego, 2013, Design Manual for Onsite Wastewater Treatment Systems, Department of Environmental Health, Land and Water Quality Division: updated November 25.

Jennings, C.W., 2010, Fault Activity Map of California and Adjacent Areas: California Geological Survey, California Geologic Map Series, Map No. 6.

Kennedy, M.P., and Tan, S.S., 2005, Geologic Map of the Oceanside 30'x60' Quadrangle, California, California Geologic Survey, Regional Geologic Map Series, Map No. 2, Scale 1:100,000.

Ninyo & Moore, 2015, Proposal for Geotechnical Evaluation, Escondido Industrial Project 2005 Harmony Grove Road, Escondido, California: dated October 7.

Norris, R. M. and Webb, R. W., 1990, Geology of California, Second Edition: John Wiley & Sons, Inc.

Tan, S.S. and Giffen, D.G., 1995, Landslide Hazards in the Northern Part of the San Diego Metropolitan Area, San Diego County, California, California Division of Mines and Geology: Landslide Hazards Identification Map No. 33, DMG OFR 95-04, Scale 1:24,000.

United States Department of the Interior, Bureau of Reclamation, 1989, Engineering Geology Field Manual.

United States Federal Emergency Management Agency (FEMA), 2012, FEMA Mapping Information Platform Website, World Wide Web, https://hazards.fema.gov/femaportal/wps/portal/, accessed in October.

United States Geological Survey, 1949, Escondido, California Quadrangle Map, 7.5 – Minute Series, Scale 1:24,000.

United States Geological Survey, 2013, Escondido, California Quadrangle Map, 7.5 – Minute Series, Scale 1:24,000.

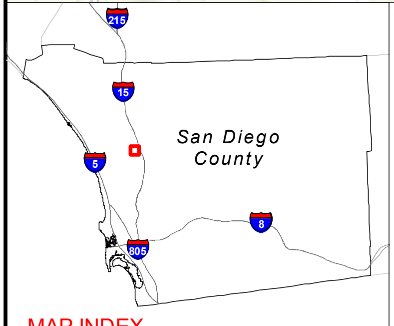
United States Geological Survey, 2015, U.S. Seismic Design Maps Tool, World Wide Web, http://earthquake.usgs.gov/designmaps/us/application.php/, accessed in November.

Ware Malcomb, 2015, Conceptual Site Plan, Rancho Escondido, 2005 Harmony Grove Rd., dated August 7.

AERIAL PHOTOGRAPHS

Source	Date	Flight	Numbers	Scale
USDA	March 31, 1953	AXN-3M	120 and 121	1:20,000

SOURCE: USGS, FAO, NPS, EPA, ESRI, DELORME, TANA, OTHER SUPPLIERS



MAP INDEX

SCALE IN FEET

0 750 1,500 3,000

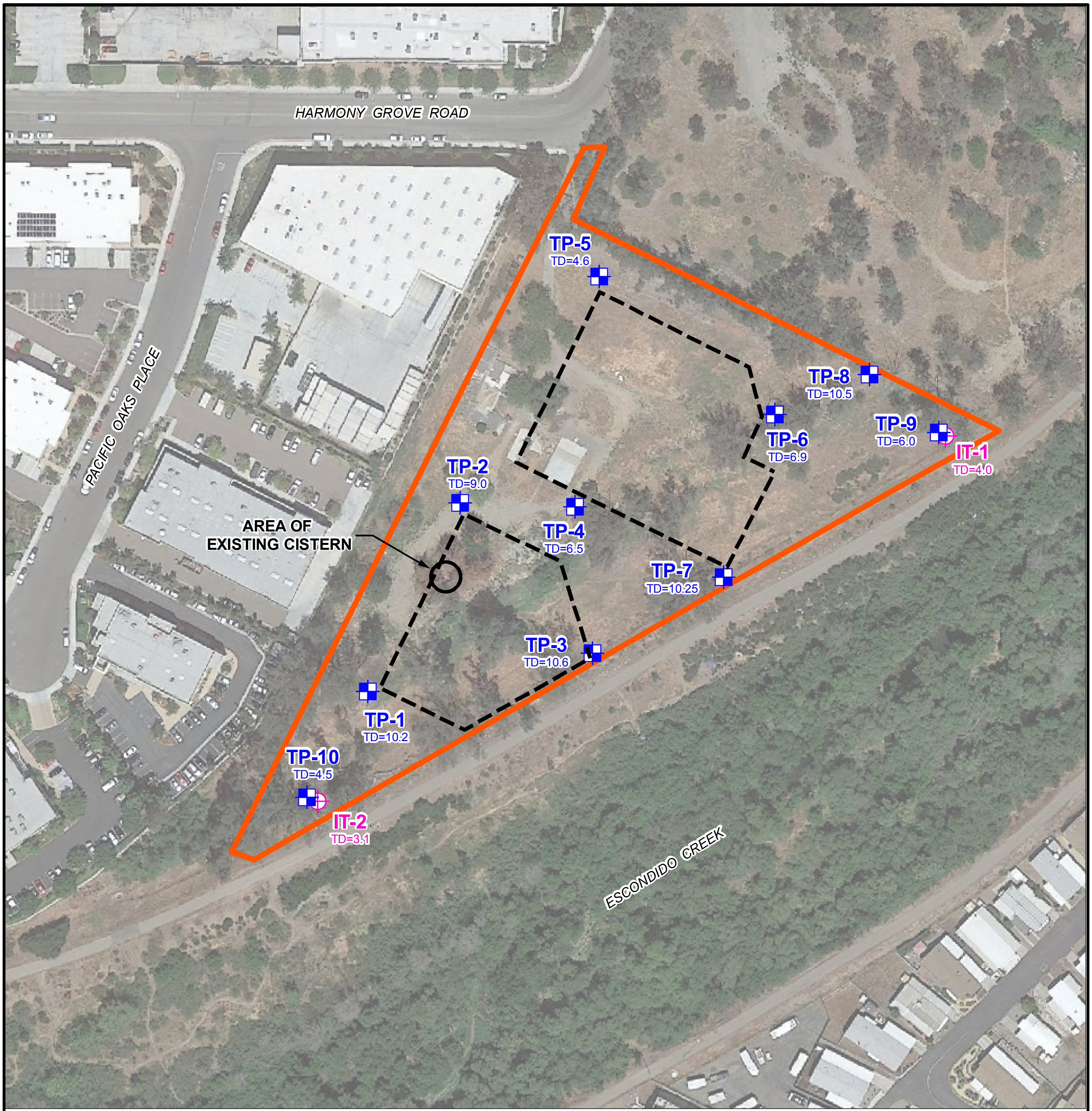
NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE

Ninyo & Moore

SITE LOCATION

PROJECT NO.	DATE	ESCONDIDO INDUSTRIAL PARK 2005 HARMONY GROVE ROAD ESCONDIDO, CALIFORNIA	FIGURE
108059001	12/15		1

1_108059001_SL_93.mxd AOB



SOURCE: 2012 SAN DIEGO IMAGERY ACQUISITION PARTNERSHIP (FLIGHT DATES: MAY 20 - JUNE 6, 2012)

LEGEND

	SITE BOUNDARY
	PROPOSED BUILDING
TP-10 TD=4.5	TEST PIT TD=TOTAL DEPTH IN FEET
IT-2 TD=3.1	INFILTRATION TEST TD=TOTAL DEPTH IN FEET

N

SCALE IN FEET

0 75 150 300

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE

Ninyo & Moore

EXPLORATION LOCATIONS

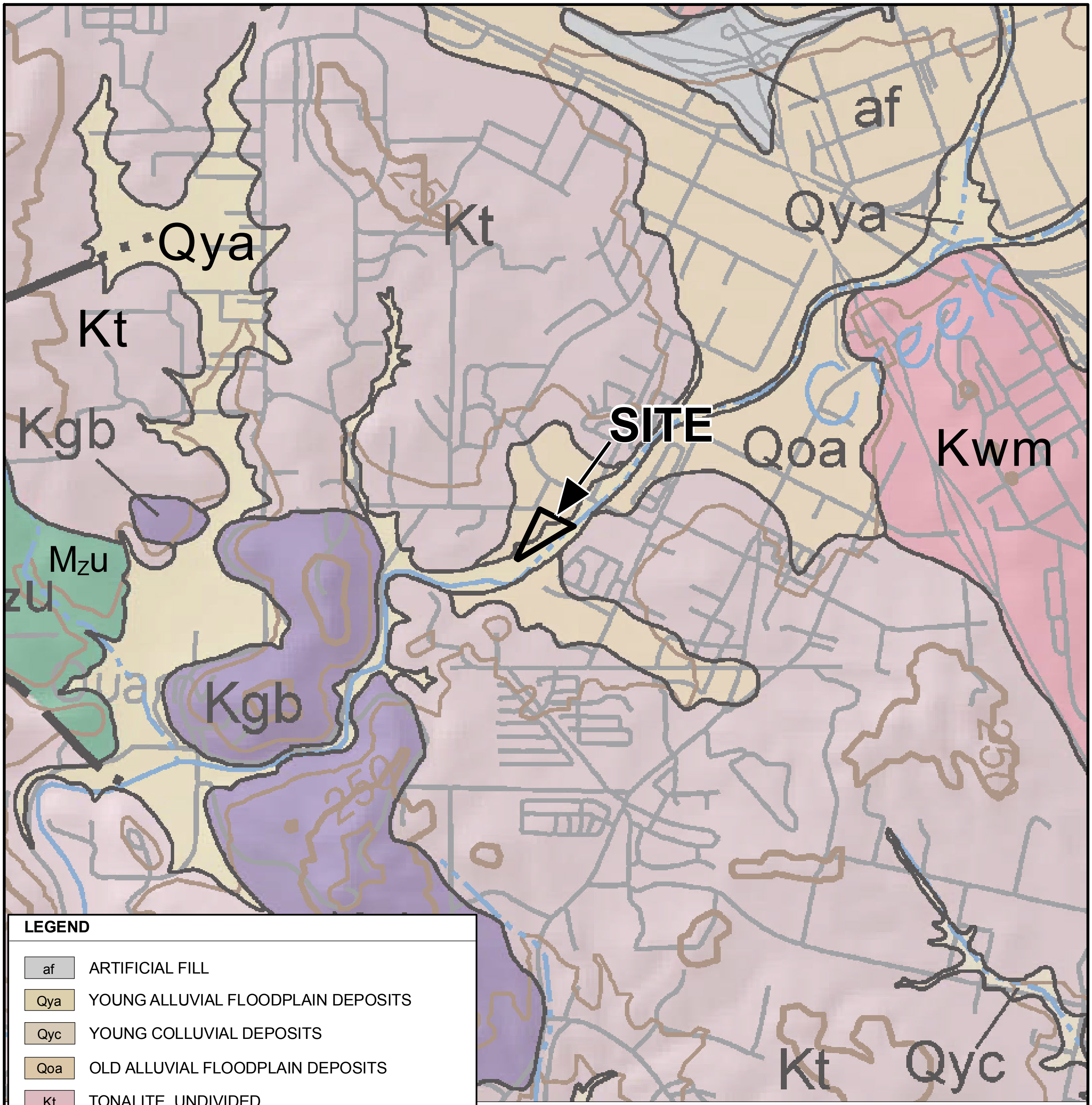
FIGURE

PROJECT NO.	DATE
108059001	12/15

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

2

2_108059001_SP.mxd AOB



SOURCE: KENNEDY, M.P., AND TAN, S.S., 2007, GEOLOGIC MAP OF THE OCEANSIDE 30' X 60' QUADRANGLE, CALIFORNIA.

