GARCREST
ENGINEERING AND CONSTRUCTION, INC

REPORT OF GEOTECHNICAL INVESTIGATION

PROPOSED RETAIL BUILDINGS AND PARKING

6326 Mission Blvd

Jurupa Valley, California

Prepared for:

MISSION BLVD PROPERTIES, LLC

Beverly Hills, California

September 27, 2021

G21-034/1

GARCREST
ENGINEERING AND CONSTRUCTION, INC
126 S. Jackson Street, Suite 300 - Glendale, California 91205
Telephone: 818-241-2408 - Facsimile: 818-241-2282

September 27, 2021

Mr. Alec Negri
Mission Blvd Properties, LLC
433 N. Camden, Suite 1000
Beverly Hills, CA 90210

Subject: **Report for Geotechnical Investigation**
Proposed Retail Buildings and Parking
6326 Mission Blvd
Jurupa Valley, California
Project No.: G21-034/1

Dear Mr. Negri:

We are pleased to present the results of our geotechnical investigation for the proposed buildings and parking construction located at the subject site. Our scope of services was performed in general accordance with our proposal dated June 28, 2021.

The onsite fill soils are not considered acceptable for the support of the proposed buildings and improvements and should be overexcavated to the native soils and at least 5 feet below grade, or at least 3 feet below the bottom of proposed foundations, whichever is deeper. The proposed buildings may be supported on shallow spread foundations established in the properly compacted engineered fill soils as recommended in this report. The recommendations presented in this report should be incorporated into the design and construction of the proposed project.

The results of our investigation, our conclusions, and recommendations are presented in this report. The conclusions and recommendations presented in this report are subject to the limitations presented in Section 9 of this report. Part of obtaining a building permit for the project involves the submittal of this report by you or your representative to the appropriate government agencies.

We appreciate the opportunity to be of services to you. Please feel free to contact us should you have any further questions or if we can be of further service.

Respectfully submitted,
GARCREST Engineering and Construction, Inc.

REGISTERED PROFESSIONAL ENGINEER
ARMEN GAPRELIAN
No. 2668
Exp. 12/31/22
GEOTECHNICAL
STATE OF CALIFORNIA

Armen Gaprelian, PE, GE
Principal Engineer

Path: F:\GARCREST\Projects\2021 Projects\G21-034.1 - Jurupa Mission\Report\Jurupa Report.docx

TABLE OF CONTENT

1.0 - SCOPE 1
2.0 - PROJECT DESCRIPTION 2
3.0 - FIELD EXPLORATION AND LABORATORY TESTING 2
4.0 - SITE CONDITIONS 3
5.0 – SUBSURFACE SOIL CONDITIONS 4
6.0 - LIQUEFACTION AND SEISMIC SETTLEMENT EVALUATION 4
7.0 - CONCLUSIONS AND RECOMMENDATIONS 5
7.1 - GENERAL 5
7.2 - EARTHWORK 6
7.2.1 - Site Preparation 6
7.2.2 – Excavation Conditions 6
7.2.3 - Compaction 7
7.2.4 - Material for Fill 7
7.2.5 - Trench Backfill 7
7.2.6 - Excavation and Temporary Slopes 7
7.3 - FOUNDATIONS 8
7.3.1 - Bearing Value 8
7.3.2 - Settlement 9
7.3.3 - Lateral Resistance 9
7.3.4 - Minor Foundations 9
7.4 - SEISMIC CONSIDERATIONS 10
7.5 – PERCOLATION TESTING 10
7.5.1 – Infiltration Devices 11
7.5.2 – Additional Discussions 12
7.6 - FLOOR SLAB SUPPORT 13
7.7 - PAVEMENT DESIGN 14
7.8 - SITE DRAINAGE 16
7.9 - EXPANSIVE SOILS 16
7.10 - CORROSIVITY 17
8.0 - ADDITIONAL SERVICES 17
9.0 - LIMITATIONS 18

PLATES

Plate 1 - Site Location Map
Plate 2 - Plot Plan

APPENDICES

Appendix A - Field Exploration
Appendix B - Laboratory Tests
Appendix C - Percolation Testing

1.0 - SCOPE

This report provides foundation design recommendations for the proposed buildings located 6326 Mission Blvd in Jurupa Valley, California. The site location is shown on Plate 1, Site Location Map. The proposed building footprint is shown on Plate 2, Plot Plan.

The site investigation was authorized to evaluate the subsurface conditions at the site, and to provide geotechnical recommendations for the design and construction of the proposed building. Our scope of services was performed in general accordance with our proposal dated June 28, 2021 and included performing a field investigation, laboratory testing, and preparing a geotechnical report including the following items and recommendations:

- Vicinity map and plot plan showing approximate field exploration locations;
- Logs of borings;
- Discussion of the scope of work;
- Discussion of field exploration methods;
- Results of laboratory testing;
- Discussion of subsurface conditions, as encountered in our field exploration;
- Discussion of liquefaction potential;
- Results of percolation testing;
- Recommendations for grading and site preparation;
- Recommendations for temporary excavations;
- Recommendations for utility trench backfill;
- Recommendations for seismic near-source factors;
- Recommendations for spread foundations, foundation settlement, and lateral resistance;
- Recommendations for support of minor foundations;
- Recommendations for slabs on grade;
- Discussion of potential for creating perched water conditions;
- Discussion of expansive and collapsible soils;

- Recommendations for flexible and rigid pavement

The assessment of general site environmental conditions for the presence of the contamination in the soils and groundwater was beyond the scope of this investigation.

Our recommendations are based on the results of our field exploration, laboratory testing, and appropriate engineering analyses. Our analyses are based on the ultimate soil strength properties.

2.0 - PROJECT DESCRIPTION

We understand that a new shopping center development is proposed for the subject site that will include five major retail buildings along the southern portion and three smaller building pads along the north portion of the site. A large parking field is proposed in the center and loading access along the rear of the major retail buildings.

We anticipate the structures to consist of a single story wood-framed or masonry type construction. Subterranean construction is not anticipated. Structural loads are not yet available but are anticipated to be relatively light.

The site is approximately 8 to 9 acres in size and is currently partially vacant and partially occupied by a small existing strip mall style development.

As part of the proposed developments and to meet Best Management Practices (BMP) requirements, we understand that infiltration devices may also be proposed as part of the project scope of work.

The proposed building location is shown on Plate 2, Plot Plan.

3.0 - FIELD EXPLORATION AND LABORATORY TESTING

The subsurface soil conditions at the site were explored by performing ten hollow-stem-auger borings within the site. The borings were performed to depths of between approximately 11½ to 26½ feet below existing grade. Our field representative supervised the fieldwork, logged the borings, and collected relatively undisturbed and disturbed samples for further evaluation and laboratory testing. The borings were performed at the locations indicated on Plate 2, Plot Plan.

Details of the field investigation and the Log of Borings are presented in Appendix A, Field Exploration.

Following the completion of the drilling for Boring B-5 and B-8 and B-9, the borings were converted into percolation wells. The results of the percolation testing are discussed later in the report. The piping was removed and the borings backfilled at the completion of the testing.

Laboratory testing was performed on selected relatively undisturbed and disturbed samples collected during the investigation to aid in the classification of the soils and to determine pertinent engineering properties used for the development of geotechnical recommendations. The following tests were performed:

- In situ moisture and dry density determination
- Direct shear test
- Consolidation
- Mechanical Sieve
- Maximum density/optimum moisture
- Preliminary corrosivity test

Laboratory testing was performed by AP Engineering and Testing, Inc. of Pomona, California. All testing was performed in accordance with the latest versions of applicable ASTM methods. We have reviewed, approve, and concur with the results of the laboratory testing. Details of the laboratory testing and test results are presented in Appendix B, Laboratory Testing.

4.0 - SITE CONDITIONS

The overall site of the proposed development is located at the southeast corner of Mission Boulevard and Stobbs Way in Jurupa Valley California. The overall site is broken into two portions with an already developed half to the east side, and a vacant undeveloped half to the west side of the site. The scope of the new development will consist of the demolition of the improvements on the eastern half of the site to combine with the overall site development. The eastern half of the site consists largely of surface parking along the northern majority of the half and an existing small retail center along the southern portion of the site. There is a gentle descending grade at the site from the north along Mission Boulevard to the south side of the site in general. Given the developed nature of the eastern half of the site, we anticipate utilities to be crossing the site in that portion, although, it is possible that some utilities may cross the vacant western half also.

5.0 – SUBSURFACE SOIL CONDITIONS

Fill soils to a depth of approximately 3 to 4 feet below grade were encountered within our borings. Deeper fill soils may be present beyond and between our borings. The onsite fill soils consist of silty sand and sandy silt soils.

The native soils encountered at the site generally consist of stiff to hard sandy silts and dense to very dense silty sand soils. Insitu moisture contents vary between 4.8 and 10.7 percent and the dry density was 104.0 to 130.0 pounds per cubic foot.

Groundwater was not encountered in our borings to the depth explored. Historical groundwater data was not available however we anticipate the historic groundwater to be at a depth that will not influence the project development in the current form.

6.0 - LIQUEFACTION AND SEISMIC SETTLEMENT EVALUATION

Liquefaction is a phenomenon associated with shallow groundwater combined with the presence of loose, fine sands and/or silts within a depth of 50 feet below grade or less. Liquefaction occurs when saturated, loose, fine sands and/or silts are subjected to strong ground shaking resulting from an earthquake event. Liquefaction has the potential to result in the soil temporarily losing part or all of its shear strength. Part of this strength may return sometime after shaking ceases. Liquefaction potential decreases with an increase in grain size, and clay and gravel content. Increasing duration of the ground shaking during a seismic event can also increase the potential for liquefaction.

As previously stated, groundwater was not encountered in our borings to the 26½ feet explored. Historical high groundwater information for the site was not available however we anticipate the historic groundwater to be at a depth that will not influence the project development in the current form. The site is not located within a State of California designated liquefaction hazard zone. Due to the relative densities, the nature of the onsite soil materials encountered within our borings, and the depth of historical groundwater, the potential for liquefaction occurrence is considered low.

Seismically induced settlement of the non-saturated soils due to seismic ground shaking has been evaluated based on field data and using the Tokimatsu and Seed (1987) procedures. We estimate the seismically induced dry settlements to be on the order of ¼-inch. Differential settlements are estimated to be less than ¼-inch.

7.0 - CONCLUSIONS AND RECOMMENDATIONS

7.1 - GENERAL

Based on our field exploration, the results of our laboratory testing, and our geotechnical analyses, it is our professional opinion that the proposed project may be constructed and is feasible from a geotechnical perspective. The recommendations presented in this report should be incorporated into the design and construction aspects of the proposed project.

As discussed earlier, fill soils were encountered within our borings to a depth of approximately 3 to 4 feet below existing grade. Deeper fill soils may be present between and beyond our borings. The onsite fill soils are not considered suitable for support of structures. The native soils generally consist of dense to very dense silty sands and stiff to hard sandy silts.

The onsite fill soils are not considered suitable for the support of the proposed structures and should be overexcavated to the firm and unyielding native soils and recompacted as properly compacted engineered fill. For the pavement areas, we recommend that the fill soils be overexcavated to at least 2 feet below the bottom of the proposed pavement section and recompacted as properly compacted engineered fill.

Based on the results of our field investigation and laboratory testing, we recommend that the onsite soils be overexcavated to a depth of at least 5 feet below existing grade or at least 3 feet below the bottom of the proposed foundations, whichever is deeper. Where deeper fill is encountered, the fill soils should be locally removed to the firm and unyielding native soils and recompacted as properly compacted engineered fill. The engineered fill should extend laterally at least 5 feet beyond the edge of the proposed foundations.

Foundations established as recommended herein may be designed for an allowable bearing value of 2,500 pounds per square foot for spread footings in engineered fill.

Slabs on grade may be supported on the properly compacted soils as recommended herein.

Flexible and rigid pavement recommendations are provided later in this report.

7.2 - EARTHWORK

7.2.1 - Site Preparation

As discussed earlier, the proposed buildings may be supported on shallow spread foundations established in the properly compacted engineered fill. For the support of the slabs on grade, the onsite fill soils should be overexcavated and recompacted as properly compacted engineered fill.

For support of foundations on engineered fill, following the overexcavation of the existing fill soils to a depth of at least 3 feet below the bottom of the proposed foundations, or at least 5 feet below existing grade, whichever is deeper, the exposed subgrade should be observed by a Garcrest representative for unsuitable soils and debris and the excavation deepened as necessary. The excavation should extend at least 5 feet laterally beyond the edge of the proposed foundations. In areas where deeper fill is encountered, the excavation should be deepened to the firm and unyielding native soils locally.

The extent of removal and recompaction below the proposed pavement areas may be reduced to approximately 2 feet below existing grade.

The exposed subgrade should then be scarified to a depth of 6-inches, brought to within 3 percent above the optimum moisture and compacted to a minimum of 90 percent relative compaction as obtainable by ASTM Designation D-1557.

