REPORT

PRELIMINARY GEOTECHNICAL ENGINEERING INVESTIGATION

Via Verde Estates
TTM 37538
Northwest Corner of 56th St and Van Buren Blvd
Jurupa Valley, CA 92509

for

SYoon Architects
13458 Felson St
Cerritos, CA 90703

Project No.: 1977-S
August 4, 2022

PACIFIC GEOTECH, INC.
GEOTECHNICAL ENGINEERING CONSULTANT

E-mail: info@PGIsoil.com

August 4, 2022
Project No.: 1977-S

SYoon Architects
13458 Felson St
Cerritos, CA 90703

Attention: Sean Yoon

SUBJECT: Preliminary Geotechnical Engineering Investigation
Via Verde Estates
TTM 37538
Northwest Corner of 56th St & Van Buren Blvd, Jurupa Valley, CA 92509

Dear Mr. Yoon,

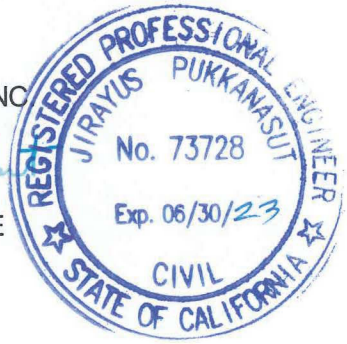
In accordance with your request and authorization, a Geotechnical Engineering Investigation has been conducted for the above-referenced project. The accompanying report presents the findings of our study, and our conclusions and recommendations pertaining to the geotechnical aspects of construction. Based on the results of our investigation, it is our opinion that the site can be developed as proposed, provided the recommendations of this report are followed and implemented during design and construction.

We appreciate the opportunity to be of service on this project. If you have questions regarding the content of this report or if we may be of additional assistance, please do not hesitate to call at any time.

Sincerely,

PACIFIC GEOTECH, INC

Jirayus Pukkanasut, PE
RCE No. 73728



Paul S. Kim, PE, GE
RGE No. 2066

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1. PURPOSE AND SCOPE

This report presents the results of a geotechnical engineering investigation for a proposed 6-unit residential subdivision for TTM 37538 at the subject site. The location of the site relative to surrounding streets and landmarks is presented on the Vicinity Map, Plate 1. The purpose of the investigation is to evaluate subsurface soil conditions and, based on the conditions encountered, to provide conclusions and recommendations pertaining to the geotechnical aspects of design and construction.

The scope of services authorized for this project includes a visual site reconnaissance, subsurface exploration, field and laboratory testing, and geotechnical engineering analyses to provide criteria for preparing design of the foundations and slabs on grade.

Recommendations presented in this report are based on the architectural plans provided by the client. The design information shall be reviewed with actual building details and site plan details. We should be notified of discrepancies to evaluate the impact upon the geotechnical recommendations.

This report has been prepared for use in design of the described project. It may not contain sufficient information for other purposes. Our professional services have been performed in accordance with generally accepted engineering procedures under similar circumstances. No other warranty, expressed or implied, is made as to the professional advice included in this report.

2. PROJECT DESCRIPTION

The proposed project is to construct a 6-unit residential subdivision for TTM 37538 as presented on the Site Plan & Boring Location, Plate 2.

3. SITE DESCRIPTION

The subject property is located on the northwest corner of 56th St and Van Buren Blvd in the City of Jurupa Valley, Riverside County. The site is essentially flat and currently occupied by a plant nursery.

4. SUBSURFACE EXPLORATION

Field exploration for the proposed project consisted of four test borings drilled to depths of 20 and 51 feet by means of a hollow stem auger. The approximate test boring locations are indicated on the Site Plan and Boring Location, Plate 2. The exploration was logged by our field engineer and undisturbed ring samples and disturbed SPT samples were obtained for laboratory testing and inspection. Logs of the test borings are enclosed in the Appendix.

5. SUBSURFACE CONDITIONS

5.1 Soil Conditions

The subsurface soils disclosed at the test borings consist generally of alternate layers of firm to dense, brown to reddish brown, very fine-sandy, slightly clayey silt to very fine-sandy silt to fine to coarse, silty sand to slightly silty to clean sand to the depth explored of 51 feet.