LEGEND

af	ARTIFICIAL FILL
Qya	YOUNG ALLUVIAL FLOODPLAIN DEPOSITS
Qyc	YOUNG COLLUVIAL DEPOSITS
Qoa	OLD ALLUVIAL FLOODPLAIN DEPOSITS
Kt	TONALITE, UNDIVIDED
Kgb	GABBRO, UNDIVIDED
Kwm	GRANODIORITE OF WOODSON MOUNTAIN
Mzu	METASEDIMENTARY AND METAVOLCANIC ROCKS, UNDIVIDED
65 ▲ U D	FAULT - SOLID WHERE ACCURATELY LOCATED, DASHED WHERE APPROXIMATE, DOTTED WHERE CONCEALED. ARROW AND NUMBER INDICATE DIRECTION AND ANGLE OF DIP OF FAULT PLANE

N

SCALE IN FEET

0 1,800 3,600

3_108059001_G.mxd AOB

NOTES: ALL DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE

Ninyo & Moore

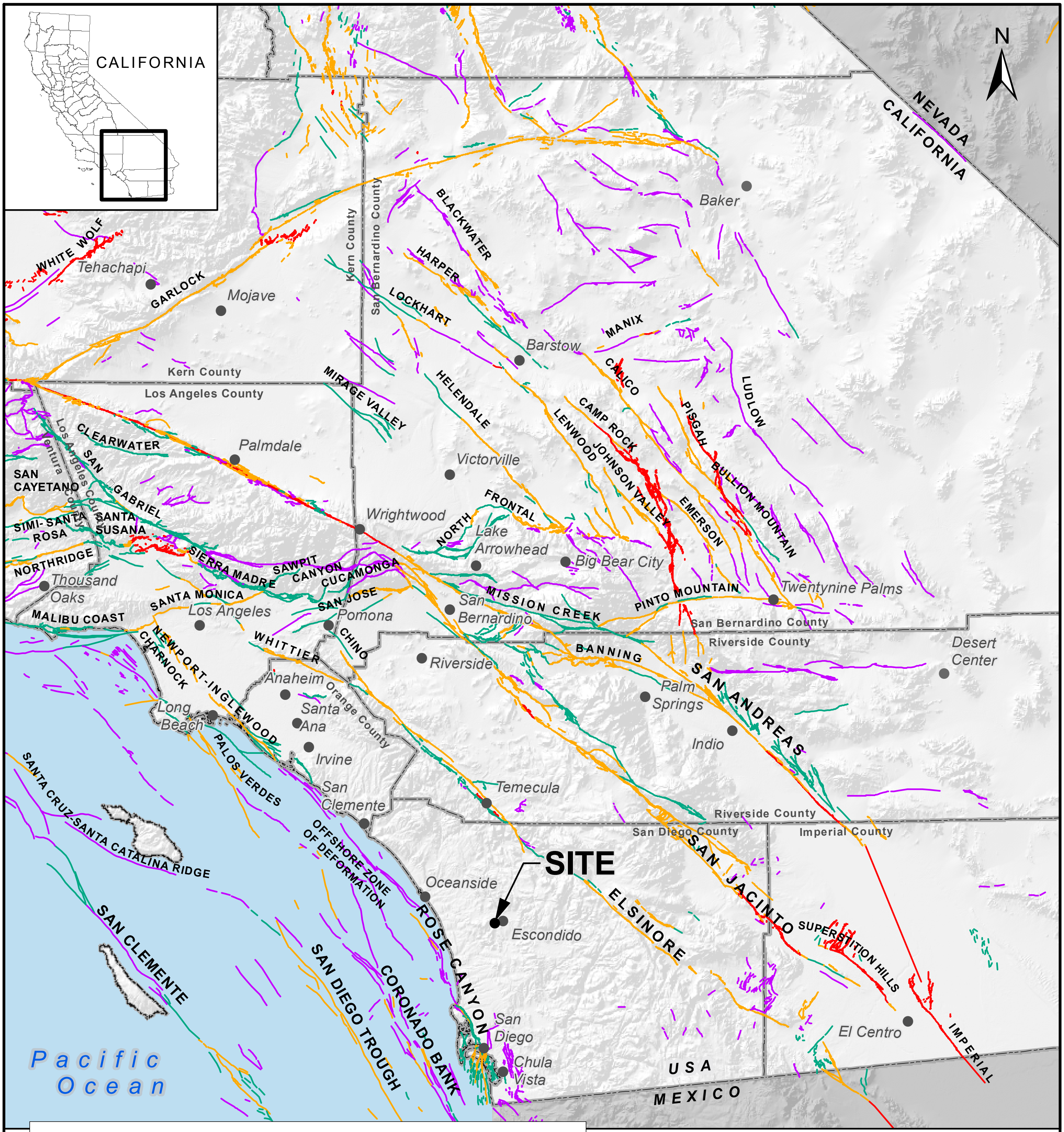
GEOLOGY

FIGURE

PROJECT NO.	DATE
108059001	12/15

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

3



LEGEND

CALIFORNIA FAULT ACTIVITY

- 🟥 HISTORICALLY ACTIVE
- 🟧 HOLOCENE ACTIVE
- 🟩 LATE QUATERNARY (POTENTIALLY ACTIVE)
- 🟪 QUATERNARY (POTENTIALLY ACTIVE)
- — STATE/COUNTY BOUNDARY

SOURCE: JENNINGS, C.W., AND BRYANT, W.A., 2010, FAULT ACTIVITY MAP OF CALIFORNIA, CALIFORNIA GEOLOGICAL SURVEY.

SCALE IN MILES

0 30 60

NOTE: DIRECTIONS, DIMENSIONS AND LOCATIONS ARE APPROXIMATE.

4_108059001_F_93.mxd AOB

Ninyo & Moore

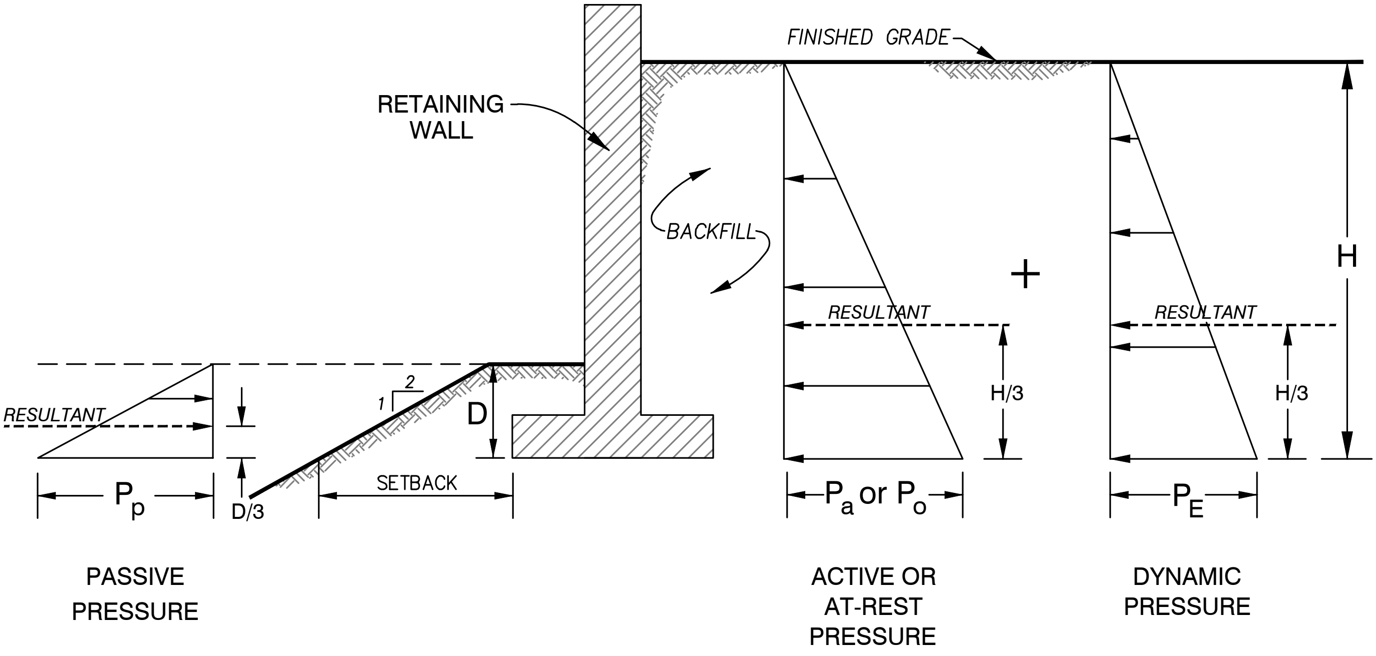
PROJECT NO.	DATE
108059001	12/15

FAULT LOCATIONS

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

FIGURE

4



NOTES:

1. ASSUMES NO HYDROSTATIC PRESSURE BUILD-UP BEHIND THE RETAINING WALL
2. STRUCTURAL, GRANULAR BACKFILL MATERIALS AS SPECIFIED IN OUR REPORT SHOULD BE USED FOR RETAINING WALL BACKFILL
3. DRAINS AS RECOMMENDED IN THE RETAINING WALL DRAINAGE DETAIL SHOULD BE INSTALLED BEHIND THE RETAINING WALL
4. SURCHARGE PRESSURES CAUSED BY VEHICLES OR NEARBY STRUCTURES ARE NOT INCLUDED
5. H AND D ARE IN FEET
6. SETBACK SHOULD BE IN ACCORDANCE WITH FIGURE 1808.7.1 OF THE CBC (2013)

RECOMMENDED GEOTECHNICAL DESIGN PARAMETERS

Lateral Earth Pressure	Equivalent Fluid Pressure (lb/ft ^{2}/ft) (1)	
P_a	Level Backfill with Granular Soils (2)	2H:1V Sloping Backfill with Granular Soils (2)
	37 H	57 H
P_O	57 H	82 H
P_E	15 H	25 H
P_p	Level Ground	2H:1V Descending Ground
	350 D	150 D