7.2.2 – Excavation Conditions

The borings were performed using a truck mounted hollow stem auger drilling equipment. Drilling was completed using moderate effort through the onsite soils. Conventional earthmoving equipment should be capable of performing the anticipated excavations required. The onsite soils consist of silty sand and sandy silt soils.

7.2.3 - Compaction

Engineered fill soils should be placed in loose lifts of no more than 8-inches, brought to a moisture content of within 3 percent above the optimum moisture content, and mechanically compacted using heavy roller and/or vibratory equipment. The fill soils should be compacted to at least 95 percent of maximum dry density.

7.2.4 - Material for Fill

The onsite soils less any debris or organic matter, may be used as fill soils. Import soils, if required, should be granular in nature and be relatively non-expansive. Import fill soils should have a minimum sand equivalent of 30, and an expansion index of less than 35. The import soils should contain sufficient fines to provide a stable subgrade and maintain low to medium permeability. All import materials should be approved by our personnel prior to import onto the site.

7.2.5 - Trench Backfill

All required trench backfill should be mechanically compacted to a minimum of 90 percent relative compaction. Trench backfill should be placed in loose lifts of 8-inches or less, brought to within 3 percent above the optimum moisture content, and compacted with mechanical equipment. Jetting or flooding is not permitted. Some settlement of the backfill may occur and utilities within the trench should be designed to accept some differential settlement.

7.2.6 - Excavation and Temporary Slopes

Excavations deeper than 4 feet should be slopped back at 1:1 (H:V) or be shored for safety. Unshored excavations should not extend below a 1½:1 (H:V) plane drawn downward from the bottom of adjacent existing foundations.

Earthen berms or other methods should be used during wet weather construction in order to prevent runoff water from entering the excavations. All runoff water should be collected and disposed of outside the construction limits.

Excavations should be observed by a representative from our firm so that modifications as a result of varying soil conditions may be facilitated.

All excavations must comply with applicable local, state, and federal safety regulations including the current OSHA Excavation and Trench Safety Standards. Construction site safety is the sole responsibility of the Contractor, who shall also be solely responsible for the means, methods, and sequencing of construction operations. Excavations and temporary slopes should be protected from surficial erosion and the effects of inclement weather by the project contractor. Protective measures such as plastic or jute mesh may be used to protect against the potential for surficial sloughing.

7.3 - FOUNDATIONS

The proposed buildings may be supported on shallow spread foundations established in and underlain by at least 3 feet of properly compacted engineered fill soils prepared as recommended in the Earthwork section above. Foundation systems may not be established in a combination of engineered fill and native, or straddle cut/fill transitions.

Prior to placement of steel reinforcement, the foundation excavations should be cleaned of debris and loose soils and water. The footing excavations should be observed by a Garcrest representative just prior to steel and concrete placement to verify the implementation of the recommendations made herein.

7.3.1 - Bearing Value

Continuous wall and isolated pad foundations supported on at least 3 feet of properly compacted engineered fill soils may be designed for a net dead-plus-live allowable pressure of 2,500 pounds per square foot.

All foundations should have a minimum width of 24-inches and be embedded at least 24-inches below the lowest adjacent grade.

A one-third increase may be used for wind and seismic loading conditions. The recommended bearing value is a net value. The weight of the concrete in the footing may be taken as 50 pounds per cubic foot and the weight of the soil backfill may be neglected when determining the downward loads.

Footings may experience an overall loss in bearing capacity or an increased potential to settle where located above and in close proximity to existing or future utility trenches. Furthermore, stresses imposed by the footings on the utility lines may cause the utilities to crack, collapse and/or lose serviceability. To reduce this risk, footings should extend below a 1:1 plane projected upward from the closest bottom corner of utility trenches.

7.3.2 - Settlement

Based on the anticipated foundation loads and dimensions, we anticipate the total static settlement of the proposed foundations to be on the order of ¾-inch. Differential settlements are anticipated to be less than ½-inch. Static settlement of all foundations is expected to be primarily elastic and should be essentially completed shortly after initial application of structural loads.

The seismically induced settlements estimated earlier are in addition to the static settlements discussed above.

7.3.3 - Lateral Resistance

Resistance to lateral loads may be provided by friction between the soil and the foundation, and by the passive resistance of the soil against the vertical face of the foundation. A coefficient of friction of 0.4 may be used between the foundation and underlying soil. The passive resistance of the soil may be taken as equivalent to the pressure developed by a fluid with a density of 300 pounds per cubic foot. A one-third increase may be used for wind and seismic loading conditions and the passive and sliding values may be combined without reduction.

Sloughing, caving, or overwidening of trench sidewalls during or following excavations may reduce or eliminate the passive resistance of the subgrade soils against foundations. In the event such conditions are encountered, our firm should be notified to review the condition and provide remedial recommendations, if necessary.

7.3.4 - Minor Foundations

Footings for minor structures, such as small retaining walls, that are structurally separate from buildings may be supported on shallow spread footings, established at least 18-inches below the lowest adjacent grade, and be designed for a bearing capacity of 1,500 pounds per square foot.

Such footings may be supported on properly compacted engineered fill or undisturbed native soils.

7.4 - SEISMIC CONSIDERATIONS

The site is located within the seismically active Southern California region. As a minimum, we recommend that the proposed buildings be designed in accordance with the requirements of the latest edition of the California Building Code (CBC).

The structure may be designed to resist earthquake forces following the 2019 edition of California Building Code (CBC), which is based on the 2018 edition of the International Building Code (IBC). The Site Classification, as defined in Section 1613.2.2 of the CBC, may be assumed to be a Site Class D, Stiff Soil Profile.

The mapped maximum considered earthquake spectral response accelerations, Ss and S1, are obtained from Figures 1613.2.1(1) and 1613.2.1(2) from the CBC and are evaluated as 1.5 and 0.6 respectively. Site coefficients Fa and Fv of 1.0 and 1.7 respectively, may be used for the calculation of the spectral response accelerations, however given that S1 is greater than 0.2, based on ASCE 7-16 (Section 11.4.8), a site response analysis may be required. With the above coefficients however, spectral response accelerations $\mathbf{S_{MS}}$ and $\mathbf{S_{M1}}$ of 1.5g and 1.02g and $\mathbf{S_{DS}}$ and $\mathbf{S_{D1}}$ of 1 g and 0.68g may be used for a Site Class D.

7.5 – PERCOLATION TESTING

It is our understanding that in order to control the stormwater flow of the proposed development, stormwater infiltration devices may be considered for the subject site depending on feasibility. Percolation testing was performed at the site to provide subsurface soil percolation potential and to assist in the design of the infiltration devices.

Percolation testing was performed in three borings at the site. After completion of drilling, borings B-5, B-8, B-9 were drilled to a depth of 10 feet, converted to percolation borings and percolation testing was performed directly in the borings. The percolation testing was performed between 5 to 10 feet below existing grade. The percolation testing was performed by drilling an 8-inch diameter boring, installing a 4-inch diameter perforated PVC pipe with openings within the abovementioned depths. Pea gravel was used as backfill around the pipe and water was filled into the pipe to saturate the medium overnight prior to performing the testing the following day. Depth readings were taken every 20 minutes for a period of approximately 2 hours or until at least three virtually even consecutive readings, the water being replenished subsequent to each reading interval. The results of the tests are presented in Appendix C, Percolation Testing and summarized in the following table.

Boring/Well No.	Approximate Adjusted Percolation Rate (Porchet Method) (inch/hr)
B-5	2.40
B-8	4.36
B-9	2.72

7.5.1 – Infiltration Devices

Based on the results summarized above, some variability may be anticipated in the subsurface soils, due to the test depth as well as localized soil variability or increase in siltier zones within the subsurface materials. It is also likely that the rate of percolation may vary at different locations across the site, however, based on our field investigation, the subsurface soils appear to be relatively uniform and we anticipate this variability to be generally minor.

It is our professional opinion that percolation rates as measured in our borings and later adjusted by the Porchet Method of approximately 2.4 inch/hr may be considered relatively representative of the overall conditions at the site. These rates have not been factored but include sidewall reductions for borehole testing.

Groundwater was not encountered within our borings performed at the site to the depth explored. Historical groundwater data was not available however we anticipate the historic groundwater to be at a depth that will not influence the project development in the current form.

Infiltration devices may consist of excavated pits or trenches to depths and size as needed for design capacity. The devices may be backfilled with granular material conforming to the requirements of Class 2 Permeable Base Material as defined by the most current State Specifications or crushed rock material between ¾- to 1-inch open graded material. The use of recycled material is not permitted. The base or rock materials should be surrounded by non-woven filter fabric to reduce the potential of fines migration into the device. Prefabricated devices should also be surrounded by base or rock material wrapped in filter fabric. Adequate overflow capacities should be incorporated into the design of the proposed devices. Infiltration devices considered for the proposed project should be installed a distance of at least 10 feet from proposed or existing foundations

7.5.2 – Additional Discussions

Liquefaction Potential Discussion

As discussed earlier, the site is not located within a State designated liquefaction hazard zone. The depth to historical high groundwater at the site was not available but is not anticipated to affect the site and project in its current concept. Based on the depth to historical groundwater and the nature of the onsite soils, the potential for seismically induced liquefaction settlement is considered low. Regardless however, to reduce the potential for adverse effects from water for the proposed improvements and existing building, we recommend that if infiltration devices are considered for the site, that the devices be kept away from existing or proposed foundations by a distance of at least 10 feet. The design of the proposed devices should include consideration for flexible connections in the event of localized settlement.

Perched Water Conditions

Based on the results of our field investigation, groundwater was not encountered within our borings to the depth explored. Typical infiltration requirements limit the depth of a device such as to maintain a separation of at least 10 feet from groundwater, including historical levels.

The onsite soils are generally sandy in nature and are considered relatively uniform across the site from the ground surface. Given the nature of the material and that substantial layer permeability and material variation with depth were not encountered at the site, it is our opinion that the potential for perched water or mounding is considered low.

Collapsible Soils

Collapsible soils are defined as soils with a potential for a significant decrease in strength and increase in compressibility when wet or saturated (hydro-collapse). Collapsible soils typically consist of relatively sandy soils that exhibit a degree of cementation.

Based on the results of our laboratory testing, the onsite soils do not exhibit a significant collapse potential.

7.6 - FLOOR SLAB SUPPORT

Following the preparation of the subgrade as recommended above, concrete floor slabs and walks may be supported on grade. The concrete slab on grade should have a minimum thickness of 5-inches and a structural engineer should design the minimum reinforcement requirements. We recommend minimum reinforcement of No.4 at 18-inches on center for the design of the slab.

Construction activities and exposure to the elements may cause deterioration of the prepared subgrade. We recommend that the exposed subgrade be inspected by our representative and that the subgrade be moisture conditioned and compacted, if necessary, prior to placement of the concrete floor slab.

The proposed floor slab on grade may be designed for a modulus of subgrade reaction of 120 pounds per cubic inch.

To reduce the impact of subsurface moisture and upward moisture migration on vinyl or other moisture sensitive flooring where such floor covering is planned, we recommend that the floor slab be underlain by a vapor retarder and a layer of compacted crushed rock, as is the current industry standard. The rock typically consists of a minimum of 4 inches of crushed rock or aggregate base material compacted to a minimum of 95 percent relative compaction. The vapor retarding membrane should consist of visqueen or poly-vinyl sheeting with a thickness of at least 10 mils. We recommend a low slump concrete with a slump not exceeding 3-inches be used to reduce possible curling of the slab.

It should be noted that these vapor barriers, although currently the industry standard, may not completely inhibit the upward migration of subsurface moisture. Other factors such as the moisture transmission rates to meet for specific floor coverings and interior humidity levels that could induce mold growth may still be beyond the prevention capabilities of the current standard. The effectiveness of the industry standard system is highly dependent on the ultimate use and design of the proposed building, its ventilation, and the indoor moisture levels.

Various factors such as surface grades, the presence of adjacent planters, the quality of the concrete placed, and permeability of the supporting soils will affect future performance. We recommend that the manufacturer for the specific flooring used be contacted for additional consultation specific to their product. The quality of the concrete slab, including the water/cement ratio and curing practices can also affect the ultimate performance of the slab. All concrete placement and curing should be performed in accordance with applicable American Concrete Institute (ACI) methods.

We are not moisture proofing experts and therefore make no guarantees or provide assurances that the use of a capillary break/vapor retarding system will reduce infiltration of subsurface moisture through the floor slab in accordance with any specific flooring material performance specifications.

7.7 - PAVEMENT DESIGN

To provide support for paving, the subgrade soils should be prepared as recommended in the Earthwork Section of this report. Our pavement recommendations are based on our findings and observations during our field investigation as well as the results of our laboratory testing. Testing indicates an R-value of 33 for the upper soils at the site.