5.2 Groundwater

Groundwater was encountered in the test borings at the depths of 19 to 24 feet below the existing grade. The last measurement groundwater level on September 1, 2021 from the local well located approximately within 2.3 miles west of the site was approximately 67 feet deep below ground surface published by the California Department of Water Resources, Groundwater Level Report is attached.

6. LABORATORY TESTING

Laboratory testing was programmed following a review of the field investigation, and after considering the probable foundation system to be evaluated. Selected soil samples were tested for the following properties:

- Field Moisture and Unit Weight (ASTM D-2216)
- Shear Resistance (ASTM D-3080)
- Consolidation Characteristics (ASTM D-2435)

The test results of moisture content and unit weight are tabulated in the Log of Boring and shearing resistance and consolidation characteristics are plotted on Direct Shear and Consolidation, respectively, in the Appendix.

Expansion Test

An expansion test was performed on a representative sample of the onsite slightly clayey, sandy silt materials in accordance with ASTM D-4829 to evaluate its volume change with moisture. The test result is as follows:

Sample	Classification	Expansion Index	Expansion Potential
B-3 @ 2'	SILT; very fine-sandy, slightly clayey	23	Low

Corrosivity

A representative sample of the on-site soils collected at a depth of 2 feet was tested for pH, chloride concentration, sulfate concentration and resistivity in order to assess corrosivity effects on underground utilities and concrete foundations. Results of the tests are summarized in the following table.

Analyte	Test Method (Caltrans)	Result
pH	643	7.39
Water Soluble Chloride	422	260 ppm
Water Soluble Sulfate	417	0.005 %
Resistivity	643	980 ohm-cm

The result of pH on the selected sample indicates that the onsite soils are not considered to represent a corrosive condition.

The concentrations of water soluble chloride indicate that the soil materials are considered moderately corrosive and deleterious to ferrous metals.

The concentrations of sulfate content on the sample indicate that the onsite soils are considered low deleterious to concrete, and that Type I Portland cement can be used for design of concrete elements.

The electrical resistivity indicates that the subsurface soils are considered severely corrosive to ferrous metals. Underground steel utilities should be blasted and given a high quality protective coating. Buried steel piping should be electrically insulated from dissimilar metals, cement-mortar or concrete coated steel, and above ground steel pipe. If further recommendations concerning this item are needed, a corrosion specialist should be consulted.

7. EARTHQUAKE HAZARDS

7.1 Faulting

Based on criteria established by the California Geological Survey, faults may be categorized as active, potentially active, or inactive. Active faults are those that show evidence of surface displacement within the last 11,000 years. Potentially active faults are those that show evidence of last displacement within the last 1.6 million years. Faults showing no evidence of displacement within the last 1.6 million years may be considered inactive for most purposes, except for some critical structures.

In 1972, the Alquist-Priolo Earthquake Fault Zoning Act was enacted. The act defines active and potentially active faults essentially the same way as that used by the California Geological Survey. The site is not located within a designated Alquist-Priolo Earthquake Fault Zone. No active or potentially active faults are known to exist within the site. The probability of surface rupture at the site from faulting is considered to be very low.

According to the "2010 Fault Activity Map of California, Jennings & Bryant" provided by California Geological Survey, Department of Conservation, Plate 3, the site is located approximately 9.6 miles of a known potential active fault, which is the Rialto-Colton fault of San Jacinto fault zone. The proposed structure shall be designed in accordance with the Earthquake Regulations of the 2019 California Building Code and the seismic design parameters provided in this report.

7.2 Soil Liquefaction

Based on the Riverside County Parcel Report, the site is in an area where historic occurrences of liquefaction, or local geologic, geotechnical or groundwater conditions indicate a high potential for liquefaction.

Earthquake-induced liquefaction is a phenomenon in which loose to medium dense saturated cohesionless soils undergo extreme losses in shear strength due to earthquake shaking. The liquefaction potential is directly related to the groundwater conditions at the site, as well as to the characteristics of the underlying soil deposits. Loose to medium dense sands below groundwater level are generally considered to be susceptible to liquefaction under strong ground shaking conditions.