NOT TO SCALE

5_108059001_d-leprw.dwg

Ninyo & Moore

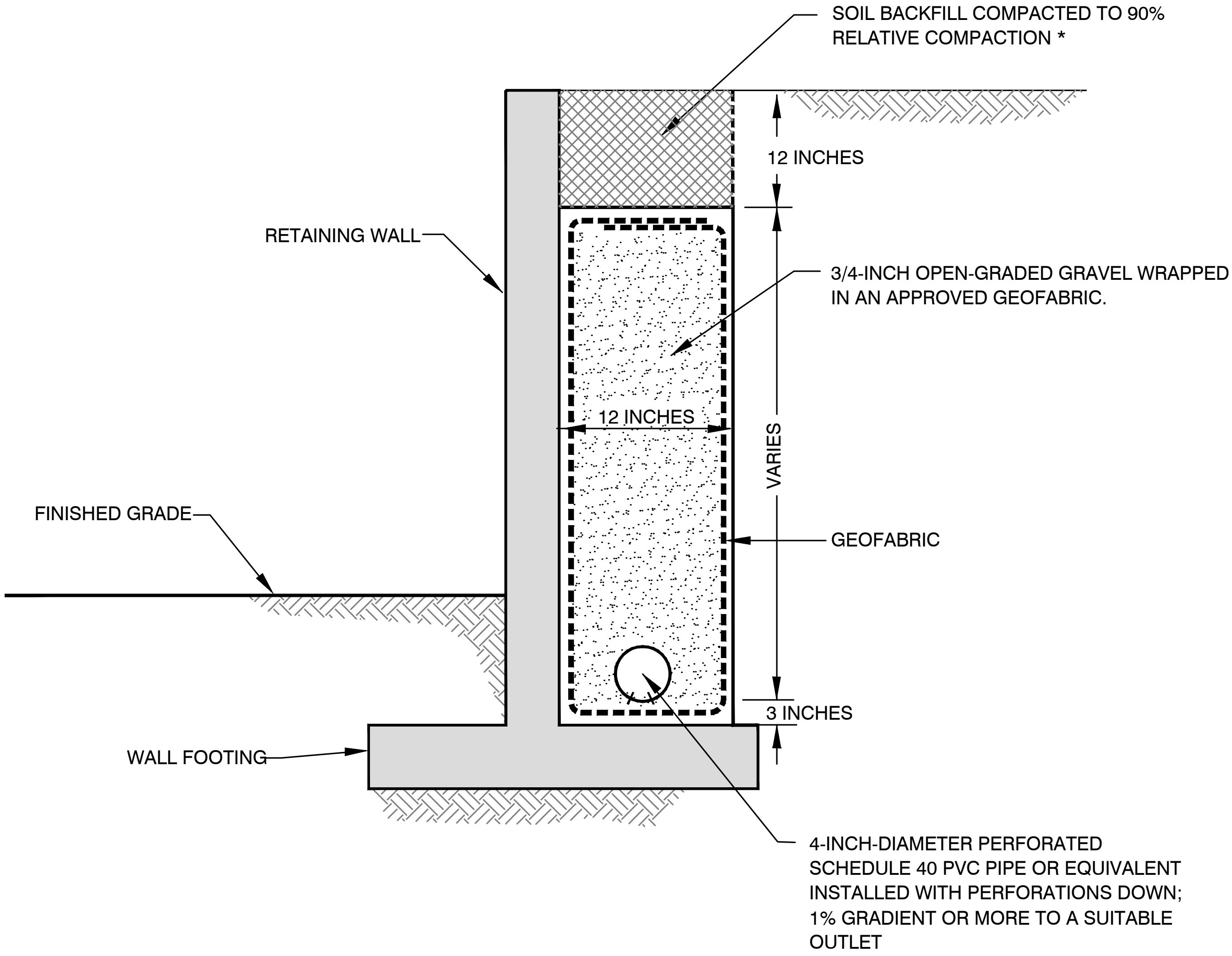
LATERAL EARTH PRESSURES FOR RETAINING WALLS

FIGURE

5

PROJECT NO.	DATE
108059001	12/15

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA



*BASED ON ASTM D1557

NOT TO SCALE

6 108059001 d-rw.dwg

NOTE: AS AN ALTERNATIVE, AN APPROVED GEOCOMPOSITE DRAIN SYSTEM MAY BE USED.

Ninyo & Moore

RETAINING WALL DRAINAGE DETAIL

FIGURE

6

PROJECT NO.	DATE
108059001	12/15

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

APPENDIX A

TEST PIT AND INFILTRATION TEST BORING LOGS

Field Procedure for the Collection of Disturbed Bulk Samples

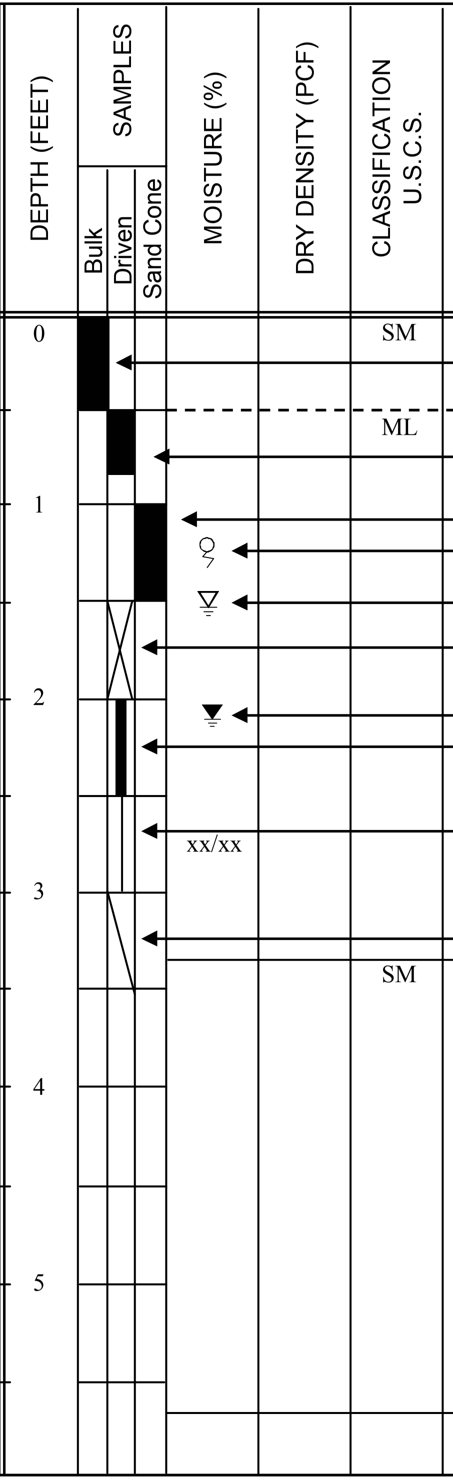
Bulk samples of representative earth materials were obtained from the test pit excavations. The samples were bagged and transported to the laboratory for testing.

Ninyo & Moore

Explanation of Test Pit, Core, Trench and Hand Auger Log Symbols

PROJECT NO.	DATE

EXCAVATION LOG
EXPLANATION SHEET



FILL:

Bulk sample.

Dashed line denotes material change.

Drive sample.

Sand cone performed.

Seepage

Groundwater encountered during excavation.

No recovery with drive sampler.

Groundwater encountered after excavation.

Sample retained by others.

Shelby tube sample. Distance pushed in inches/length of sample recovered in inches

No recovery with Shelby tube sampler.

ALLUVIUM:

Solid line denotes unit change.

Attitude: Strike/Dip

b: Bedding
c: Contact
j: Joint
f: Fracture
F: Fault
cs: Clay Seam
s: Shear
bss: Basal Slide Surface
sf: Shear Fracture
sz: Shear Zone
sbs: Sheared Bedding Surface

The total depth line is a solid line that is drawn at the bottom of the excavation log.

SCALE: 1 inch = 1 foot

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	BORING LOG EXPLANATION SHEET
0	■							Bulk sample.
		■						Modified split-barrel drive sampler.
		⧗						2-inch inner diameter split-barrel drive sampler.
		⊠						No recovery with modified split-barrel drive sampler, or 2-inch inner diameter split-barrel drive sampler.
		▮						Sample retained by others.
5		◣						Standard Penetration Test (SPT).
		◺						No recovery with a SPT.
		▯	XX/XX					Shelby tube sample. Distance pushed in inches/length of sample recovered in inches.
		◹						No recovery with Shelby tube sampler.
		▥						Continuous Push Sample.
10				♀				Seepage.
				▽				Groundwater encountered during drilling.
				▼				Groundwater measured after drilling.
						▦	SM	MAJOR MATERIAL TYPE (SOIL): Solid line denotes unit change.
						▨	CL	Dashed line denotes material change.
15						▨		Attitudes: Strike/Dip b: Bedding c: Contact j: Joint f: Fracture F: Fault cs: Clay Seam s: Shear bss: Basal Slide Surface sf: Shear Fracture sz: Shear Zone sbs: Shear Bedding Surface
								The total depth line is a solid line that is drawn at the bottom of the boring.
20								

BORING LOG

Explanation of Boring Log Symbols

PROJECT NO.	DATE	FIGURE

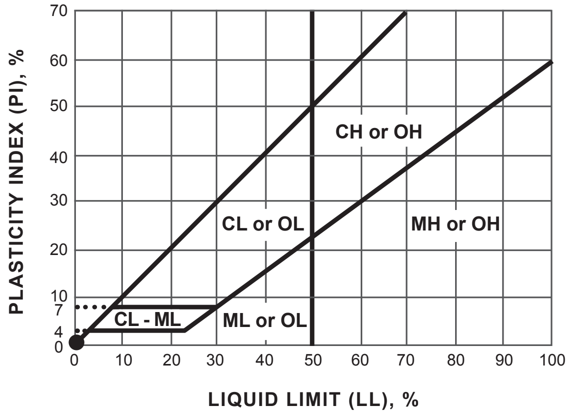
SOIL CLASSIFICATION CHART PER ASTM D 2488

PRIMARY DIVISIONS			SECONDARY DIVISIONS	
			GROUP SYMBOL	GROUP NAME
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	**GRAVEL** more than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVEL less than 5% fines	GW	well-graded GRAVEL
			GP	poorly graded GRAVEL
		GRAVEL with DUAL CLASSIFICATIONS 5% to 12% fines	GW-GM	well-graded GRAVEL with silt
			GP-GM	poorly graded GRAVEL with silt
			GW-GC	well-graded GRAVEL with clay
			GP-GC	poorly graded GRAVEL with clay
		GRAVEL with FINES more than 12% fines	GM	silty GRAVEL
			GC	clayey GRAVEL
			GC-GM	silty, clayey GRAVEL
	SAND 50% or more of coarse fraction passes No. 4 sieve	CLEAN SAND less than 5% fines	SW	well-graded SAND
			SP	poorly graded SAND
		SAND with DUAL CLASSIFICATIONS 5% to 12% fines	SW-SM	well-graded SAND with silt
			SP-SM	poorly graded SAND with silt
			SW-SC	well-graded SAND with clay
			SP-SC	poorly graded SAND with clay
		SAND with FINES more than 12% fines	SM	silty SAND
			SC	clayey SAND
			SC-SM	silty, clayey SAND
FINE-GRAINED SOILS 50% or more passes No. 200 sieve	**SILT and CLAY** liquid limit less than 50%	INORGANIC	CL	lean CLAY
			ML	SILT
			CL-ML	silty CLAY
		ORGANIC	OL (PI > 4)	organic CLAY
			OL (PI < 4)	organic SILT
	SILT and CLAY liquid limit 50% or more	INORGANIC	CH	fat CLAY
			MH	elastic SILT
		ORGANIC	OH (plots on or above "A"-line)	organic CLAY
			OH (plots below "A"-line)	organic SILT
	Highly Organic Soils		PT	Peat