The required pavement thicknesses are based on expected wheel loads and the volume of traffic (TI or Traffic Index). Anticipated traffic indices of 4 through 7 have been used to develop pavement recommendations as presented in the tables below.

Asphalt Concrete Pavement

Traffic Usage	Traffic Index	Asphaltic Concrete (inches)	Base Course (inches)
Automobile Parking Areas	4	3	4
Automobile Traffic	5	3	5
Truck Traffic	6	3½	7
Heavy Truck Traffic	7	4	9

Portland Cement Concrete Pavement

Traffic Usage	Traffic Index	Portland Cement Concrete (inches)	Base Course (inches)
Automobile Parking Areas	4	6½	4
Automobile Traffic	5	6½	4
Truck Traffic	6	7	4
Heavy Truck Traffic	7	7½	4

The above sections have been derived based on the following assumptions.

- The subgrade soils below pavements should be overexcavated to a depth of 2 feet below the pavement section, brought to within 3 percent above the optimum moisture content, and compacted to a minimum of 95 percent relative compaction in accordance with the recommendations in the Earthwork section of this report

- The upper 6-inches of the prepared subgrade should be compacted to a minimum of 95 percent relative compaction.

- The aggregate base is brought to within 2 percent of the optimum moisture content and compacted to a minimum of 95 percent relative compaction.

- The subgrade is stable and non-pumping.

- Adequate drainage is provided to reduce the potential of water migration and ponding under the pavement section.

- Planter curbs and gutters extend at least 4-inches into the subgrade level and below the base course to reduce the migration of water into the pavement base course.

- Minimum portland cement concrete compressive strengths of 4,000 pounds per square inch have been used for design.

- Base courses should conform to Caltrans or Standard Specification for Public Works Construction (Green Book) specifications.

- Asphalt pavement materials and placement methods should be in accordance with Caltrans methods.

7.8 - SITE DRAINAGE

Ponding and saturation of the soils in the vicinity of the proposed foundations should be avoided. To reduce this potential, we recommend that positive drainage be provided for the site, in both improvement and landscaping areas, to carry surface water away from the building foundations and slabs on grade and towards appropriate drop inlets or other surface drainage devices. Site grading adjacent to structures and foundations should be sloped away a minimum of 5 percent for a minimum distance of 10 feet away from the face of wall. Impervious surfaces within 10 feet of structures should be sloped a minimum of 2 percent away from the building. These grades should be maintained for the life of the structure. We also recommend that roof runoff be connected to a suitable collection and discharge system to avoid surface discharge and potential saturating the soils near foundations. Poor perimeter and surface drainage may result in water migration beneath building foundations, and may result in potential distress to the proposed improvements.

Planter areas adjacent to the building and foundations should be lined to reduce the infiltration of irrigation water beneath the building. Care should also be taken to maintain a leak-free irrigation system.

7.9 - EXPANSIVE SOILS

Soils that have the potential for volume change (shrinkage and swelling) caused by moisture variations or drying and wetting cycles are classified as expansive soils. Soil moisture variations are typically a result of rainfall, irrigation, poor drainage, roof drains discharging surficially, and exposure to heat and drought conditions. This shrinkage and swelling action can potentially result in distress to pavements, floor slabs-on-grade, and foundations and grade beams.

Based on the results of our field investigation, the site is underlain by relatively granular soils that are anticipated to have very low to negligible expansion potentials.

7.10 - CORROSIVITY

Selected samples of the near surface soils were collected and tested for corrosivity potential. The samples were tested for pH, resistivity, soluble chlorides, and soluble sulfates in general accordance with California Test Methods 643, 422, and 417 respectively. The results of the tests are presented in Appendix B. Preliminary corrosivity testing indicates that the soils have a moderate potential to buried ferrous metals and a mild potential to buried concrete structures. Based on the preliminary corrosivity results, concrete structures should comply with cement type, minimum compressive strength, and minimum water/cement ratio requirements as specified in ACI guidelines 318, Section 4.3.

These tests are only an indicator of the soil corrosivity at the site. A competent corrosion engineer should be consulted to further evaluate the corrosion potential for the onsite soils, suggest additional testing if needed, and to provide further recommendations for corrosion mitigation as applicable to the specific project and improvements.

8.0 - ADDITIONAL SERVICES

We recommend that Garcrest perform a review of the project specifications and plans to evaluate the correct interpretation and incorporation of the recommendations presented in this report into the project design. We will assume no responsibility for incorrect or inadequate interpretation of the recommendations herein should we not be retained for the review of the project plans and specifications.

We also recommend that our firm be retained to perform the geotechnical observation and testing services for the earthwork operations at the site. The services may include the following:

- Observation of cleaning and excavating operations,
- Observation and inspection of the exposed subgrades to receive fill,
- Evaluation of the suitability of import soils,
- Observation and testing of fill placed,
- Observation and probing of foundation excavations prior to placement of concrete.

This service allows us the opportunity to evaluate the applicability of the recommendations presented herein during the construction phase and allows us to make additional recommendations, if necessary. If another firm is retained to provide geotechnical observation services, our professional liability and responsibility would be limited to the extent that we would no longer be the geotechnical engineer of record.

9.0 - LIMITATIONS

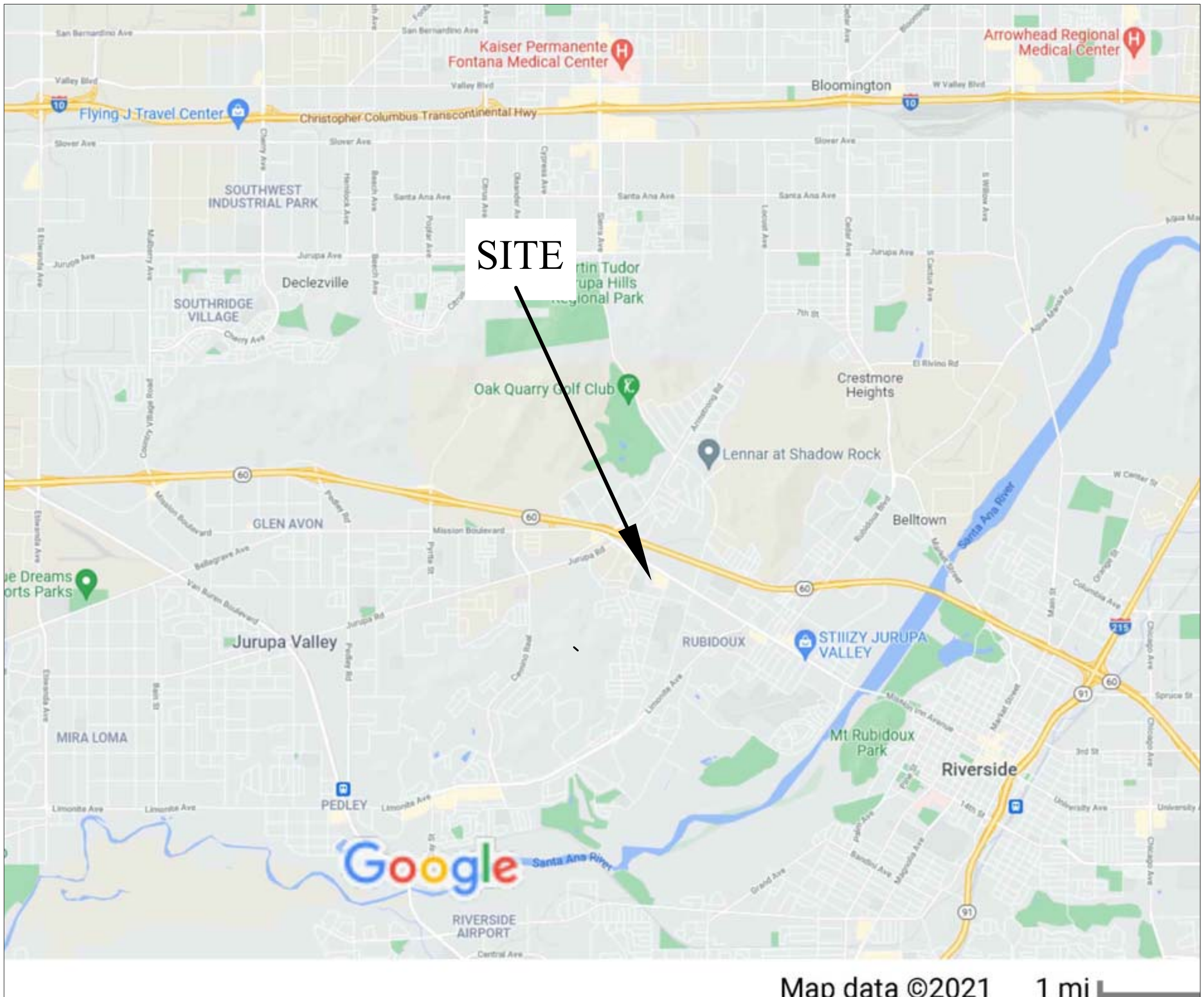
The recommendations presented herein are based on our understanding of the described project information and our interpretation of the data collected during our field investigation. The findings, conclusions, and recommendations presented in this report have been prepared in accordance with the accepted geotechnical practices. Our services have been performed using that degree of care and skill ordinarily exercised, under similar circumstances, by geotechnical consultants practicing in this or similar localities. No other warranty, expressed or implied, is made to the professional advice included in this report.

This report has been prepared exclusively for Mission Blvd Properties LLC and their design consultants for the specific application of their project located at 6326 Mission Blvd in Jurupa Valley, California. This report has not been prepared for other parties and may contain insufficient information for the purpose of other parties and other uses.

The client is responsible for the distribution of this report to all parties associated with the project, including design consultants, contractors, subcontractors. This report may be used to prepare project specifications but is not intended to be used as a specification document.

This report is intended for the sole use of the Client for this specific project within a reasonable time from its issuance. Regulatory and site condition changes may result in the additional information to be incorporated into the report and additional work to be performed by Garcrest prior to the issuance of an update. Non-compliance with these limitations releases Garcrest from any liability resulting from the use of this report by other unauthorized parties

PLATES



SCALE: Not to Scale

REFERENCE: GoogleMaps (2021)

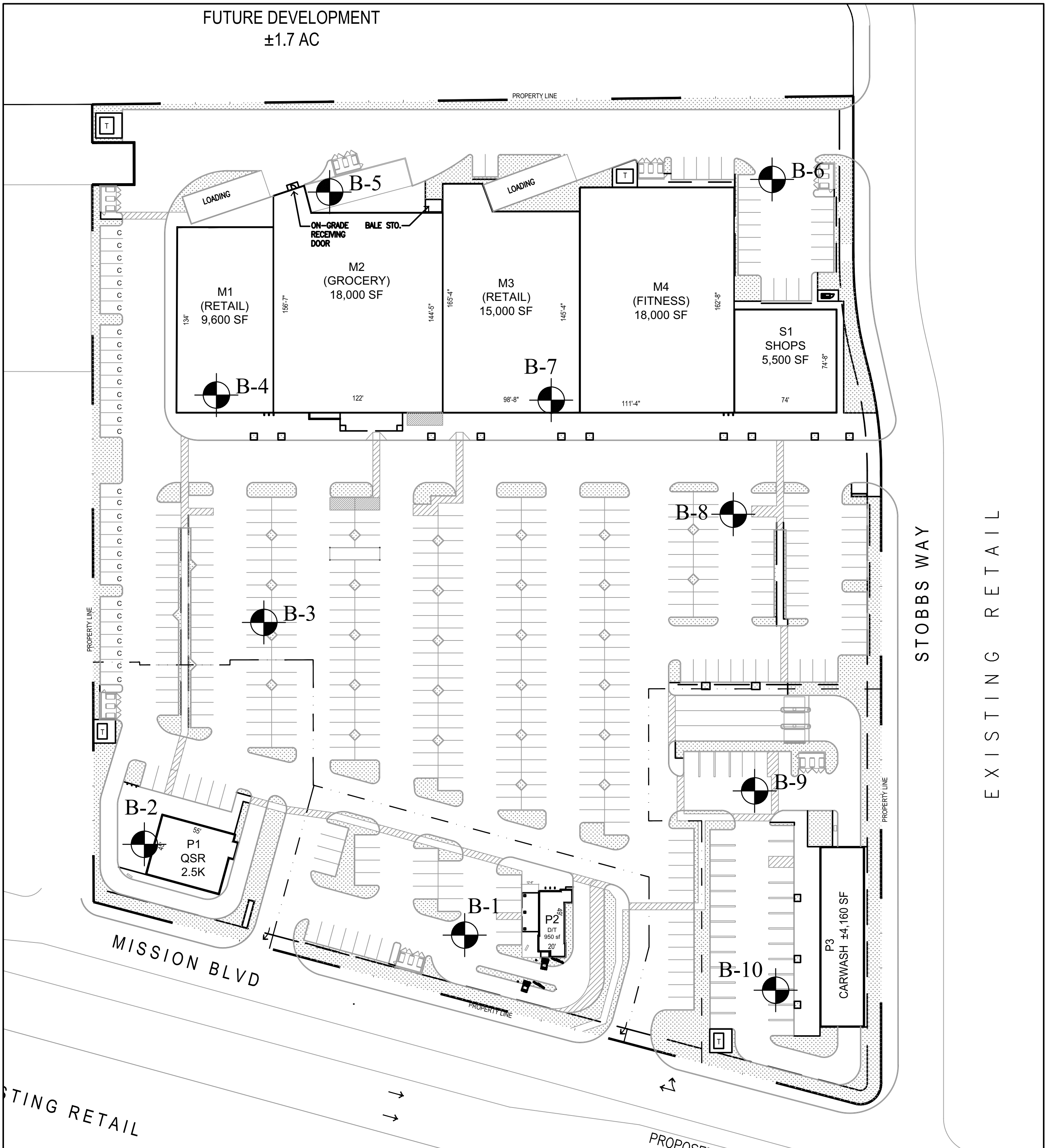
NORTH

GARCREST
ENGINEERING AND CONSTRUCTION, INC.