TABLE 1. SUMMARY OF SOIL LIQUEFACTION EVALUATION

(Based on Boring-1)
Design Earthquake Magnitude 7.40
PGAm 0.60 g
Historic High Groundwater 19.0 feet bgs
Current Groundwater 19.0 feet bgs

Sample Depth (ft) D	Soil Type	Layer (ft)	Thickness (ft) H	Fines Content (<0.074mm) %	Liquid Limit % LL	Plastic Limit % PL	Plasticity Index % PI	*Sat. Moisture Content* % Φ_{sat}	Wet Unit Weight pcf γ_t	Total Overburden Pressure psf σ_{vo}	Effective Over-burden Pressure psf σ_{vo}'	Measured N-value N_m	Overburden Factor Eq (9) C_N	N-Value Correction Factors Table (2) $^*C_EC_BC_RC_S$	Normalized N-value Eq (10) $(N_1)_{60}$	Fines Content Factor Eq (6) α	Fines Content Factor Eq (7) β	Corrected N-value Eq (5) $(N_1)_{60CS}$	Depth Reduction Coefficient Eq (2) r_d	Cyclic Resistance Ratio Eq (4) $CRR_{7.5}$	Cyclic Stress Ratio Eq (1) CSR	Magnitude Scaling Factor Eq(2) pg152 MSF	Factor of Safety Eq (24)	Volumetric Strain %	Settlement (inch)
		0-4	4	Non-Liquefiable above Historically High Groundwater Table					125	500	500														
5	sand	4-9	5	29.2	NP	NP	NP	16.3	134.3	1171	2045	21	1.34	0.90	25.4	4.7	1.1	33.8	0.99	N/A	0.221	1.030	non-liqu	N/A	-
10	sand	9-14	5	28.6	NP	NP	NP	15.3	135.7	1850	2411	33	1.07	0.90	31.8	4.6	1.1	40.9	0.98	N/A	0.292	1.030	non-liqu	N/A	-
15	sand	14-19	5	55.8	31	19	12	16.0	134.8	2523	2773	38	0.92	1.02	35.5	5.0	1.2	47.6	0.97	N/A	0.342	1.030	non-liqu	N/A	-
20	sand	19-24	5	52.6	NP	NP	NP	14.5	136.8	3207	3145	41	0.82	1.14	38.3	5.0	1.2	51.0	0.95	N/A	0.379	1.030	non-liqu	N/A	-
25	sand	24-29	5	34.1	NP	NP	NP	13.5	138.2	3898	3524	35	0.77	1.14	30.9	4.9	1.2	41.7	0.94	N/A	0.406	1.030	non-liqu	N/A	-
30	sand	29-34	5	12.9	NP	NP	NP	16.0	134.7	4572	3885	37	0.74	1.14	31.1	1.9	1.0	34.1	0.93	N/A	0.427	1.030	non-liqu	N/A	-
35	sand	34-39	5	11.8	NP	NP	NP	13.2	138.7	5265	4267	34	0.70	1.20	28.7	1.5	1.0	31.1	0.89	N/A	0.428	1.030	non-liqu	N/A	-
40	sand	39-44	5	10.9	NP	NP	NP	13.0	138.9	5960	4649	35	0.67	1.20	28.3	1.2	1.0	30.2	0.85	N/A	0.424	1.030	non-liqu	N/A	-
45	sand	44-49	5	13.4	NP	NP	NP	13.5	138.2	6651	5029	38	0.65	1.20	29.6	2.0	1.0	32.8	0.81	N/A	0.417	1.030	non-liqu	N/A	-
50	sand	49-51	2	8.2	NP	NP	NP	12.8	139.3	6930	4995	44	0.65	1.20	34.4	0.3	1.0	35.2	0.77	N/A	0.415	1.030	non-liqu	N/A	-
																								Total	0.00

* C_E=1.0, C_B=1, C_R=1, C_S=1.2 "non-lique" : if PI >=18 or W_{sat} <0.8LL, or $(N1)_{60CS}$ >=30