GRAIN SIZE

DESCRIPTION		SIEVE SIZE	GRAIN SIZE	APPROXIMATE SIZE
Boulders		> 12"	> 12"	Larger than basketball-sized
Cobbles		3 - 12"	3 - 12"	Fist-sized to basketball-sized
Gravel	Coarse	3/4 - 3"	3/4 - 3"	Thumb-sized to fist-sized
	Fine	#4 - 3/4"	0.19 - 0.75"	Pea-sized to thumb-sized
Sand	Coarse	#10 - #4	0.079 - 0.19"	Rock-salt-sized to pea-sized
	Medium	#40 - #10	0.017 - 0.079"	Sugar-sized to rock-salt-sized
	Fine	#200 - #40	0.0029 - 0.017"	Flour-sized to sugar-sized
Fines		Passing #200	< 0.0029"	Flour-sized and smaller

PLASTICITY CHART



APPARENT DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	SPOOLING CABLE OR CATHEAD		AUTOMATIC TRIP HAMMER	
	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)
Very Loose	≤ 4	≤ 8	≤ 3	≤ 5
Loose	5 - 10	9 - 21	4 - 7	6 - 14
Medium Dense	11 - 30	22 - 63	8 - 20	15 - 42
Dense	31 - 50	64 - 105	21 - 33	43 - 70
Very Dense	> 50	> 105	> 33	> 70

CONSISTENCY - FINE-GRAINED SOIL

CONSIS-TENCY	SPOOLING CABLE OR CATHEAD		AUTOMATIC TRIP HAMMER	
	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)	SPT (blows/foot)	MODIFIED SPLIT BARREL (blows/foot)
Very Soft	< 2	< 3	< 1	< 2
Soft	2 - 4	3 - 5	1 - 3	2 - 3
Firm	5 - 8	6 - 10	4 - 5	4 - 6
Stiff	9 - 15	11 - 20	6 - 10	7 - 13
Very Stiff	16 - 30	21 - 39	11 - 20	14 - 26
Hard	> 30	> 39	> 20	> 26

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USCS METHOD OF SOIL CLASSIFICATION

Explanation of USCS Method of Soil Classification

PROJECT NO.	DATE	FIGURE

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TEST PIT LOG

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

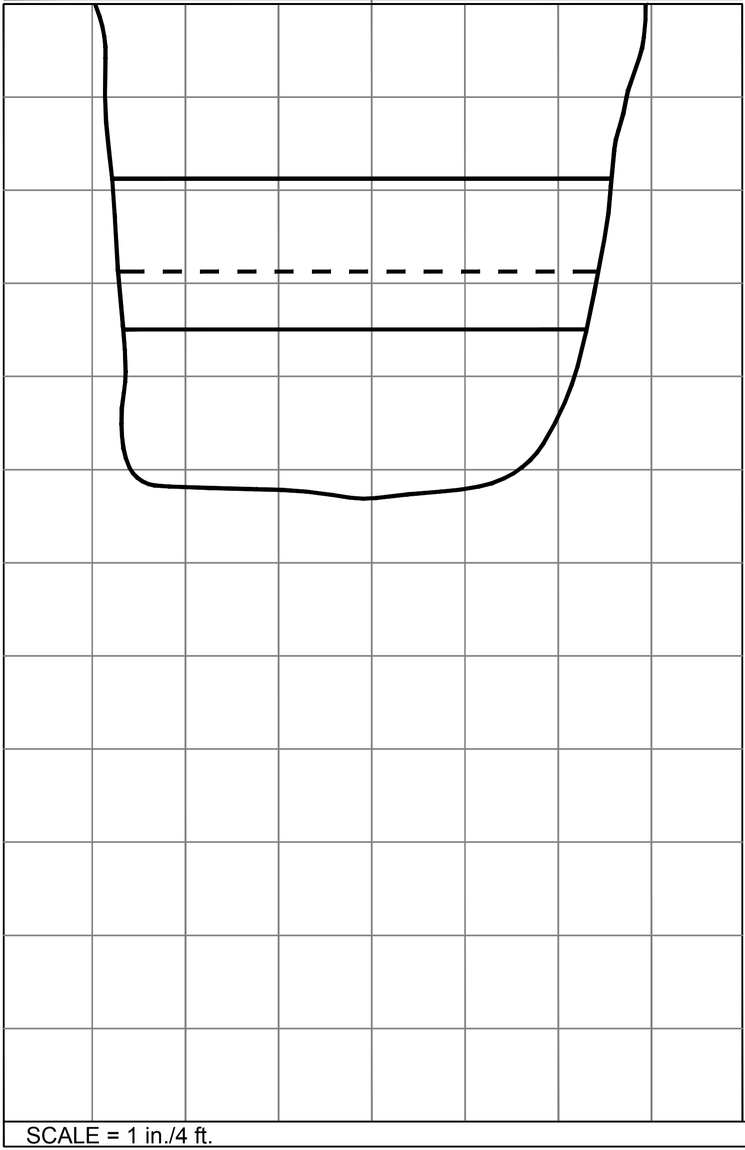
PROJECT NO.	DATE
108059001	12/15

DATE EXCAVATED 11/04/15 TEST PIT NO. TP-1

GROUND ELEVATION 620'± (MSL) LOGGED BY NMM

METHOD OF EXCAVATION Backhoe

LOCATION See Figure 2



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0	■			3.9		SM	UNDOCUMENTED FILL: Light brown and brown, dry to moist, loose, silty fine to medium SAND; scattered granitic gravel and cobble.
4	■					SC	ALLUVIUM: Reddish brown, moist, medium dense, clayey SAND; scattered zones of silty sand.
						SM	Brown to grayish brown, moist, medium dense, silty fine to coarse SAND.
8	■						GRANITIC ROCK: Brownish gray to dark brownish gray, moist, medium-grained GRANITIC ROCK; weathered. Moist to wet.
12 16 20 24							Total Depth = 10.2 feet. (Refusal) Groundwater not encountered. Backfilled on 11/04/15. Note: Groundwater, though not encountered at the time of excavation, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./4 ft.

FIGURE A-1

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TEST PIT LOG

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

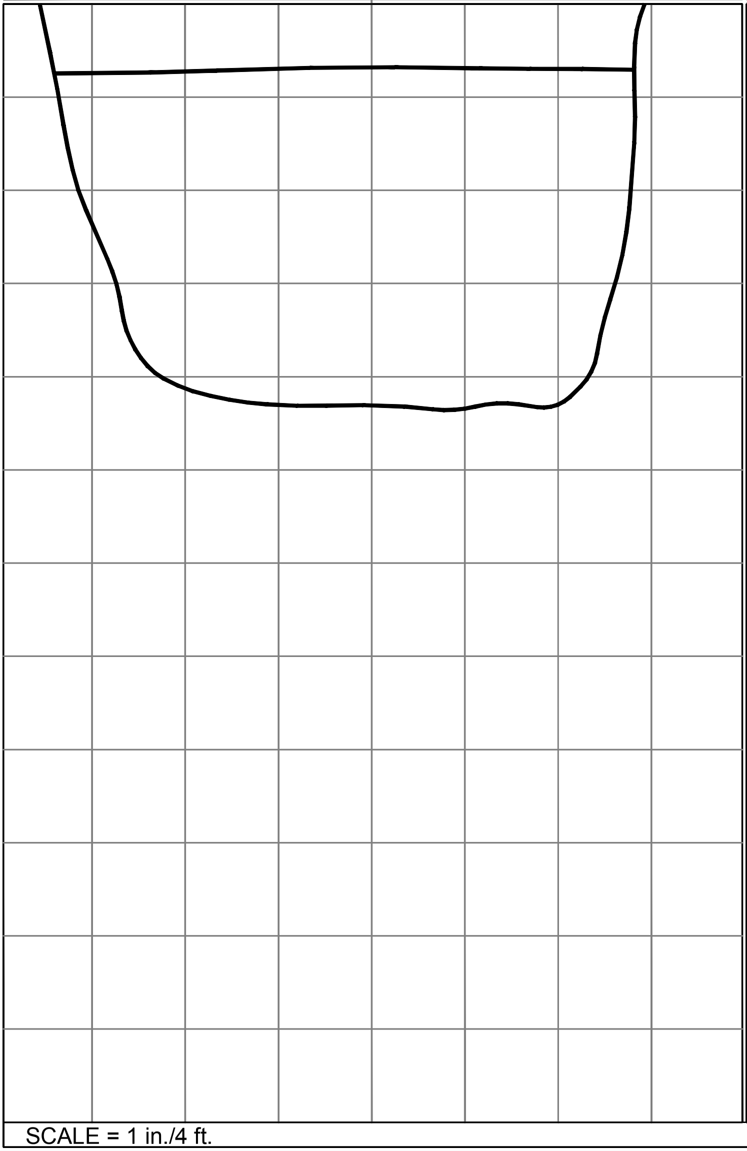
PROJECT NO.	DATE
108059001	12/15

DATE EXCAVATED 11/04/15 TEST PIT NO. TP-2

GROUND ELEVATION 620' ± (MSL) LOGGED BY NMM

METHOD OF EXCAVATION Backhoe

LOCATION See Figure 2



SCALE = 1 in./4 ft.

DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0	■					SM	<u>COLLUVIUM/TOPSOIL</u>: Brown, moist to wet, loose to medium dense, silty fine to medium SAND.
							<u>GRANITIC ROCK</u>: Reddish brown to grayish brown, moist, medium- to coarse-grained GRANITIC ROCK; weathered.
4							@ 5': Grayish brown. @ 6': Moist to wet.
8							@ 9': Difficult digging; slightly weathered rock.
							Total Depth = 9 feet. Groundwater not encountered. Backfilled on 11/04/15.
12							Note: Groundwater, though not encountered at the time of excavation, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
16							The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
20							
24							

FIGURE A-2

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TEST PIT LOG

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

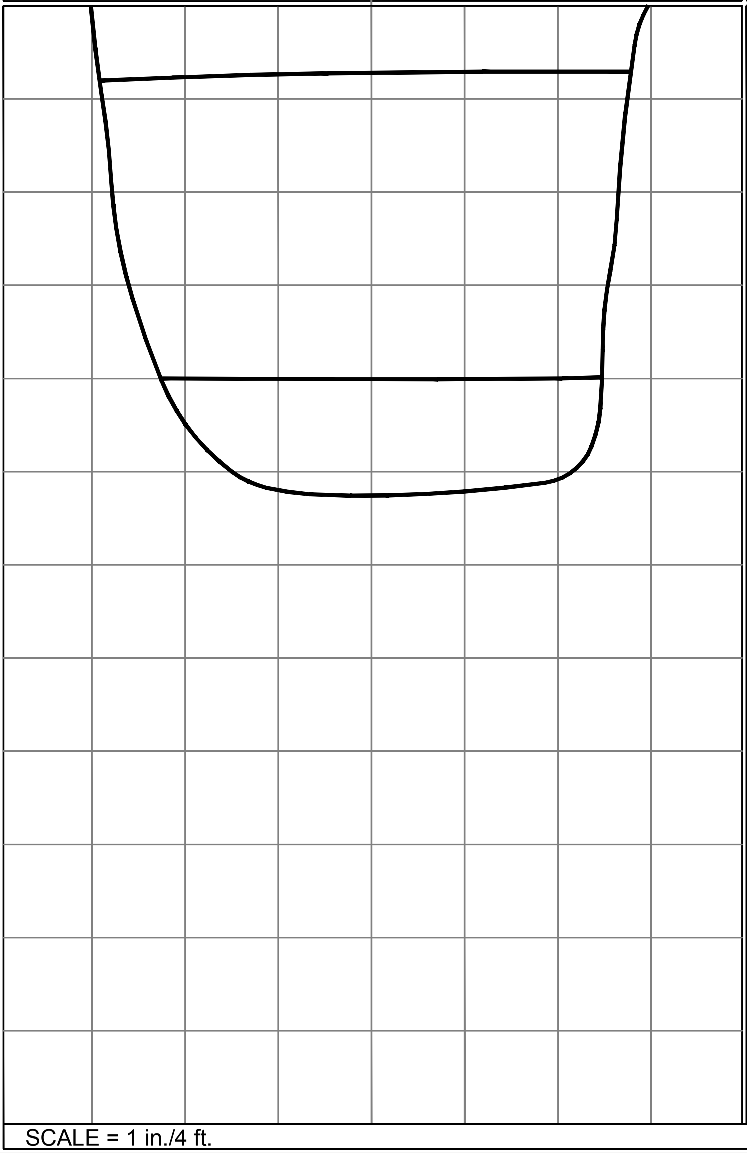
PROJECT NO.	DATE
108059001	12/15

DATE EXCAVATED 11/04/15 TEST PIT NO. TP-3

GROUND ELEVATION 615' ± (MSL) LOGGED BY NMM

METHOD OF EXCAVATION Backhoe

LOCATION See Figure 2



SCALE = 1 in./4 ft.

DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0	■					SM	COLLUVIUM/TOPSOIL: Light brown, moist, very loose, silty fine to medium SAND; numerous roots.
						SM	ALLUVIUM: Brown to reddish brown, moist, loose, silty fine to coarse SAND. @ 2.5': Medium dense.
4							
8							GRANITIC ROCK: Dark brownish gray to bluish gray, moist, medium- to coarse-grained GRANITIC ROCK; weathered.
							Total Depth = 10.6 feet. Groundwater not encountered. Backfilled on 11/04/15. Note: Groundwater, though not encountered at the time of excavation, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
12							
16							
20							
24							

FIGURE A-3

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TEST PIT LOG

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

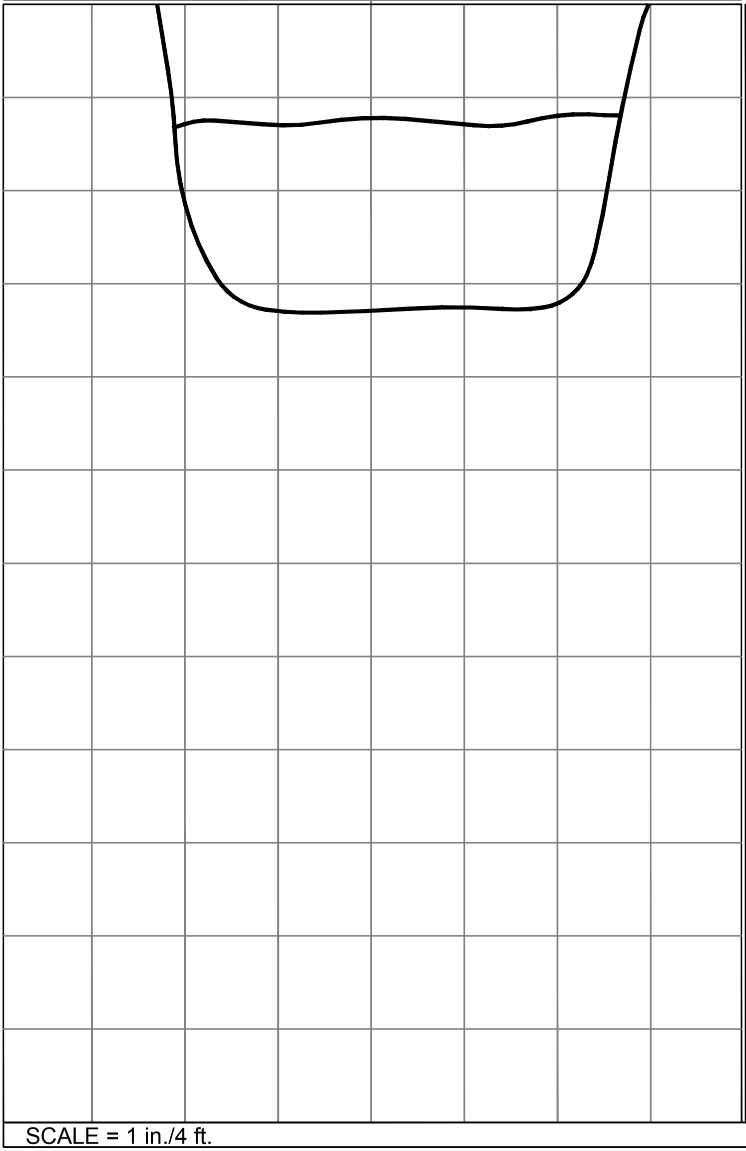
PROJECT NO.	DATE
108059001	12/15

DATE EXCAVATED 11/04/15 TEST PIT NO. TP-4

GROUND ELEVATION 620' ± (MSL) LOGGED BY NMM

METHOD OF EXCAVATION Backhoe

LOCATION See Figure 2



SCALE = 1 in./4 ft.

DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0						SM	UNDOCUMENTED FILL: Light brown to brown, dry to moist, loose to medium dense, silty fine to medium SAND; scattered cobbles and debris (trash, concrete pieces).
4	■			5.5			GRANITIC ROCK: Brown to reddish brown, dry to moist, medium to coarse-grained GRANITIC ROCK; weathered. @ 5': Grayish brown.
8 12 16 20 24							Total Depth = 6.5 feet. (Refusal) Groundwater not encountered. Backfilled on 11/04/15. Note: Groundwater, though not encountered at the time of excavation, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

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TEST PIT LOG

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

PROJECT NO.	DATE
108059001	12/15

DATE EXCAVATED 11/04/15 TEST PIT NO. TP-5

GROUND ELEVATION 620' ± (MSL) LOGGED BY NMM

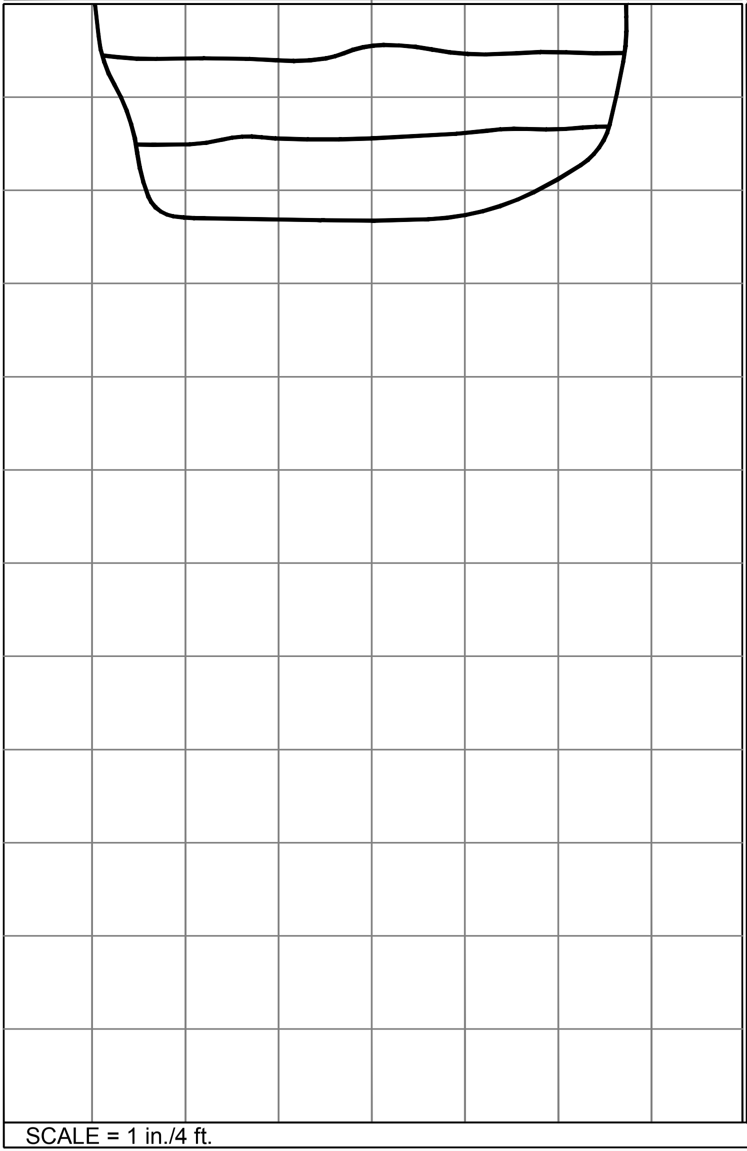
METHOD OF EXCAVATION Backhoe

LOCATION See Figure 2

DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0						SM	UNDOCUMENTED FILL: Grayish brown, dry to moist, loose, silty fine SAND; scattered debris (tile, metal pieces, plastic).
	■					SM	ALLUVIUM: Brown, moist, medium dense, silty fine to medium SAND; pinhole porosity. @ 2.5': Dense.
4							GRANITIC ROCK: Reddish to grayish brown, dry to moist, medium- to coarse-grained GRANITIC ROCK; weathered @ 4': Difficult digging.
							Total Depth = 4.6 feet. (Refusal) Groundwater not encountered. Backfilled on 11/04/15.
8							
12							
16							
20							
24							

Note: Groundwater, though not encountered at the time of excavation, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.



SCALE = 1 in./4 ft.