SITE LOCATION MAP

Proposed Retail Buildings and Parking
6326 Mission Blvd
Jurupa Valley, California
Project No. G21-034/1

PLATE
1



KEY

Approximate Boring Locations

REFERENCE: Base plan provided by Architects Orange

SCALE

1 100

NORTH

GARCREST

ENGINEERING AND CONSTRUCTION, INC.

PLOT PLAN

Proposed Retail Buildings and Parking
6326 Mission Blvd
Jurupa Valley, California
Project No. G21-034/1

PLATE

2

APPENDIX A – FIELD EXPLORATION

APPENDIX A

FIELD EXPLORATION

The soil conditions at the site were explored by drilling three borings using a truck-mounted hollow stem auger type drilling equipment provided by 2R Drilling of Chino, California. The borings were performed on July 9, 2021. The borings were advanced to a depth of 26½ feet below the existing grade. The boring locations are shown on Plate 2, Plot Plan. The borings were backfilled using the excavated cuttings and tamped.

The soils encountered were logged by our field engineer and relatively undisturbed and bulk samples were collected for laboratory inspection and testing. The logs of our borings are presented on Figure A-1 through A-10, Log of Borings. The samples were classified in accordance with the Uniform Soil Classification Method (USCS).

A California-type ring sampler was used to collect the relatively undisturbed samples. The sampler was driven a total of 18-inches. The number of blows required to drive the sampler the final 12-inches was recorded on the borings logs. The hammer weight and drop height are also indicated on the boring logs.

Disturbed samples were also collected using a Standard Penetration Test (SPT) sampler. The sampler was driven a total of 18-inches and a number of blows required to drive the final 12-inches were recorder and are presented on the boring logs. The SPT was driven using a 140-pound automatic trip hammer falling a drop height of 30 inches.

Garcrest Engineering & Construction, Inc.
LOG OF BORING

PROJECT NO.: G21-034/1
PROJECT NAME: Jurupa
LOCATION: 6326 Mission Blvd. Jurupa Valley CA
ELEVATION:

DRILLER: 2R Drilling
DRILL METHOD: 8" Hollow Stem Auger
HAMMER: 140 pound Auto/30 inches

LOGGED BY: RL
OPERATOR: Cody/Bishop
RIG TYPE: CME75
DATE: 7/9/2021

BORING NO.: *B-1*

Depth (ft)	Sample Type	Blows/ 6"	Blows/Foot	Sample Number	Graphical Log	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Moisture Content (%)	Dry Density (pcf)	Others
						SM	**FILL** SILTY SAND - Dark Brown, fine- medium, moist, some clay, few gravel			
						ML	**ALLUVIUM** SANDY SILT - brown, fine to medium, moist, few gravel, few clay			
5	Ring	5 8 10	18	1				6.1	116	DS CORR
	Ring	5 7 11	18	2			-- finer			SA
10	Ring	10 11 22	33	3				7.3	104	
15	Ring	12 22 31	53	4				6.9	116	
						SM	SILTY SAND - Red/Brown, fine to medium, slightly moist, few clay, few gravel			
20	SPT	13 22 50/5"		5						
25	Ring	50/6"		6			-- Gravel increase, moist, some clay			

NOTES:
BORING TERMINATED AT 26½ feet.
No Groundwater Encountered
Boring backfilled with cuttings and tamped, patched at surface.

Legend: --Ring -SPT ---Bulk ---No Recovery ---Water Table

chk: AG 09/25/21

PLATE A-1

Garcrest Engineering & Construction, Inc.
LOG OF BORING

PROJECT NO.:	G21-034/1	**DRILLER:**	2R Drilling	**LOGGED BY:**	RL
PROJECT NAME:	Jurupa	**DRILL METHOD:**	8" Hollow Stem Auger	**OPERATOR:**	Cody/Bishop
LOCATION:	6326 Mission Blvd. Jurupa Valley CA	**HAMMER:**	140 pound Auto/30 inches	**RIG TYPE:**	CME75
ELEVATION:				**DATE:**	7/9/2021

BORING NO.: *B-2*

Depth (ft)	SAMPLES: Sample Type	Blows/ 6"	Blows/Foot	Sample Number	Graphical Log	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Moisture Content (%)	Dry Density (pcf)	Others
0						**SM**	**FILL** **SILTY SAND -** Dark Brown, fine to medium, moist, few gravel, few clay			
						ML	**ALLUVIUM** **SANDY SILT -** Brown, fine to medium, moist, few clay, no gravel			
5	Ring	7 10 10	20	1				6.9	115	CS
10	Ring	7 10 18	28	2			-- finer, few clay	7.1	114	
15	SPT	7 9 14	23	3			-- slightly moist, some clay			
20	Ring	22 40 50/5"		4		**SM**	**SILTY SAND -** Red/Brown, fine to medium, moist, few gravel, some clay	10.7	130	

NOTES:
BORING TERMINATED AT 21½ feet.
No Groundwater Encountered
Boring backfilled with cuttings and tamped, patched at surface.

Legend: --Ring -SPT ---Bulk ---No Recovery ---Water Table

chk: AG 09/25/21

PLATE A-2

Garcrest Engineering & Construction, Inc.
LOG OF BORING

PROJECT NO.: G21-034/1
PROJECT NAME: Jurupa
LOCATION: 6326 Mission Blvd. Jurupa Valley CA
ELEVATION:

DRILLER: 2R Drilling
DRILL METHOD: 8" Hollow Stem Auger
HAMMER: 140 pound Auto/30 inches

LOGGED BY: RL
OPERATOR: Cody/Bishop
RIG TYPE: CME75
DATE: 7/9/2021

BORING NO.: *B-3*

Depth (ft)	SAMPLES: Sample Type	Blows/ 6"	Blows/Foot	Sample Number	Graphical Log	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Moisture Content (%)	Dry Density (pcf)	Others
0						**SM**	<u>**FILL**</u> **SILTY SAND -** Brown/Red Brown, fine to medium, moist, few gravel, few clay.			
4						**ML**	<u>**ALLUVIUM**</u> **SANDY SILT -** Brown, fine to medium, moist, some clay, few gravel			
5	Ring	5 6 9	15	1				5.1	115	
10	Ring	11 19 22	41	2			-- no clay			
11½							<u>**NOTES:**</u> BORING TERMINATED AT 11½ feet. No Groundwater Encountered Boring backfilled at completion of test with excavated cuttings, patched at surface.			
15										
20										
25										

Legend: --Ring -SPT ---Bulk ---No Recovery ---Water Table

chk: AG 09/25/21

PLATE A-3

Garcrest Engineering & Construction, Inc.
LOG OF BORING

PROJECT NO.:	G21-034/1	**DRILLER:**	2R Drilling	**LOGGED BY:**	RL
PROJECT NAME:	Jurupa	**DRILL METHOD:**	8" Hollow Stem Auger	**OPERATOR:**	Cody/Bishop
LOCATION:	6326 Mission Blvd. Jurupa Valley CA	**HAMMER:**	140 pound Auto/30 inches	**RIG TYPE:**	CME75
ELEVATION:				**DATE:**	7/9/2021

BORING NO.: *B-4*

Depth (ft)	Sample Type	Blows/ 6"	Blows/Foot	Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Moisture Content (%)	Dry Density (pcf)	Others
0					SM	**FILL** **SILTY SAND -** Red/Brown, fine to medium, moist, some clay, few gravel few coarse sand			
5	Ring	5 13 18	31	1	SM	**ALLUVIUM** **SILTY SAND -** Brown, fine to medium, moist, few clay, few gravel, some coarse sand	9.1	111	CORR DS
	Ring	9 13 17	30	2			7.1	125	
10	Ring	9 12 19	31	3					
					ML	**SANDY SILT** - Red/Brown, fine to medium, slightly moist, few clay			
15	SPT	10 20 24	44	4					
						-- some gravel/pebble clasts			
20	Ring	17 28 40	68	5		-- more sand	8.8	123	
25	SPT	12 16 24	40	6		-- very moist, some clay, few gravel			
						NOTES: BORING TERMINATED AT 26½ feet. No Groundwater Encountered Boring backfilled at completion of test with excavated cuttings, patched at surface.			

Legend: --Ring -SPT ---Bulk ---No Recovery ---Water Table

chk: AG 09/25/21

PLATE A-4

Garcrest Engineering & Construction, Inc.
LOG OF BORING

PROJECT NO.:	G21-034/1	**DRILLER:**	2R Drilling	**LOGGED BY:**	RL
PROJECT NAME:	Jurupa	**DRILL METHOD:**	8" Hollow Stem Auger	**OPERATOR:**	Cody/Bishop
LOCATION:	6326 Mission Blvd. Jurupa Valley CA	**HAMMER:**	140 pound Auto/30 inches	**RIG TYPE:**	CME75
ELEVATION:				**DATE:**	7/9/2021

BORING NO.: *B-5*

Depth (ft)	SAMPLES: Sample Type	Blows/ 6"	Blows/Foot	Sample Number	Graphical Log	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Moisture Content (%)	Dry Density (pcf)	Others
						SM	**FILL** **SILTY SAND -** Red/Brown, fine to medium, moist, few clay, some gravel			
						SM	**ALLUVIUM** **SILTY SAND -** Red/Brown, fine to medium, slightly moist, few clay, few gravel, some coarse sand			
5	Ring	3 4 5	9	1				8.0	113	CS
10	Ring	10 17 20	37	2			-- Trace Gravel	6.5	124	SA
							NOTES: BORING TERMINATED AT 11½ feet. No Groundwater Encountered Boring Converted to Percolation Test. Boring backfilled at completion of test with excavated cuttings, patched at surface.			
15										
20										
25										

Legend: --Ring -SPT ---Bulk ---No Recovery ---Water Table

chk: AG 09/25/21

PLATE A-5

Garcrest Engineering & Construction, Inc.
LOG OF BORING

PROJECT NO.:	G21-034/1	**DRILLER:**	2R Drilling	**LOGGED BY:**	RL
PROJECT NAME:	Jurupa	**DRILL METHOD:**	8" Hollow Stem Auger	**OPERATOR:**	Cody/Bishop
LOCATION:	6326 Mission Blvd. Jurupa Valley CA	**HAMMER:**	140 pound Auto/30 inches	**RIG TYPE:**	CME75
ELEVATION:				**DATE:**	7/9/2021

BORING NO.: *B-6*

Depth (ft)	SAMPLES: Sample Type	Blows/ 6"	Blows/Foot	Sample Number	Graphical Log	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Moisture Content (%)	Dry Density (pcf)	Others
						ML	**FILL** **SANDY SILT -** Brown/Dark Brown, fine, slightly moist, few gravel, some clay			
						ML	**ALLUVIUM** **SANDY SILT -** Brown/Dark Brown, fine, slightly moist, few gravel, many clay, dense			
5	Ring	9 19 40	59	1				5.2	105	
	Ring	19 40 50/4"		2			-- fine to medium, very slightly moist, some gravel, no clay			
10	Ring	20 50/5"		3			-- Brown/Red Brown, fine, slightly moist, few gravel, few clay	5.9	111	
15	SPT	50/6"		4			-- Brown/Tan, many gravel, some clay			
20	Ring	50/6"		5				6.9	112	
25	SPT	21 36 50	86	6			-- Brown/Red Brown, fine, few gravel, moist			

NOTES:
BORING TERMINATED AT 26½ feet.
No Groundwater Encountered
Boring backfilled at completion of test with excavated cuttings.