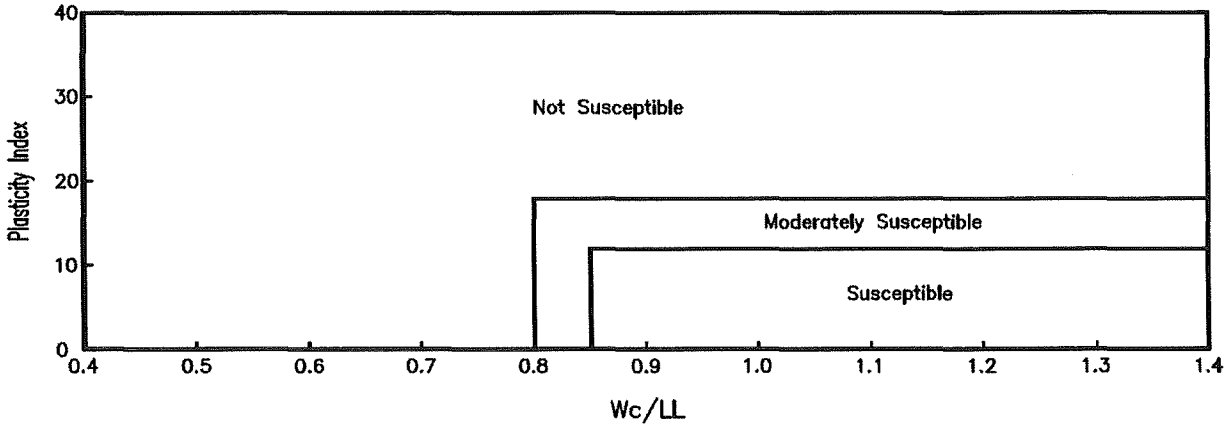
REFERENCE:

"Proceeding of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils", Technical Report NCEER-97-0022, December 31, 1997

Based on the Special Publication 117A, "Guidelines for Evaluating and Mitigating Seismic Hazards in California" and the 2019 California Building Code, PGA of 0.6g corresponding to the PGA_M with 2% probability of exceedance in 50 years and an earthquake magnitude of 7.4 were obtained from the USGS Interactive Deaggregation Web Site. For the soil layers not classified "non-liquefiable" in the screening criteria, liquefaction potential was analyzed utilizing the highest groundwater table at the site of 19 feet, in accordance with the "NCEER Workshop on Evaluation of Liquefaction Resistance of Soils, December 31, 1997".

Screening criteria were performed for the samples between 4 and 51 feet, utilizing plasticity index (PI) and saturated moisture content (w_{sat}) in accordance with the procedure referenced in the Bray and Sancio paper. The soils having PI>18 and w_{sat}<0.8LL were classified "non-liquefiable". The result of the screening assessment is summarized on Table 1. The graphical representation of liquefaction susceptible criteria is presented on Figure 1.

Figure. 1 Graphical Representation of Liquefaction Susceptible Criteria



Reference: Bray J. D. and Sancio R. B., 2006 "Assessment of the Liquefaction Susceptibility of Fine-grained Soils" Journal of Geotechnical and Geoenvironmental Engineering, ASCE, September 2006

Liquefaction analysis was performed for the PGA corresponding to PGA_M using 2% probability of exceedance in 50 years (2,475-year return period), and its result is provided on Table 1. Potential seismic-induced settlement was computed for the soil layers having the safety factor less than 1.0 in accordance with a simplified method proposed by Kohji Tokimatsu and Seed, H.B. 1987, "Evaluation of Settlement in Sands due to Earthquake Shaking", Journal of the Geotechnical Engineering Division, ASCE, Vol. 113, No. 8, August, 1987. Based on the result of the analysis, seismic-induced settlement will not occur.

7.3 Earthquake-Induced Landslides

The site is essentially flat and not considered at risk for landslides.

7.4 Earthquake-Induced Settlement and Subsidence

Seismically-induced settlement can be an effect related to earthquake ground motion. Based on the relatively dense and consolidated nature of the site soils, it is our opinion that the potential for seismically-induced settlement will be nil.

7.5 Tsunamis

Due to the location and elevation of the subject site, tsunamis do not pose a hazard to this site.

.8. CONCLUSION AND RECOMMENDATIONS

Based on our evaluation of the site conditions and findings of this investigation, it is concluded that the proposed development of the subject property is feasible from the geotechnical engineering viewpoint provided the following conclusions and recommendations are incorporated into design criteria and project specifications and are implemented during construction.