FIGURE A-5

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TEST PIT LOG

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

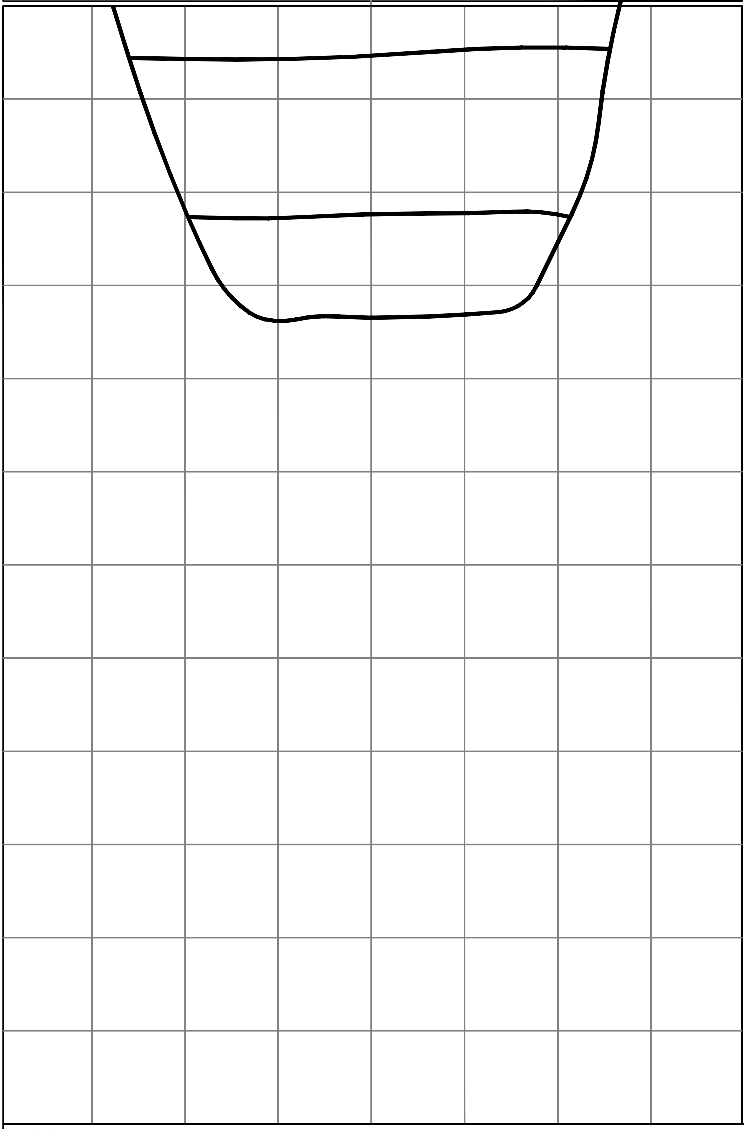
PROJECT NO.	DATE
108059001	12/15

DATE EXCAVATED 11/04/15 TEST PIT NO. TP-6

GROUND ELEVATION 620' ± (MSL) LOGGED BY NMM

METHOD OF EXCAVATION Backhoe

LOCATION See Figure 2



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0						SM	COLLUVIUM/TOPSOIL: Brown, dry to moist, loose, silty fine SAND; numerous roots.
	■					SM	ALLUVIUM: Brown to reddish brown, moist, medium dense, silty fine to coarse SAND. @ 2.5': Medium dense to dense.
4							GRANITIC ROCK: Grayish brown, moist, medium- to coarse-grained, GRANITIC ROCK; weathered. @ 6': Difficult digging.
8							Total Depth = 6.9 feet. (Refusal) Groundwater not encountered. Backfilled on 11/04/15. Note: Groundwater, though not encountered at the time of excavation, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
12							
16							
20							
24							

SCALE = 1 in./4 ft.

FIGURE A-6

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TEST PIT LOG

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

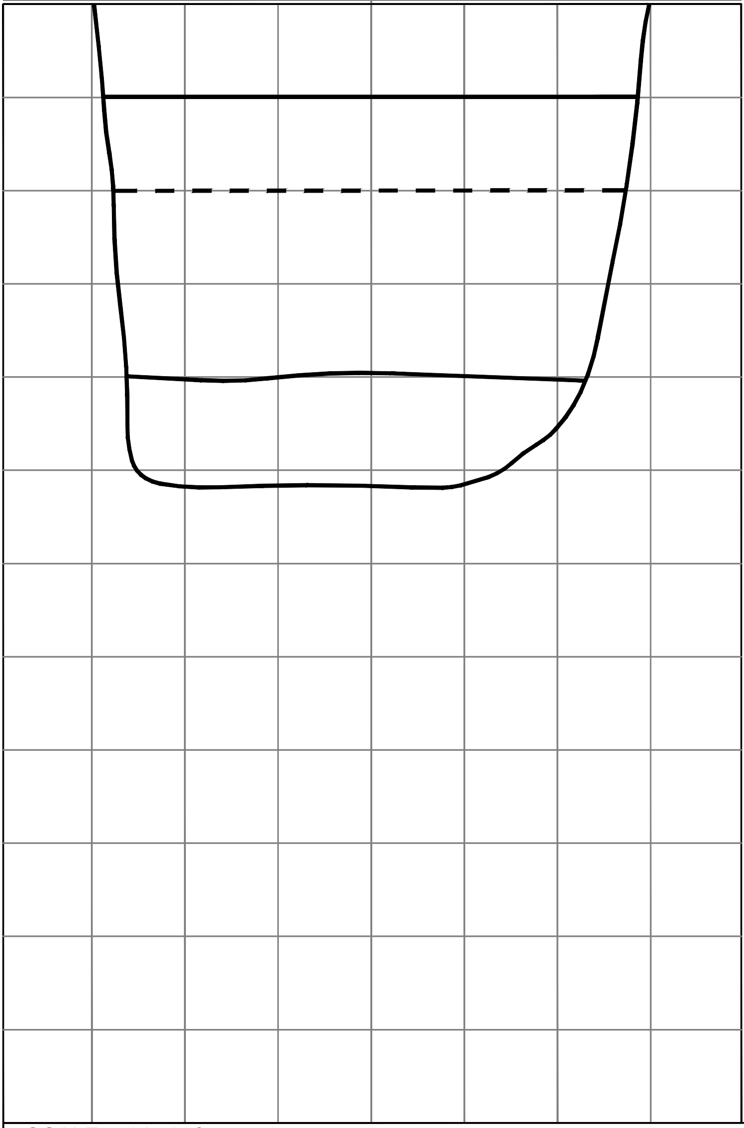
PROJECT NO.	DATE
108059001	12/15

DATE EXCAVATED 11/04/15 TEST PIT NO. TP-7

GROUND ELEVATION 615'± (MSL) LOGGED BY NMM

METHOD OF EXCAVATION Backhoe

LOCATION See Figure 2



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0						SM	COLLUVIUM/TOPSOIL: Light brown to brown, dry to moist, very loose to loose, silty fine SAND; numerous roots.
						SM	ALLUVIUM: Brown to reddish brown, moist, loose to medium dense, silty fine to medium SAND.
4	■					CL	Reddish brown, moist, stiff to very stiff, fine to coarse sandy CLAY.
	■			12.0			
8							GRANITIC ROCK: Brownish gray, moist, medium- to coarse-grained GRANITIC ROCK; weathered.
	■						@ 10': Difficult drilling.
							Total Depth = 10.25 feet. (Refusal) Groundwater not encountered. Backfilled on 11/04/15.
12							Note: Groundwater, though not encountered at the time of excavation, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
16							The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
20							
24							

SCALE = 1 in./4 ft.

FIGURE A-7

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TEST PIT LOG

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

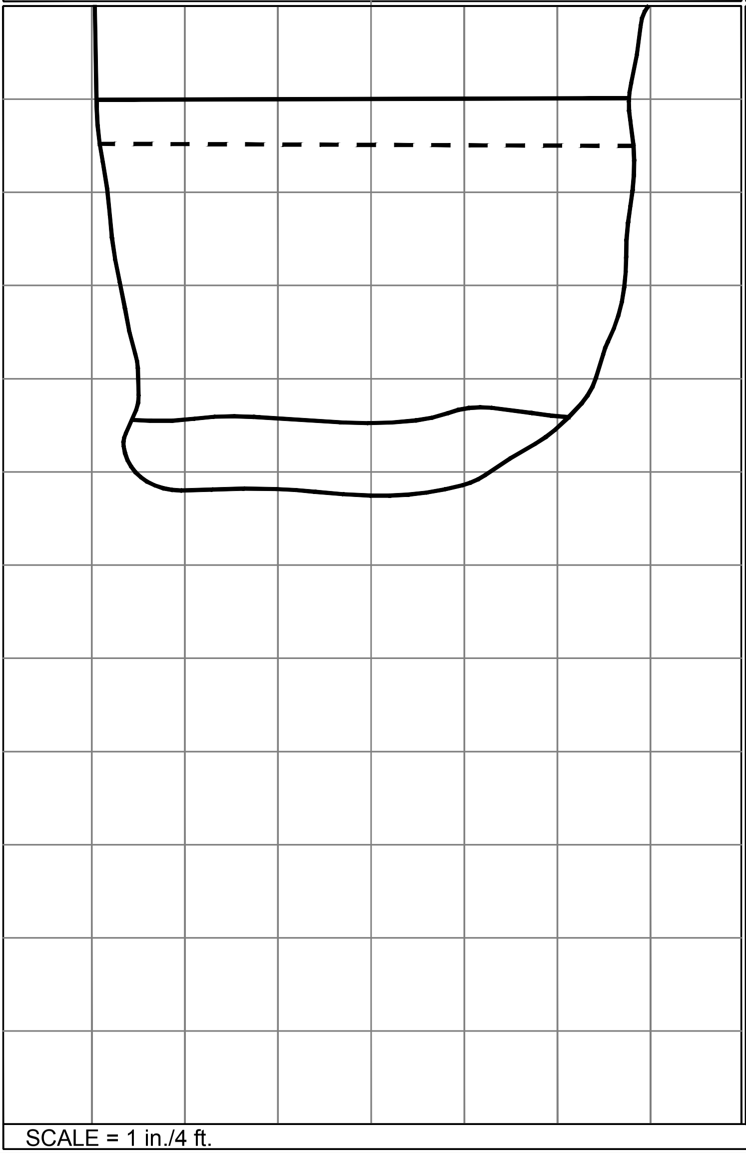
PROJECT NO.	DATE
108059001	12/15

DATE EXCAVATED 11/04/15 TEST PIT NO. TP-8

GROUND ELEVATION 620' ± (MSL) LOGGED BY NMM

METHOD OF EXCAVATION Backhoe

LOCATION See Figure 2



SCALE = 1 in./4 ft.

DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0						SM	COLLUVIUM/TOPSOIL: Light brown, dry to moist, loose to medium dense, silty fine to medium SAND.
	■					CL	ALLUVIUM: Brown to dark reddish brown, moist, very stiff, sandy CLAY; scattered roots.
4 8						SM	Yellowish and reddish brown, moist, medium dense to dense, silty fine to medium SAND; little clay; scattered charcoal.
							GRANITIC ROCK: Brownish gray, moist, medium- to coarse-grained GRANITIC ROCK; weathered; scattered veins of dark gray; fine-grained rock.
12 16 20 24							Total Depth = 10.5 feet. Groundwater not encountered. Backfilled on 11/04/15. Note: Groundwater, though not encountered at the time of excavation, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

FIGURE A-8

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TEST PIT LOG

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

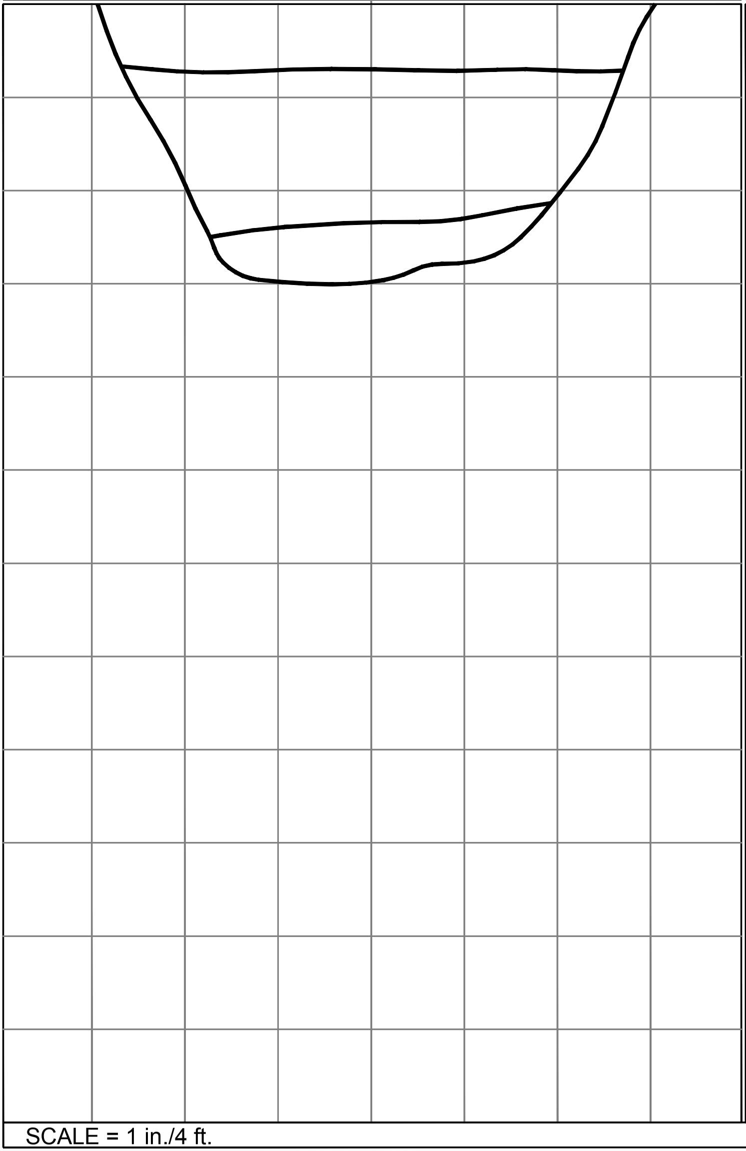
PROJECT NO.	DATE
108059001	12/15

DATE EXCAVATED 11/04/15 TEST PIT NO. TP-9

GROUND ELEVATION 615' ± (MSL) LOGGED BY NMM

METHOD OF EXCAVATION Backhoe

LOCATION See Figure 2



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0						SM	COLLUVIUM/TOPSOIL: Light brown, dry to moist, loose, silty fine to medium SAND; numerous roots; friable.
	■			9.4		SM	ALLUVIUM: Reddish brown to yellowish brown, moist, medium dense to dense, silty fine to medium SAND; pinhole porosity; scattered roots.
4							GRANITIC ROCK: Grayish brown, moist, medium-grained, GRANITIC ROCK; weathered.
							Total Depth = 6 feet. Groundwater not encountered. Backfilled on 11/04/15. Note: Groundwater, though not encountered at the time of excavation, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
8							
12							
16							
20							
24							

SCALE = 1 in./4 ft.

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TEST PIT LOG

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

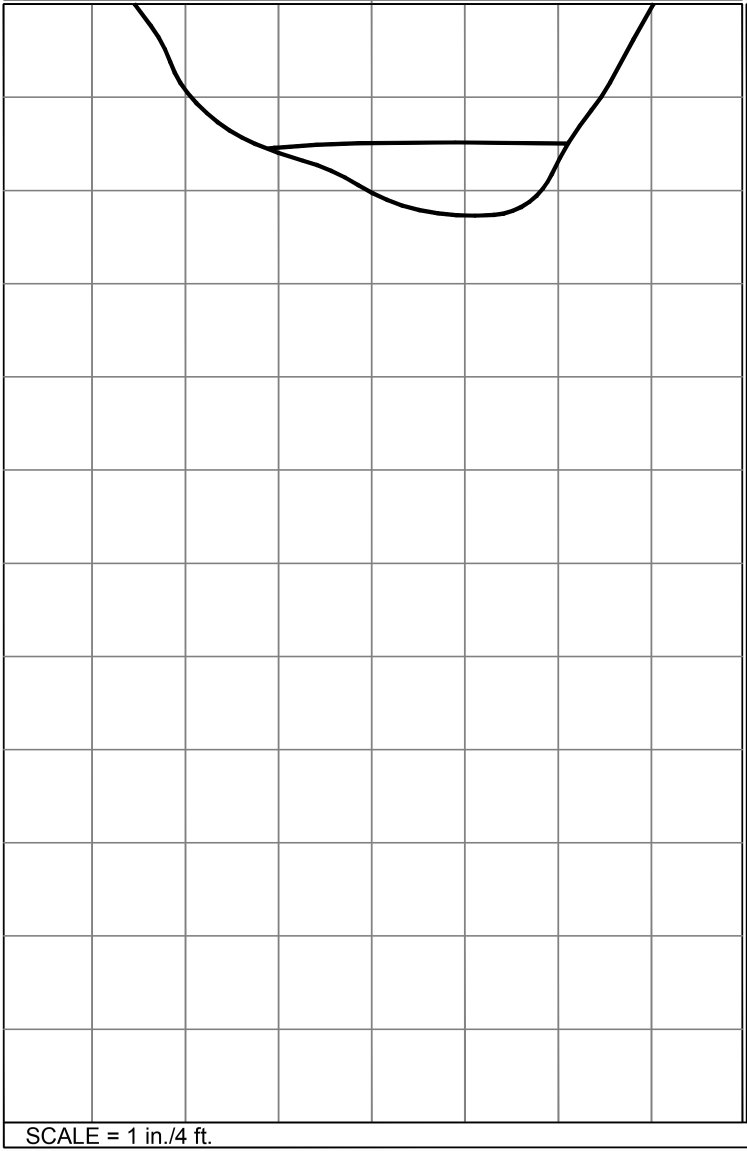
PROJECT NO.	DATE
108059001	12/15

DATE EXCAVATED 11/04/15 TEST PIT NO. TP-10

GROUND ELEVATION 610'± (MSL) LOGGED BY NMM

METHOD OF EXCAVATION Backhoe

LOCATION See Figure 2



DEPTH (FEET)	SAMPLES Bulk	SAMPLES Driven	SAMPLES Sand Cone	MOISTURE (%)	DRY DENSITY (PCF)	CLASSIFICATION U.S.C.S.	DESCRIPTION
0						SM	ALLUVIUM: Brown, moist, loose, silty fine to medium SAND; numerous roots; scattered layers of fine clayey sand.
4	■			12.3			GRANITIC ROCK: Gray, moist, medium-grained GRANITIC ROCK; weathered. @ 4': Difficult digging.
8							
12							
16							
20							
24							

Total Depth = 4.5 feet. (Refusal)
Groundwater not encountered.
Backfilled on 11/04/15.

Note: Groundwater, though not encountered at the time of excavation, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.

The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.

SCALE = 1 in./4 ft.

FIGURE A-10

DATE DRILLED 11/04/15 BORING NO. IT-1
GROUND ELEVATION 615' ± (MSL) SHEET 1 OF 1
METHOD OF DRILLING 6" Diameter Hand Auger
DRIVE WEIGHT N/A DROP N/A
SAMPLED BY BTM LOGGED BY BTM REVIEWED BY RDH

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						▨	SM	<u>COLLUVIUM/TOPSOIL:</u> Brown, dry to moist, loose, silty SAND.
						▨	SM	<u>ALLUVIUM:</u> Reddish brown to brown, moist, medium dense, silty SAND. @ 3.5': Dense.
								Total Depth = 4 feet. Groundwater not encountered during drilling. Infiltration test set on 11/04/15. Backfilled shortly after testing on 11/05/15. Note: Groundwater, though not encountered at the time of excavation, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
5								
10								
15								
20								

Ninyo & Moore

BORING LOG

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD, ESCONDIDO, CALIFORNIA

PROJECT NO.	DATE	FIGURE
108059001	12/15	A-11

DATE DRILLED 11/04/15 BORING NO. IT-2

GROUND ELEVATION 610' ± (MSL) SHEET 1 OF 1

METHOD OF DRILLING 6" Diameter Hand Auger

DRIVE WEIGHT N/A DROP N/A

SAMPLED BY BTM LOGGED BY BTM REVIEWED BY RDH

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0						▦	SM	ALLUVIUM: Brown, moist, loose, silty SAND.
								GRANITIC ROCK: Gray, moist, medium-grained GRANITIC ROCK; weathered. Total Depth = 3.1 feet. Groundwater not encountered during drilling. Infiltration test set on 11/04/15. Backfilled shortly after testing on 11/05/15. Note: Groundwater, though not encountered at the time of excavation, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report. The ground elevation shown above is an estimation only. It is based on our interpretations of published maps and other documents reviewed for the purposes of this evaluation. It is not sufficiently accurate for preparing construction bids and design documents.
5								
10								
15								
20								

Ninyo & Moore

BORING LOG

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD, ESCONDIDO, CALIFORNIA

PROJECT NO.	DATE	FIGURE
108059001	12/15	A-12

APPENDIX B

GEOTECHNICAL LABORATORY TESTING

Classification

Soils were visually and texturally classified in accordance with the Unified Soil Classification System (USCS) in general accordance with ASTM D 2488-00. Soil classifications are indicated on the logs of the exploratory excavations in Appendix A.

Moisture Content

The moisture content of samples obtained from the exploratory excavations was evaluated in accordance with ASTM D 2216. The test results are presented on the logs of the exploratory excavations in Appendix A.

Gradation Analysis

Gradation analysis tests were performed on selected representative soil samples in general accordance with ASTM D 422. The grain-size distribution curves are shown on Figures B-1 and B-2. These test results were utilized in evaluating the soil classifications in accordance with USCS.