Legend: --Ring -SPT ---Bulk ---No Recovery ---Water Table

chk: AG 09/25/21

PLATE A-6

Garcrest Engineering & Construction, Inc.
LOG OF BORING

PROJECT NO.:	G21-034/1	**DRILLER:**	2R Drilling	**LOGGED BY:**	RL
PROJECT NAME:	Jurupa	**DRILL METHOD:**	8" Hollow Stem Auger	**OPERATOR:**	Cody/Bishop
LOCATION:	6326 Mission Blvd. Jurupa Valley CA	**HAMMER:**	140 pound Auto/30 inches	**RIG TYPE:**	CME75
ELEVATION:				**DATE:**	7/9/2021

BORING NO.: *B-7*

Depth (ft)	SAMPLES: Sample Type	Blows/ 6"	Blows/Foot	Sample Number	Graphical Log	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Moisture Content (%)	Dry Density (pcf)	Others
0						ML	**FILL** **SANDY SILT -** Brown/Dark Brown, fine, moist, few gravel, few clay			
						ML	**ALLUVIUM** **SANDY SILT -** Brown/Dark Brown, fine, moist, few gravel, few clay, few medium to coarse sand			
5	Ring	5 8 12	20	1				6.2	116	CS
	Ring	12 19 22	41	2			-- Brown/Tan, some clay, slightly moist	6.3	109	
10	SPT	6 12 19	31	3						
15	Ring	19 32 50	82	4			-- some gravel	6.5	124	
20	SPT	50/6"		5			-- many gravel, likely siltstone			
25							**NOTES:** BORING TERMINATED AT 21½ feet. No Groundwater Encountered Boring backfilled at completion of test with excavated cuttings, patched at surface.			

Legend: Ring --Ring; SPT -SPT; ---Bulk; ---No Recovery; ---Water Table

chk: AG 09/25/21

PLATE A-7

Garcrest Engineering & Construction, Inc.
LOG OF BORING

PROJECT NO.: G21-034/1	**DRILLER:** 2R Drilling	**LOGGED BY:** RL	
PROJECT NAME: Jurupa	**DRILL METHOD:** 8" Hollow Stem Auger	**OPERATOR:** Cody/Bishop	
LOCATION: 6326 Mission Blvd. Jurupa Valley CA	**HAMMER:** 140 pound Auto/30 inches	**RIG TYPE:** CME75	
ELEVATION:		**DATE:** 7/9/2021	

BORING NO.: *B-8*

Depth (ft)	SAMPLES: Sample Type	Blows/ 6"	Blows/Foot	Sample Number	Graphical Log	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Moisture Content (%)	Dry Density (pcf)	Others
						ML	**FILL** **SANDY SILT-** Tan/Brown, fine to medium, slightly moist, few gravel			
5	SPT	9 16 24	40	1		ML	**ALLUVIUM** **SANDY SILT-** Tan/Brown, fine, slightly moist, few gravel			
10	SPT	50/6"		2			-- fine to medium sand, few clay	4.9	111	
15							**NOTES:** BORING TERMINATED AT 11½ feet. No Groundwater Encountered Boring Converted to Percolation Test. Boring backfilled at completion of test with excavated cuttings.			
20										
25										

Legend: --Ring -SPT ---Bulk ---No Recovery ---Water Table

chk: AG 09/25/21

PLATE A-8

Garcrest Engineering & Construction, Inc.
LOG OF BORING

PROJECT NO.:	G21-034/1	**DRILLER:**	2R Drilling	**LOGGED BY:**	RL
PROJECT NAME:	Jurupa	**DRILL METHOD:**	8" Hollow Stem Auger	**OPERATOR:**	Cody/Bishop
LOCATION:	6326 Mission Blvd. Jurupa Valley CA	**HAMMER:**	140 pound Auto/30 inches	**RIG TYPE:**	CME75
ELEVATION:				**DATE:**	7/9/2021

BORING NO.: *B-9*

Depth (ft)	Sample Type	Blows/ 6"	Blows/Foot	Sample Number	Graphical Log	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Moisture Content (%)	Dry Density (pcf)	Others
						ML	**FILL** **SANDY SILT -** Tan/Brown, fine, slightly moist, few gravel, few clay			RV MAX
						ML	**ALLUVIUM** **SANDY SILT -** Tan/Brown, fine to medium, very slightly moist, few gravel, no clay			
5	SPT	16 10 10	20	1						SA
10	SPT	50/6"		2						
							NOTES: BORING TERMINATED AT 11½ feet. No Groundwater Encountered Boring Converted to Percolation Test. Boring backfilled at completion of test with excavated cuttings.			
15										
20										
25										

Legend: --Ring --SPT ---Bulk ---No Recovery ---Water Table

chk: AG 09/25/21

PLATE A-9

Garcrest Engineering & Construction, Inc.
LOG OF BORING

PROJECT NO.:	G21-034/1	**DRILLER:**	2R Drilling	**LOGGED BY:**	RL
PROJECT NAME:	Jurupa	**DRILL METHOD:**	8" Hollow Stem Auger	**OPERATOR:**	Cody/Bishop
LOCATION:	6326 Mission Blvd. Jurupa Valley CA	**HAMMER:**	140 pound Auto/30 inches	**RIG TYPE:**	CME75
ELEVATION:				**DATE:**	7/9/2021

BORING NO.: *B-10*

Depth (ft)	SAMPLES: Sample Type	Blows/ 6"	Blows/Foot	Sample Number	Graphical Log	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Moisture Content (%)	Dry Density (pcf)	Others
0						ML	**FILL** **SANDY SILT-** Tan/Brown, fine, slightly moist, few gravel			
3						ML	**ALLUVIUM** **SANDY SILT-** Tan/Brown, fine, slightly moist, few gravel			
5		10 15 21	36	1				4.8	109	DS
7.5		25 50/6"		2		SM	**SILTY SAND-** Brown/Dark Brown, fine to medium, some gravel, some clay, very dense	5.7	127	
10		20 27 30	57	3						
15		30 50/4"		4		ML	**SANDY SILT-** Brown/Red Brown, fine to medium, slightly moist, few gravel, few clay, very dense	6.2	123	
20		30 50/6"		5						

NOTES:
BORING TERMINATED AT 21½ feet.
No Groundwater Encountered
Boring backfilled with cuttings and tamped

Legend: --Ring --SPT ---Bulk ---No Recovery ---Water Table

chk: AG 09/25/21

PLATE A-10

APPENDIX B – LABORATORY TESTING

APPENDIX B

LABORATORY TESTS

Laboratory tests were performed on selected samples to aid in the classification of the soils encountered and to determine engineering properties for the onsite soils. The laboratory tests were performed by AP Engineering and Testing, Inc. of Pomona, California.

Field moisture content and dry densities of the soils were determined by performing tests on relatively undisturbed samples collected. The results are presented on the boring logs and Figure B-1, Moisture and Density Test Results.

Direct Shear tests were performed on selected samples to evaluate the strength parameters of the soils. The tests were conducted on samples after soaking to near-saturated moisture content at various surcharges. The tests were performed in general accordance with ASTM Standard Test Method D-3080. The tests were performed at a strain rate of 0.005 inches per minute under soaked conditions. The results of the tests are shown on Figure B-2, Direct Shear Test Results.

A Consolidation test was performed on a selected sample to evaluate the compressibility of the soils. The test was conducted in general accordance with ASTM Standard Test Method D-2435. Water was added to the sample to illustrate the effect of moisture on compressibility. The results are presented on Figure B-3, Consolidation Curve.

Sieve analyses were performed on selected samples of the materials encountered at the site to evaluate the grain size distribution of the soils and to aid in the classification. Tests were performed in general accordance with ASTM Test Method D-422. The results are presented on Figure B-4, Grain Size Distribution Curve.

R-value testing was performed on a representative sample of the near surface soils at the site. The test was performed in general accordance with Caltrans Standard Test Method 301. The results of are presented on Figure B-5, R-value Test Data.

Maximum density and optimum moisture testing was performed on selected bulk samples of the onsite soils to determine optimum compaction characteristics. The test was performed in general accordance with ASTM Standard Method D-1557-91. The test results are presented on Figure B-6, Compaction Test.

A series of corrosivity tests were performed on selected samples of the soils encountered at the site. The tests included pH, resistivity, soluble chlorides and soluble sulfates. The tests were performed in general accordance with California Test Methods 643, 422, and 417 respectively. The results are presented on Figure B-7, Corrosion Test Results

AP Engineering and Testing, Inc.
DBE|MBE|SBE
2607 Pomona Boulevard | Pomona, CA 91768
t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com

MOISTURE AND DENSITY TEST RESULTS

ASTM D2216 and ASTM D7263 (Method B)

Client: Garcrest Engineering
Project Name: Jurupa Mission
Project No.: G21-034/1

AP Lab No.: 21-0721
Test Date: 07/16/21

Boring No.	Sample No.	Sample Depth (ft.)	Moisture Content (%)	Dry Density (pcf)
B1	-	10	7.3	103.7
B1	-	15	6.9	116.4
B2	-	10	7.1	114.0
B2	-	20	10.7	129.6
B3	-	5	5.1	115.1
B4	-	7.5	7.1	124.5
B4	-	20	8.8	122.8
B5	-	10	6.5	123.6
B6	-	5	5.2	105.2
B6	-	10	5.9	110.6
B6	-	20	6.9	112.1
B7	-	7.5	6.3	109.4
B7	-	15	6.5	124.3
B8	-	10	4.9	110.7
B10	-	7.5	5.7	126.7
B10	-	15	6.2	122.6

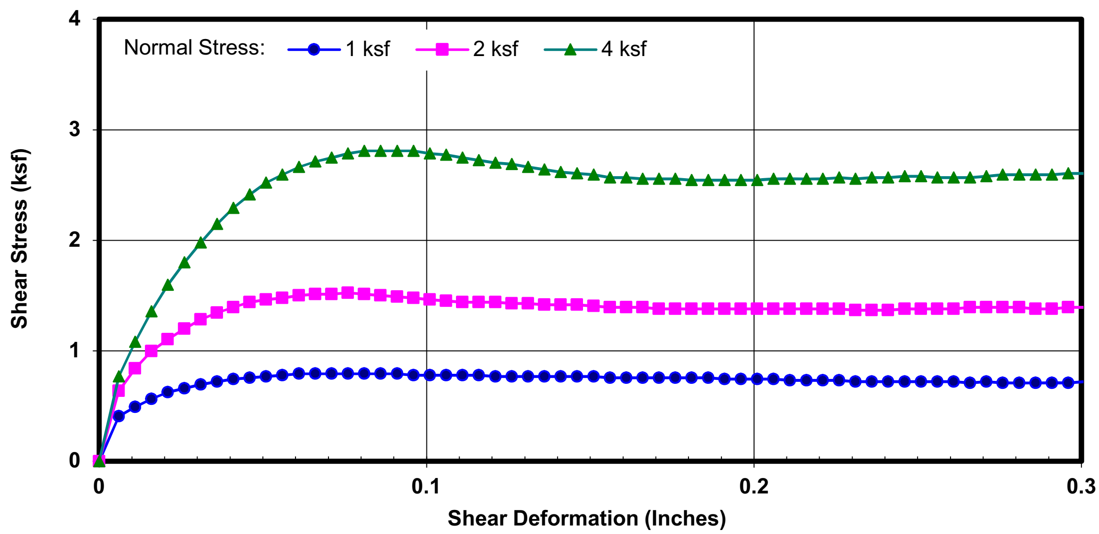
AP Engineering and Testing, Inc.
DBE|MBE|SBE
2607 Pomona Boulevard | Pomona, CA 91768
t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com

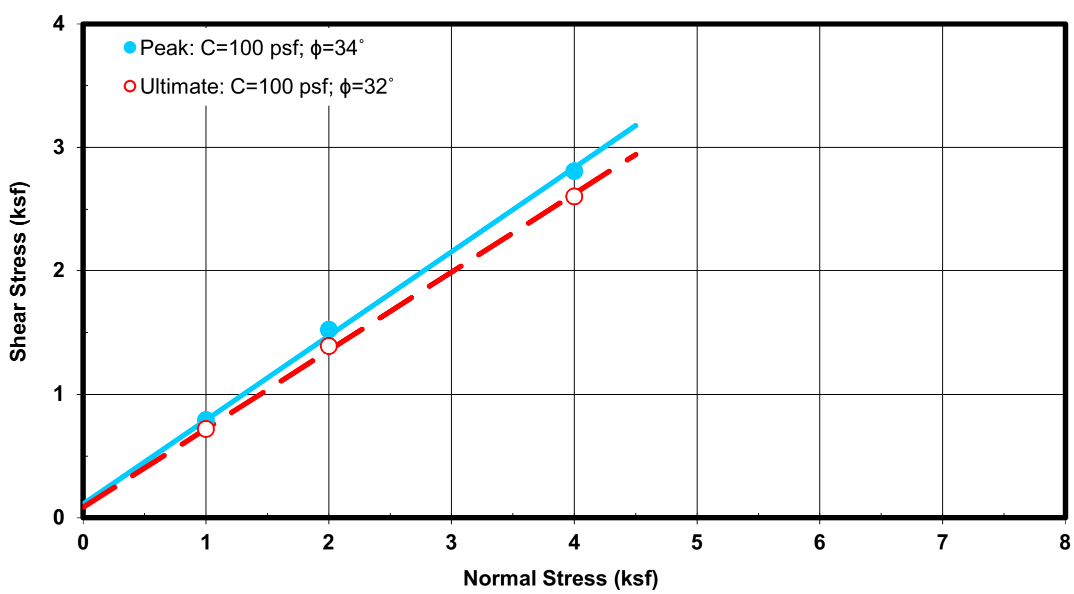
DIRECT SHEAR TEST RESULTS
ASTM D 3080

Client: Garcrest Engineering
Project Name: Jurupa Mission
Project No.: G21-034/1
Boring No.: B1
Sample No.: - **Depth (ft):** 5
Sample Type: Mod. Cal.
Soil Description: Silty Sand
Test Condition: Inundated **Shear Type:** Regular

Tested By: ST **Date:** 07/16/21
Computed By: NR **Date:** 07/20/21
Checked by: AP **Date:** 07/26/21

Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)	Initial Degree Saturation (%)	Final Degree Saturation (%)	Normal Stress (ksf)	Peak Shear Stress (ksf)	Ultimate Shear Stress (ksf)
123.4	116.4	6.1	15.1	36	91	1	0.792	0.720
						2	1.524	1.392
						4	2.808	2.604



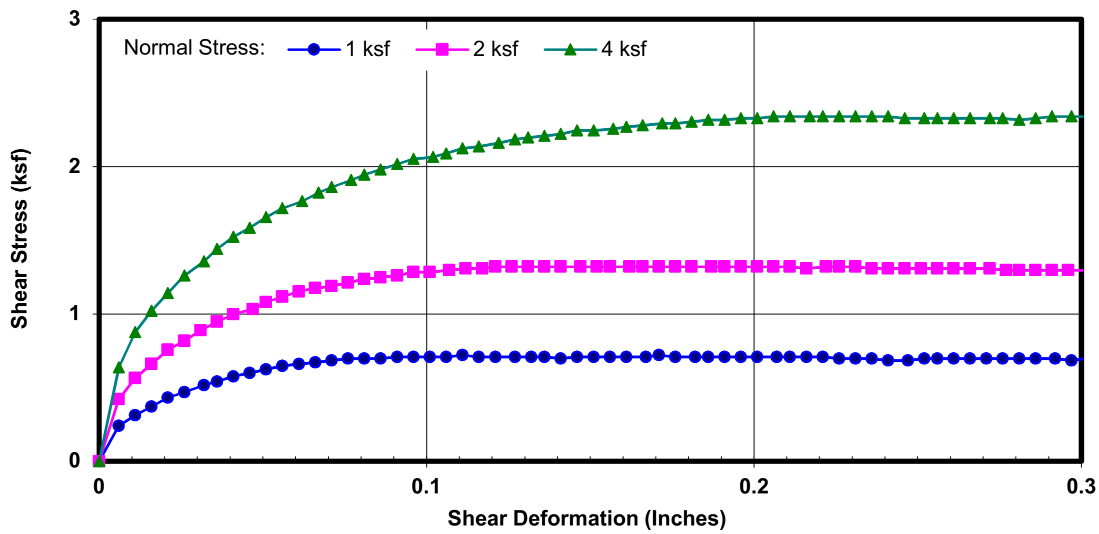


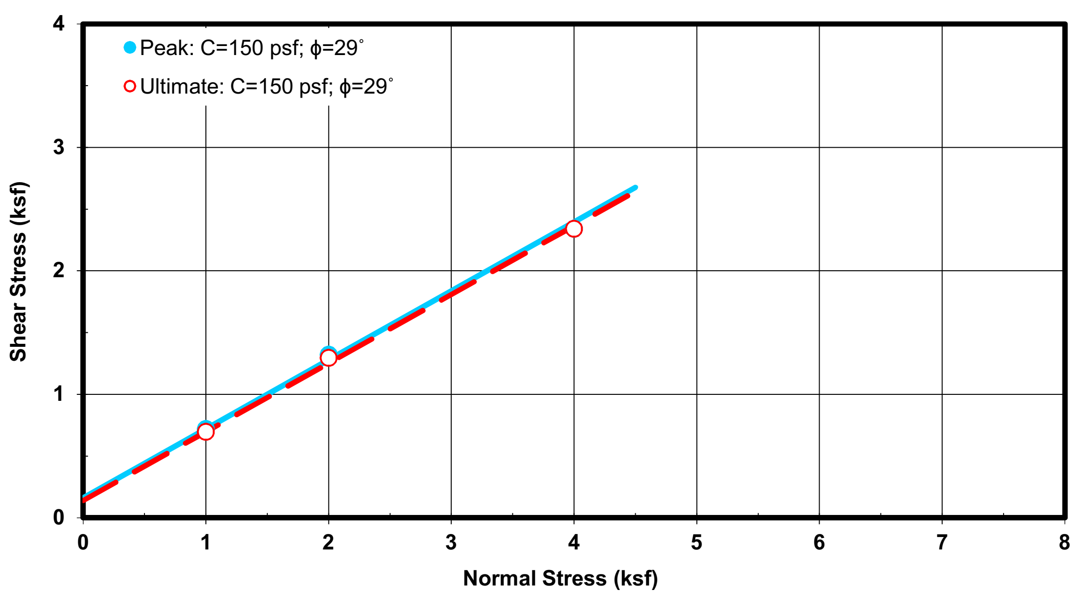
AP Engineering and Testing, Inc.
DBE|MBE|SBE
2607 Pomona Boulevard | Pomona, CA 91768
t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com

DIRECT SHEAR TEST RESULTS
ASTM D 3080

Client:	Garcrest Engineering	**Tested By:**	ST	**Date:**	07/20/21
Project Name:	Jurupa Mission	**Computed By:**	NR	**Date:**	07/21/21
Project No.:	G21-034/1	**Checked by:**	AP	**Date:**	07/26/21
Boring No.:	B4				
Sample No.:	- **Depth (ft):** 5				
Sample Type:	Mod. Cal.				
Soil Description:	Silty Sand w/traces of clay				
Test Condition:	Inundated **Shear Type:** Regular				

Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)	Initial Degree Saturation (%)	Final Degree Saturation (%)	Normal Stress (ksf)	Peak Shear Stress (ksf)	Ultimate Shear Stress (ksf)
121.0	110.9	9.1	18.0	47	93	1	0.720	0.696
						2	1.320	1.296
						4	2.340	2.340





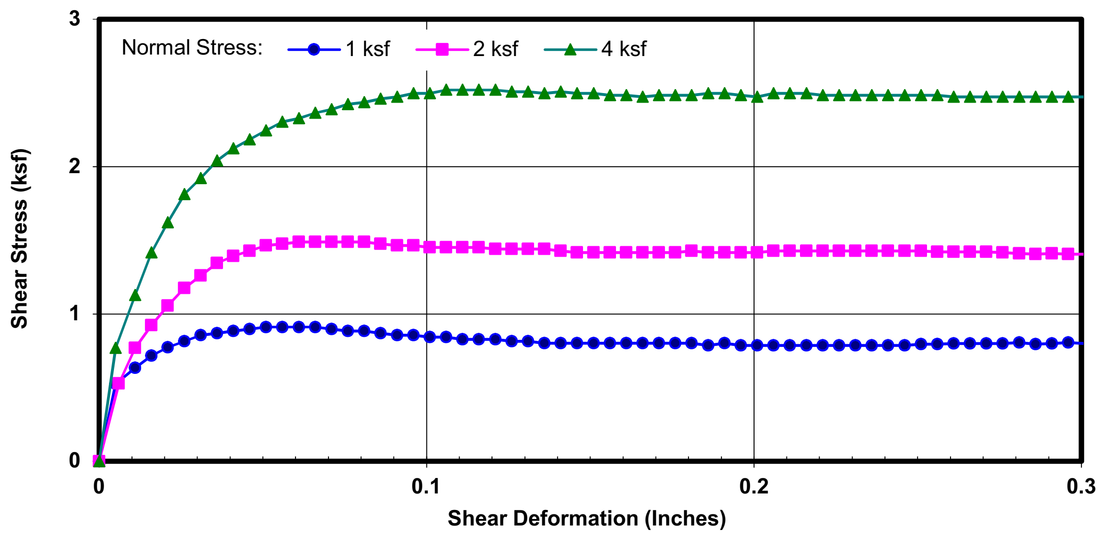
AP Engineering and Testing, Inc.
DBE|MBE|SBE
2607 Pomona Boulevard | Pomona, CA 91768
t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com

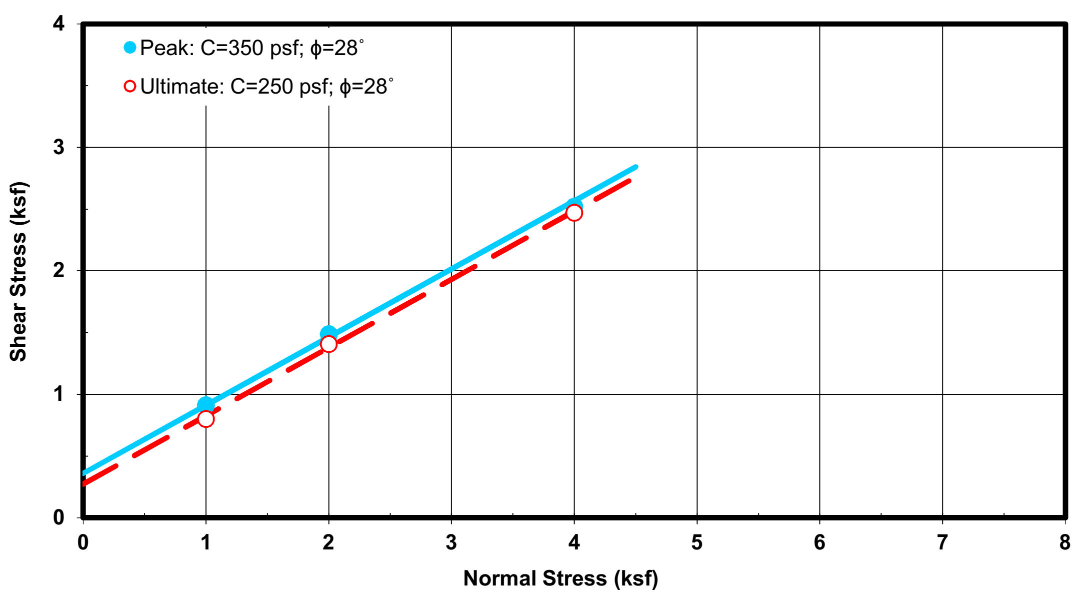
DIRECT SHEAR TEST RESULTS
ASTM D 3080

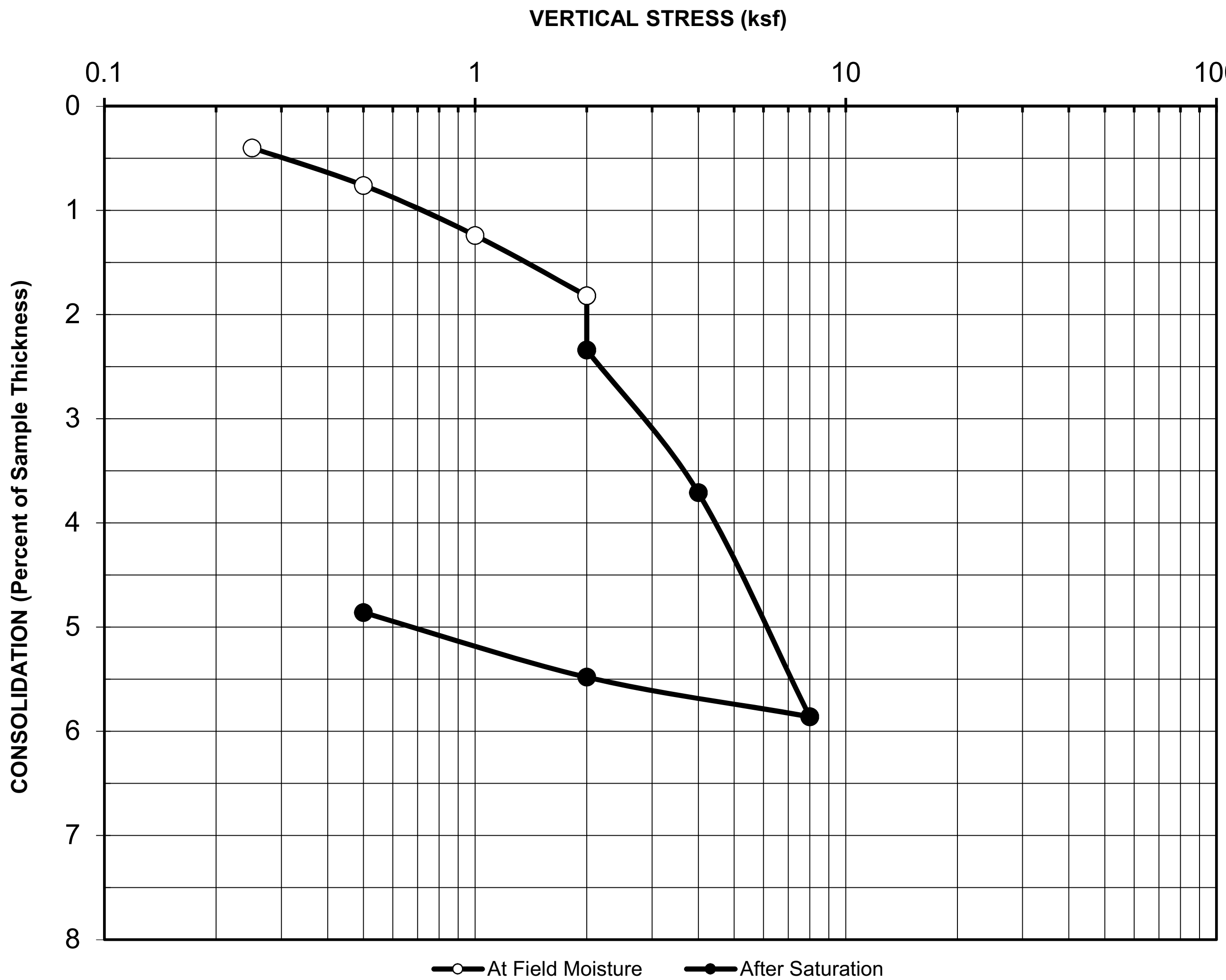
Client: Garcrest Engineering
Project Name: Jurupa Mission
Project No.: G21-034/1
Boring No.: B10
Sample No.: - **Depth (ft):** 5
Sample Type: Mod. Cal.
Soil Description: Lean Clay
Test Condition: Inundated **Shear Type:** Regular