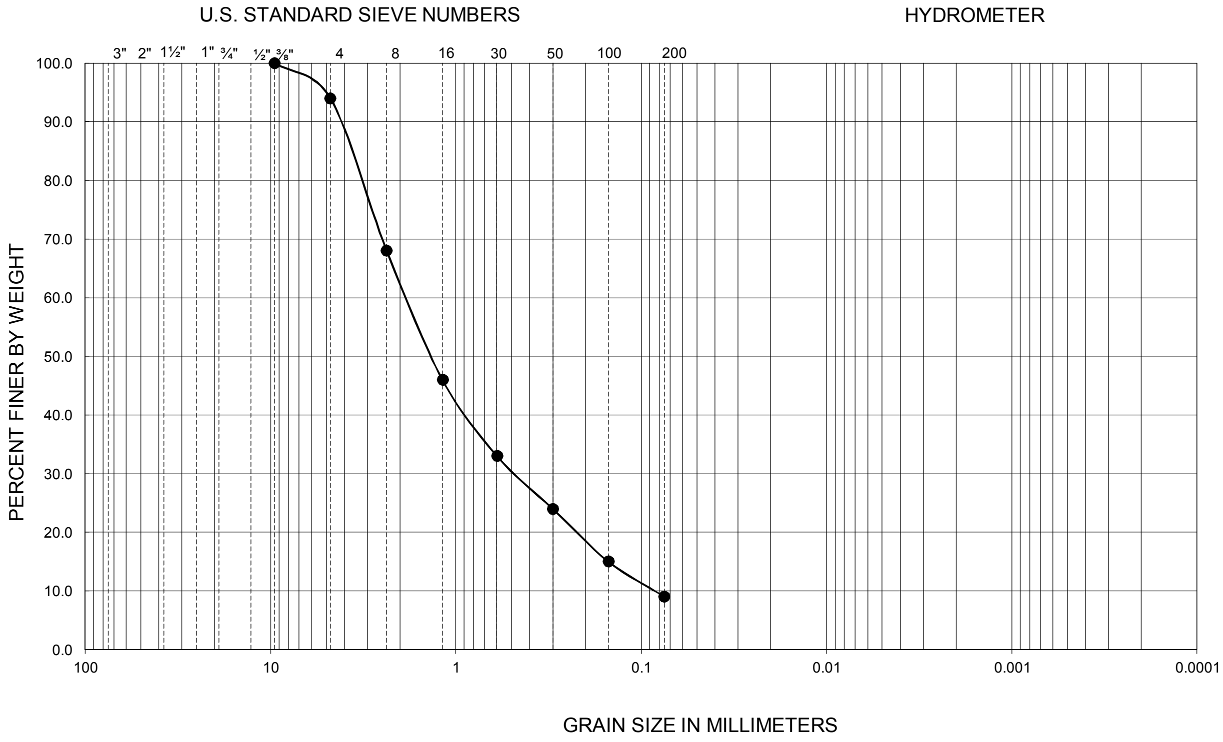
Soil Corrosivity Tests

Soil pH, and resistivity tests were performed on representative samples in general accordance with CT 643. The soluble sulfate and chloride content of selected samples were evaluated in general accordance with CT 417 and CT 422, respectively. The test results are presented on Figure B-3.

R-Value

The resistance value, or R-value, for site soils was evaluated in general accordance with California Test (CT) 301. Samples were prepared and evaluated for exudation pressure and expansion pressure. The equilibrium R-value is reported as the lesser or more conservative of the two calculated results. The test results are shown on Figure B-4.

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (%)	Equivalent USCS
●	TP-4	4.0-6.0	--	--	--	0.09	0.49	1.85	21.8	1.5	9	SW-SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422

Ninyo & Moore

GRADATION TEST RESULTS

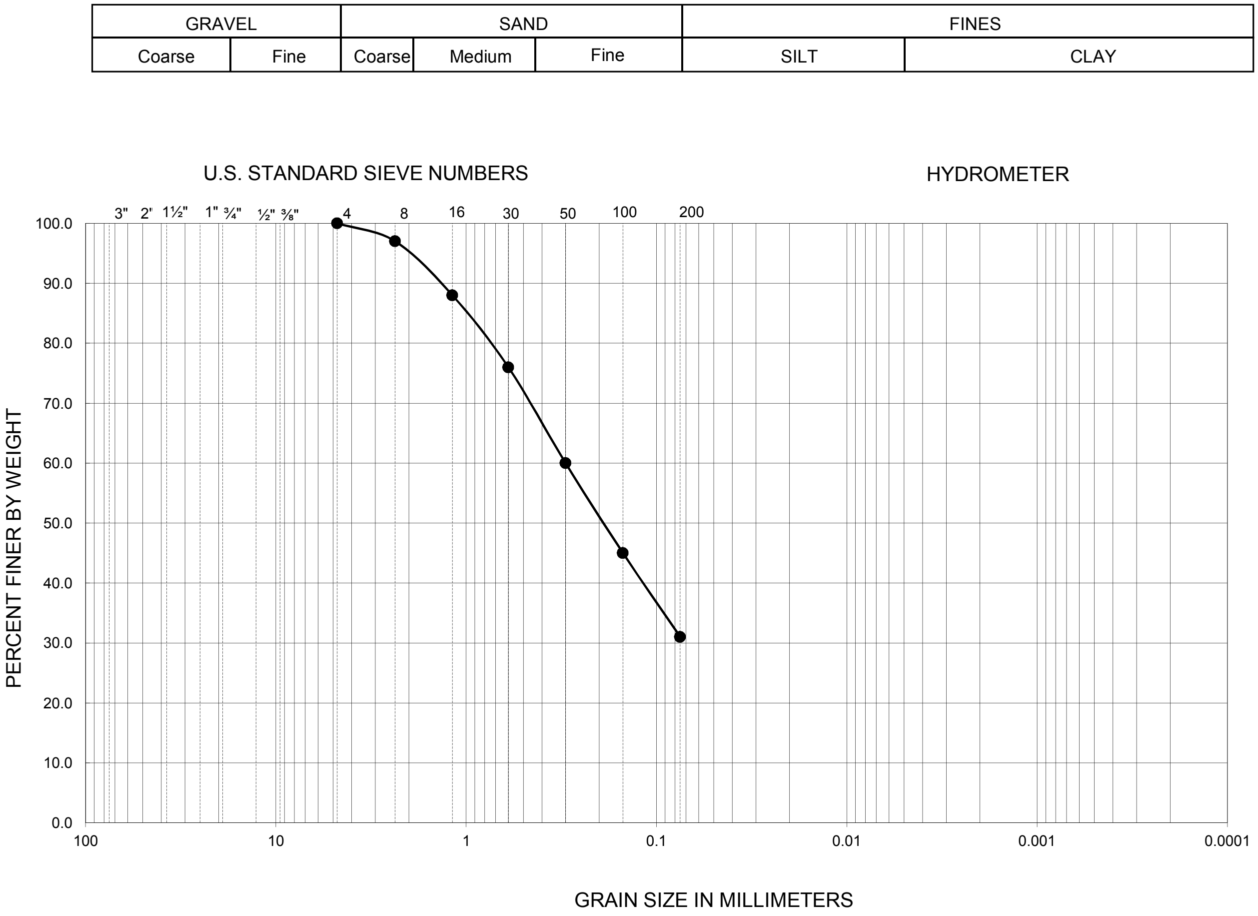
PROJECT NO.	DATE
108059001	12/15

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

FIGURE

B-1

108059001_SIEVE TP-4 @ 4.0-6.0.xls



Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D_{10}	D_{30}	D_{60}	C_u	C_c	Passing No. 200 (%)	USCS
●	TP-5	1.0-3.0	--	--	--	--	--	--	--	--	31	SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422

Ninyo & Moore		GRADATION TEST RESULTS	FIGURE
PROJECT NO.	DATE	ESCONDIDO INDUSTRIAL PARK 2005 HARMONY GROVE ROAD ESCONDIDO, CALIFORNIA	B-2
108059001	12/15		

SAMPLE LOCATION	SAMPLE DEPTH (FT)	pH [1]	RESISTIVITY [1] (Ohm-cm)	SULFATE CONTENT [2]		CHLORIDE CONTENT [3] (ppm)
				(ppm)	(%)	
TP-8	2.0-3.0	6.9	620	100	0.010	390

[1] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 643
[2] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 417
[3] PERFORMED IN GENERAL ACCORDANCE WITH CALIFORNIA TEST METHOD 422

Ninyo & Moore

CORROSIVITY TEST RESULTS

PROJECT NO.	DATE
108059001	12/15

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

FIGURE

B-3

SAMPLE LOCATION	SAMPLE DEPTH (FT)	SOIL TYPE	R-VALUE
TP-7	4.0-8.0	Sandy CLAY (CL)	10

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 2844/CT 301

Ninyo & Moore

R-VALUE TEST RESULTS

PROJECT NO.	DATE
108059001	12/15

ESCONDIDO INDUSTRIAL PARK
2005 HARMONY GROVE ROAD
ESCONDIDO, CALIFORNIA

FIGURE

B-4

APPENDIX C

INFILTRATION TESTING RESULTS

Test Date: 11/5/2015
Infiltration Test No.: IT-1
Test Hole Diameter (inches): 6.0
Excavation Depth (feet): 4.0
Test performed and recorded by: NMM
Soil Type: Silty sand

t_1	d_1	t_2	d_2	Δt	Δd	Δt/Δd MPI	Adjusted MPI	Rate in/hr
12:34	3.44	13:04	3.46	30	0.02	125	296	<0.4
13:05	3.46	13:35	3.47	30	0.01	250	592	<0.4

Test Date: 11/5/2015
Infiltration Test No.: IT-2
Test Hole Diameter (inches): 6.0
Excavation Depth (feet): 3.1
Test performed and recorded by: NMM
Soil Type: Silty sand

t_1	d_1	t_2	d_2	Δt	Δd	Δt/Δd MPI	Adjusted MPI	Rate in/hr
12:04	2.39	12:10	2.80	6	0.41	1	3	>10
12:11	2.32	12:38	3.01	17	0.69	2	5	>10
12:39	2.42	12:46	2.83	7	0.41	1	3	>10
12:48	2.44	12:55	2.83	7	0.39	1	4	>10
12:56	2.60	13:09	2.99	13	0.39	3	7	8.6
13:10	2.38	13:20	2.89	10	0.51	2	4	>10
13:21	2.53	13:31	2.92	10	0.39	2	5	>10
13:32	2.40	13:42	2.86	10	0.46	2	4	>10
13:43	2.45	13:53	2.87	10	0.42	2	5	>10
13:54	2.52	14:04	2.92	10	0.40	2	5	>10
14:05	2.46	14:15	2.90	10	0.44	2	4	>10
14:16	2.49	14:26	2.90	10	0.41	2	5	>10
14:27	2.52	14:37	2.95	10	0.43	2	5	>10
14:39	2.49	14:42	2.97	12	0.48	2	5	>10
14:43	2.54	14:53	2.96	10	0.42	2	5	>10

Porosity of gravel (n) =	0.35	Pea Gravel
Hole Diameter (D_H) =	6.0	inches
Pipe Diameter (D_P) =	2.0	inches

Adjustment Factor = 2.37

Notes:

t_1 = initial time when filling or refilling is completed in minutes
d_1 = initial depth to water in hole at t_1 in feet
t_2 = final time when incremental water level reading is taken in minutes
d_2 = final depth to water in hole at t_2 in feet
Δt = change in time between initial and final water level readings in minutes ($t_2 - t_1$)
Δd = change in depth to water in feet ($d_2 - d_1$)
MPI = minutes per inch
in/hr = inches per hour
DNI = did not infiltrate