Tested By: ST **Date:** 07/20/21
Computed By: NR **Date:** 07/21/21
Checked by: AP **Date:** 07/26/21

Wet Unit Weight (pcf)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Final Moisture Content (%)	Initial Degree Saturation (%)	Final Degree Saturation (%)	Normal Stress (ksf)	Peak Shear Stress (ksf)	Ultimate Shear Stress (ksf)
114.6	109.4	4.8	18.3	24	91	1	0.911	0.800
						2	1.488	1.406
						4	2.520	2.472





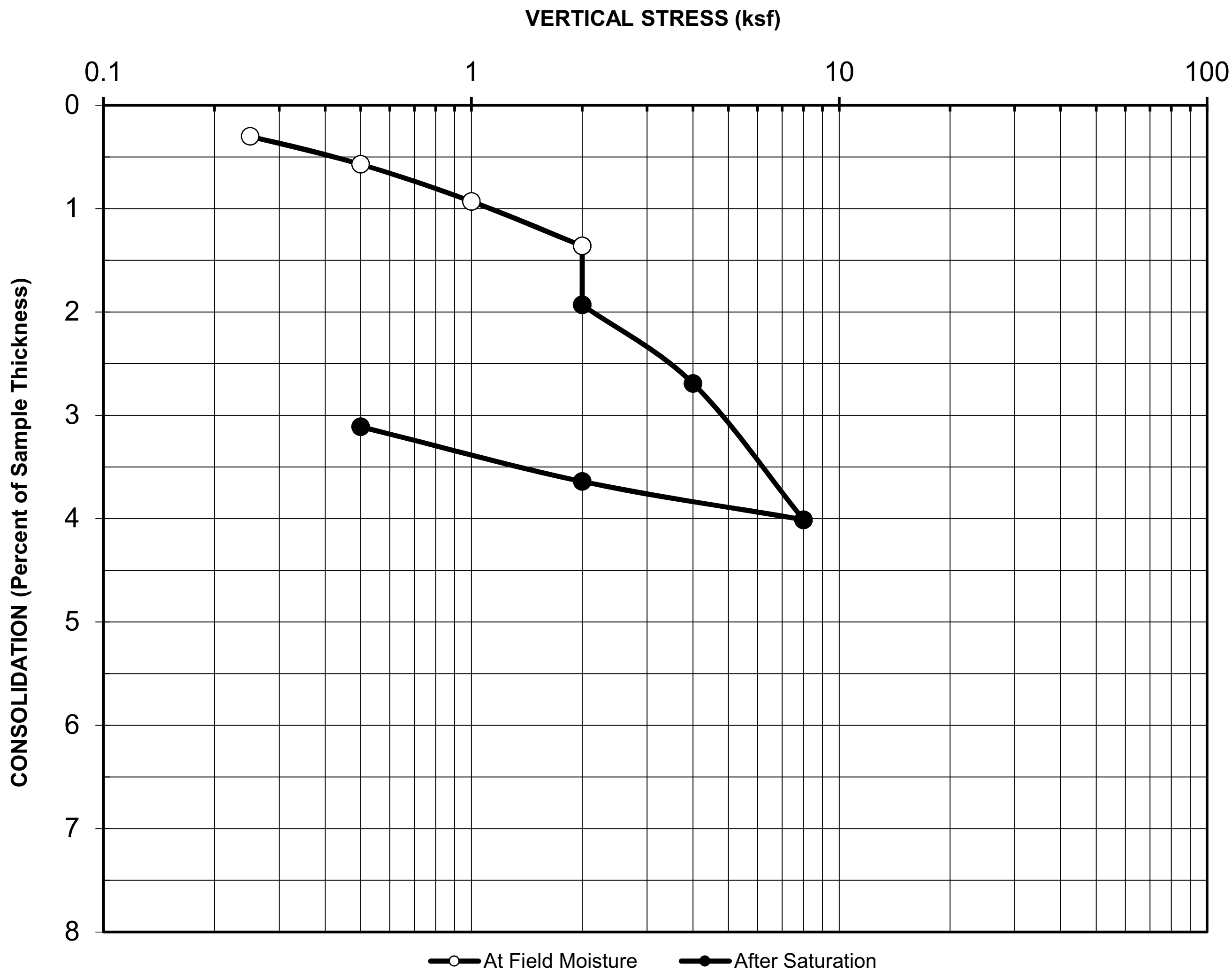


Boring No. :	B5	Initial Dry Unit Weight (pcf):	112.5
Sample No.:	-	Initial Moisture Content (%):	8.0
Depth (feet):	5	Final Moisture Content (%):	14.6
Sample Type:	Mod Cal	Assumed Specific Gravity:	2.7
Soil Description:	Clayey Sand	Initial Void Ratio:	0.50
Remarks:	Collapse= 0.52% upon inundation		

CONSOLIDATION CURVE
ASTM D 2435

Project Name: Jurupa Mission
Project No.: G21-034/1
Date: 7/15/2021
AP No: 21-0721 **Sheet No:** 1

AP Engineering and Testing, Inc.
DBE|MBE|SBE
2607 Pomona Boulevard | Pomona, CA 91768
t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com



Boring No. :	B7	Initial Dry Unit Weight (pcf):	115.8
Sample No.:	-	Initial Moisture Content (%):	6.2
Depth (feet):	5	Final Moisture Content (%):	14.4
Sample Type:	Mod Cal	Assumed Specific Gravity:	2.7
Soil Description:	Silty Sand w/traces of clay	Initial Void Ratio:	0.46
Remarks:	Collapse= 0.57% upon inundation		

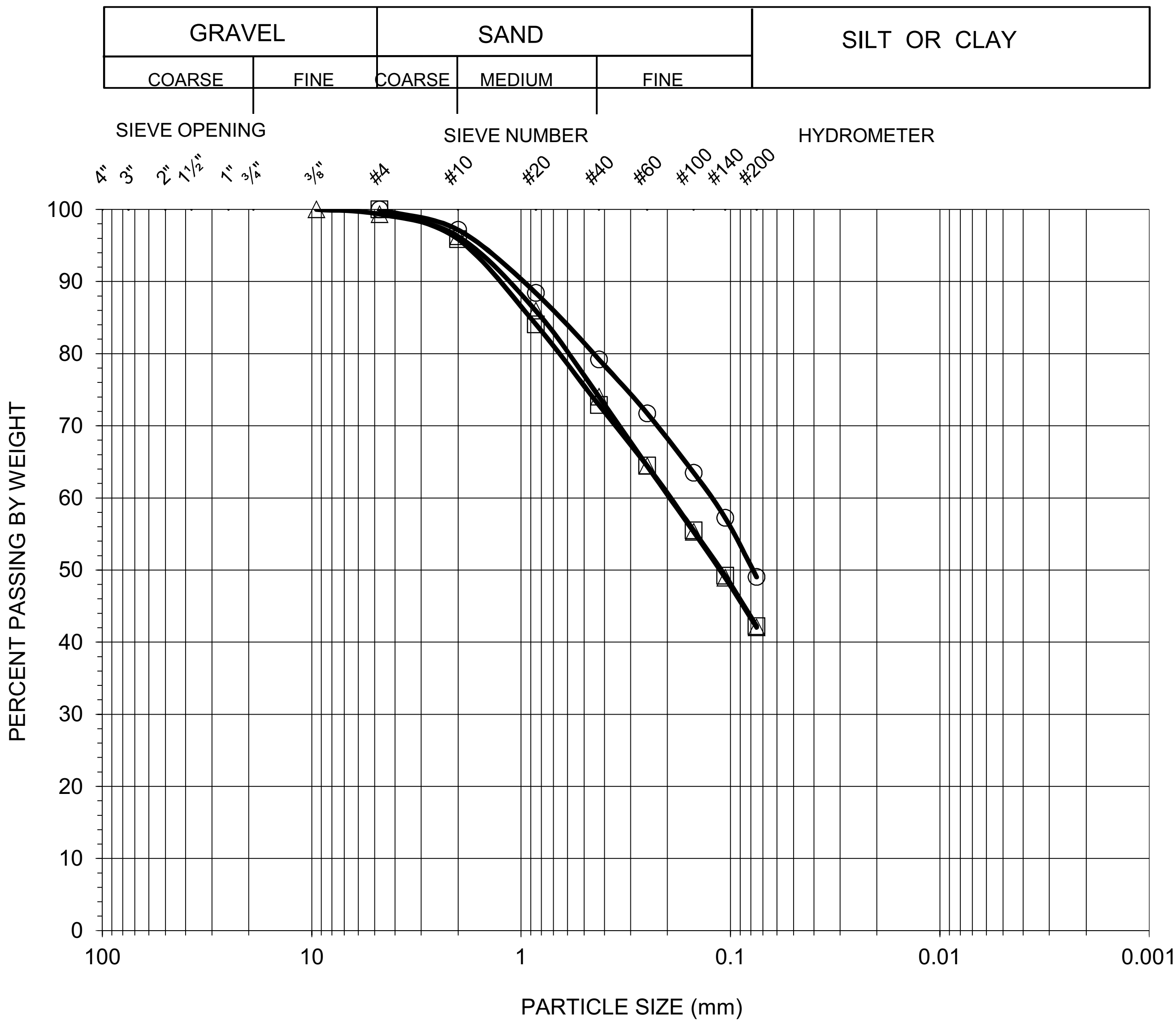
CONSOLIDATION CURVE
ASTM D 2435

Project Name:	Jurupa Mission
Project No.:	G21-034/1
Date:	7/15/2021
AP No:	21-0721 **Sheet No:** 1

AP Engineering and Testing, Inc.
DBE|MBE|SBE
2607 Pomona Boulevard | Pomona, CA 91768
t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com

GRAIN SIZE DISTRIBUTION CURVE
ASTM D 6913

Client Name:	Garcrest Engineering	Tested by:	SM	Date:	07/20/21
Project Name:	Jurupa Mission	Computed by:	NR	Date:	07/21/21
Project No.:	G21-034/1	Checked by:	AP	Date:	07/26/21



Symbol	Boring No.	Sample No.	Sample Depth (feet)	Percent			Atterberg Limits LL:PL:PI	Soil Type U.S.C.S
				Gravel	Sand	Silt & Clay		
○	B1	-	7.5	0	51	49	N/A	SC*
□	B5	-	10	0	58	42	N/A	SC*
△	B9	-	5	1	57	42	N/A	SC*

**Note: Based on visual classification of sample*

AP Engineering and Testing, Inc.
DBE|MBE|SBE
2607 Pomona Boulevard | Pomona, CA 91768
t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com

R-VALUE TEST DATA

ASTM D2844

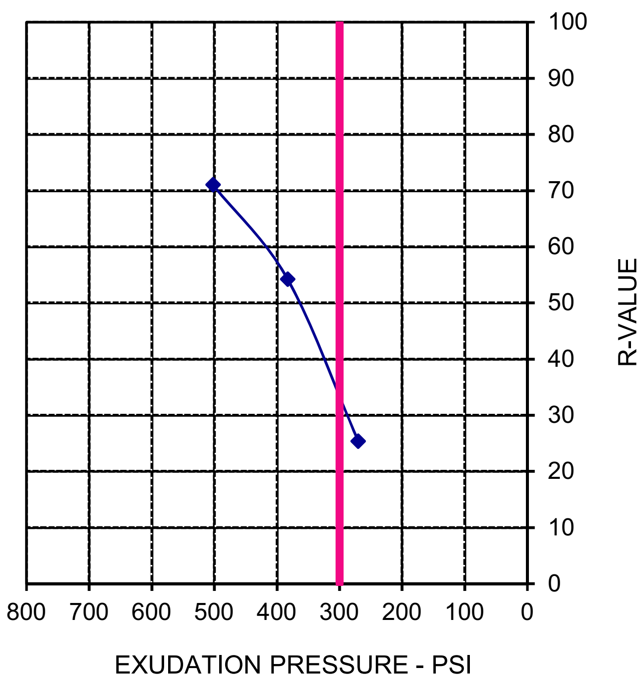
Project Name:	Jurupa Mission	Tested By: ST	Date: 07/17/21
Project Number:	G21-034/1	Computed By: KM	Date: 07/18/21
Boring No.:	B9	Checked By: AP	Date: 07/26/21
Sample No.:	-	Depth (ft.): 0-3	
Location:	N/A		
Soil Description:	Clayey Sand		

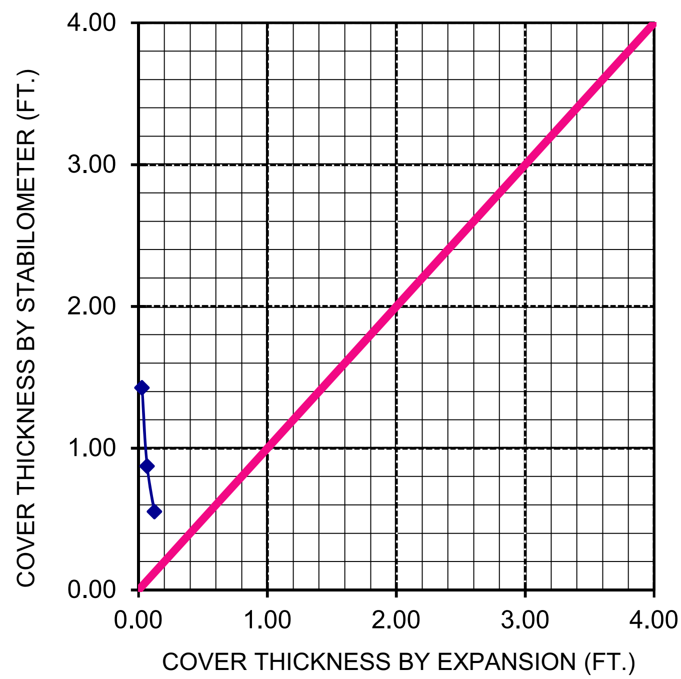
Mold Number	D	F	E	
Water Added, g	0	25	0	
Compact Moisture(%)	11.3	10.4	9.5	
Compaction Gage Pressure, psi	100	150	250	
Exudation Pressure, psi	270	383	502	
Sample Height, Inches	2.6	2.6	2.6	
Gross Weight Mold, g	3148	3052	3126	
Tare Weight Mold, g	1965	1869	1955	
Net Sample Weight, g	1184	1183	1171	
Expansion, inchesx10^{-4}	8	20	37	
Stability 2,000 (160 psi)	46/99	30/55	18/34	
Turns Displacement	4.77	4.38	4.12	
R-Value Uncorrected	24	52	69	
R-Value Corrected	25	54	71	
Dry Density, pcf	123.9	124.8	124.6	
Traffic Index	8.0	8.0	8.0	
G.E. by Stability	1.43	0.87	0.55	
G.E. by Expansion	0.03	0.07	0.12	

R-VALUE		
	By Exudation:	33
	By Expansion:	*N/A
	At Equilibrium: (by Exudation)	33

Remarks

Gf = 1.34, and 0.0 % Retained on the ¾"
*Not Applicable





AP Engineering and Testing, Inc.
DBE|MBE|SBE
2607 Pomona Boulevard | Pomona, CA 91768
t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com

COMPACTION TEST

Client:	Garcrest Engineering			AP Number:	21-0721
Project Name:	Jurupa Mission	Tested By:	NG	Date:	07/20/21
Project No. :	G21-034/1	Calculated By:	NR	Date:	07/21/21
Boring No.:	B9	Checked By:	AP	Date:	07/26/21
Sample No.:	-	Depth (ft.):	0-3		

Visual Sample Description: Clayey Sand

Compaction Method: [X] ASTM D1557 [ ] ASTM D698

Preparation Method: [ ] Moist [X] Dry

METHOD: A
MOLD VOLUME (CU.FT): 0.0333

Wt. Comp. Soil + Mold (gm.)	3976	4041	3951	3807		
Wt. of Mold (gm.)	1856	1856	1856	1856		
Net Wt. of Soil (gm.)	2120	2185	2095	1951		
Container No.						
Wt. of Container (gm.)	179.48	149.83	149.80	130.02		
Wet Wt. of Soil + Cont. (gm.)	639.74	583.25	667.60	658.06		
Dry Wt. of Soil + Cont. (gm.)	610.98	547.12	613.46	639.00		
Moisture Content (%)	6.67	9.09	11.68	3.74		
Wet Density (pcf)	140.21	144.51	138.56	129.03		
Dry Density (pcf)	131.45	132.46	124.07	124.38		

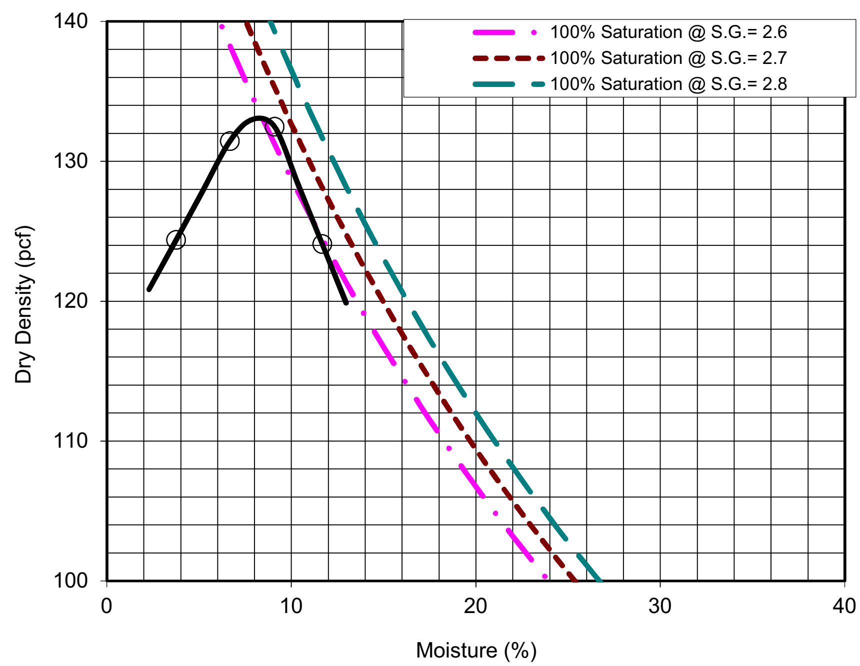
Maximum Dry Density (pcf)	**133.0**	Optimum Moisture Content (%)	**8.3**
Maximum Dry Density w/ Rock Correction (pcf)	**N/A**	Optimum Moisture Content w/ Rock Correction (%)	**N/A**

PROCEDURE USED

[X] *METHOD A: Percent of Oversize:* *0.2%*
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)

[ ] *METHOD B: Percent of Oversize:* *N/A*
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)

[ ] *METHOD C: Percent of Oversize:* *N/A*
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)



AP Engineering and Testing, Inc.
DBE|MBE|SBE
2607 Pomona Boulevard | Pomona, CA 91768
t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com

CORROSION TEST RESULTS

Client Name: Garcrest Engineering
Project Name: Jurupa Mission
Project No.: G21-034/1

AP Job No.: 21-0721
Date: 07/20/21

Boring No.	Sample No.	Depth (feet)	Soil Description	Minimum Resistivity (ohm-cm)	pH	Sulfate Content (ppm)	Chloride Content (ppm)
B1	-	5	Silty Sand	7,127	8.1	21	20
B4	-	5	Silty Sand w/ traces of clay	4,204	8.0	34	26

NOTES:
Resistivity Test and pH: California Test Method 643
Sulfate Content : California Test Method 417
Chloride Content : California Test Method 422
ND = Not Detectable
NA = Not Sufficient Sample
NR = Not Requested

APPENDIX C– PERCOLATION TESTING

Well B-5

Diameter (in) =	8	Depth of Hole (ft) =	10	Effi. =	1
Length of Pipe (ft) =	10	casing diameter (in) =	3	Perc. Zone	5 ft to 10 ft

	Time	Time Difference (min)	Depth to Top of Water (ft)	Change in Depth (ft)	Change in Depth (in)	Depth of water above bott. of screen (ft)	Avg. Head (ft)	Percolation Rate "R" (min/in.)	Percolation Rate "R" (in/min)
1	14:41		4.42	-		5.6			
	14:46	5	5.08	0.67	8.0	4.9	5.3	0.62	1.60
2	15:03		3.42			6.6			
	15:08	5	4.08	0.67	8.0	5.9	6.3	0.62	1.60
3	15:11		3.42			6.6			
	15:16	5	4.08	0.67	8.0	5.9	6.3	0.62	1.60
4	15:18		3.00			7.0			
	15:23	5	3.67	0.67	8.0	6.3	6.7	0.63	1.60
5	15:24		3.17			6.8			
	15:29	5	3.83	0.67	8.0	6.2	6.5	0.62	1.60

96.048 in/hr

	Ho=	82.008 in	DH=	8.004 in
Porchet	Hf=	74.004 in	Have=	78.006 in
Method	r=	4 in	DT=	5.00 min

It= DH(60r)/DT(r+2xHave)

It= 2.40 in/hr

Well B-8

Diameter (in) =	8	Depth of Hole (ft) =	10	Effi. =	1
Length of Pipe (ft) =	10	casing diameter (in) =	3	Perc. Zone	5 ft to 10 ft

	Time	Time Difference (min)	Depth to Top of Water (ft)	Change in Depth (ft)	Change in Depth (in)	Depth of water above bott. of screen (ft)	Avg. Head (ft)	Percolation Rate "R" (min/in.)	Percolation Rate "R" (in/min)
1	16:42		3.67	-		6.3			
	16:47	5	4.83	1.17	14.0	5.2	5.8	0.36	2.80
2	16:49		3.75			6.3			
	16:54	5	4.92	1.17	14.0	5.1	5.7	0.36	2.80
3	16:56		3.92			6.1			
	17:01	5	5.08	1.17	14.0	4.9	5.5	0.36	2.80
4	17:02		3.00			7.0			
	17:07	5	4.17	1.17	14.0	5.8	6.4	0.36	2.80
5	17:08		3.17			6.8			
	17:13	5	4.33	1.17	14.0	5.7	6.3	0.36	2.80

168.048 in/hr

	Ho=	82.008 in	DH=	14.004 in
Porchet	Hf=	68.004 in	Have=	75.006 in
Method	r=	4 in	DT=	5.00 min

It= DH(60r)/DT(r+2xHave)

It= 4.36 in/hr

Well B-9

Diameter (in) =	8	Depth of Hole (ft) =	10	Effi. =	1		
Length of Pipe (ft) =	10	casing diameter (in) =	3	Perc. Zone	5 ft to	10 ft	

	Time	Time Difference (min)	Depth to Top of Water (ft)	Change in Depth (ft)	Change in Depth (in)	Depth of water above bott. of screen (ft)	Avg. Head (ft)	Percolation Rate "R" (min/in.)	Percolation Rate "R" (in/min)
1	15:52		3.583	-		6.4			
	15:57	5	4.333	0.75	9	5.7	6.0	0.56	1.80
2	16:01		4.000			6.0			
	16:06	5	4.750	0.75	9.0	5.3	5.6	0.56	1.80
3	16:07		4.000			6.0			
	16:12	5	4.750	0.75	9.0	5.3	5.6	0.56	1.80
4	16:14		3.833			6.2			
	16:19	5	4.58	0.75	9.0	5.4	5.8	0.56	1.80
5	16:20		3.166			6.8			
	16:25	5	3.916	0.75	9.0	6.1	6.5	0.56	1.80

108 in/hr

	Ho=	82.008 in	DH=	9 in
Porchet	Hf=	73.008 in	Have=	77.508 in
Method	r=	4 in	DT=	5.00 min

It= DH(60r)/DT(r+2xHave)

It= 2.72 in/hr