The subsurface soils at the proposed building pads shall be overexcavated to a minimum depth of 2 feet below base of the proposed footings and replaced as new compacted fill for uniform support of foundations and slab on grade. The proposed buildings may be supported on conventional spread footings founded in the new compacted fill.

8.1 Soil Expansion

The subsurface soils consist of slightly clayey, sandy silt materials. An expansion index test was performed on a sample in accordance with the ASTM D-4829 to evaluate its volume change with moisture. The test result indicates that the material has LOW expansion potential with an EI of 23.

Foundations shall be placed at least 24 inches below the lowest adjacent final grade to mitigate expansion potential.

8.2 Seismic Design Parameters

The project site is classified as Site Class F. However, in accordance with the exception to Section 20.3.1, ASCE/SEI 7-16, as the proposed structure has a fundamental period of vibration less than 0.5 second, the site-response analysis is not required to determine spectral acceleration for liquefaction soils and a Site Class is permitted to be determined in accordance with Section 20.3 and the corresponding values of F_a and F_v from Table 11.4-1 and 11.4-2.

Based on 2019 California Building Code and ASCE/SEI 7-16, the site is classified as Site Class D and the following seismic design parameters are applicable:

SEISMIC COEFFICIENTS (2019 California Building Code)		
Nature of Occupancy (Table 1604.5, CBC 2019)	II	
Importance Factors (Table 11.5-2 ASCE 7-16)	1.0	
	Short Period (0.2s)	One-Second Period
Earth Materials and Site Class (Table 20.3-1 ASCE 7-16)	Alluvium – S_D	
Mapped Maximum Considered Earthquake (MCE) Spectral Response Acceleration (Figures 22-1 through 22-8, ASCE 7-16)	S_s = 1.500 (g)	S_1 = 0.579 (g)
Site Coefficients (Table 11.4-1 and 11.4-2, ASCE 7-16)	F_a = 1.0	F_v = 1.8
Adjusted MCE Spectral Response Acceleration (Equations 11.4-1 and 11.4-2, ASCE 7-16)	S_{MS} = 1.500 (g)	S_{M1} = 1.042 (g)
Design Acceleration (Equations 11.4-3 and 11.4-4, ASCE 7-16)	S_{DS} = 1.000 (g)	S_{D1} = 0.694 (g)
Seismic Design Category (Table 11.6-1 and 11.6-2, ASCE 7-16)	D	

A ground motion hazard analysis is not required for structures other than seismically isolated structures and structures with damping systems where structures on Site Class D sites with S_1 greater than or equal to 0.2, provided the value of the seismic response coefficient C_S is determined by Equation 12.8-2 for values of T less than or equal to 1.5T_S and taken as equal to 1.5 times the value computed in accordance with Equation 12.8-3 for T_L greater than or equal to T greater than 1.5T_S or Equation 12.8-4 for T greater than T_L.

8.3 Foundation Design

8.3.1 Conventional Spread Footings

An allowable bearing value of 2,000 pounds per square foot is recommended for continuous footings of at least 15 inches in width and isolated pad footings of at least 24 inches square, placed at a depth of at least 24 inches below grade, bearing in the new compacted fill.

The bearing values are for dead plus live loads and may be increased by one-third for momentary wind or seismic loads.

8.3.2 Lateral Design

Resistance to lateral loading may be provided by passive earth pressure within the soils and by friction acting at the base of foundations and slabs on grade. Passive earth pressure may be computed as an equivalent fluid having a density of 150 pounds per cubic foot to a maximum of 2,000 pounds per square foot.

Friction between the base of the footings and/or floor slabs and the underlying soil may be assumed to be 0.35 times the dead load. When combining passive pressure and friction for lateral resistance, the passive component should be reduced by one-third.

8.3.3 Footing Reinforcement

Continuous footings should be reinforced with at least four No. 4 bars; two near the top and two near the bottom of the footings. Reinforcement of isolated footings shall be utilized as deemed necessary by the Structural Engineer for the project.

8.3.4 Foundation Settlement

The total static settlement of the foundations is estimated not to exceed three quarters of an inch. Differential settlement between adjacent footings is expected not to exceed half of an inch over a distance of 30 feet.

8.4 Slabs on Grade

Concrete slabs constructed on grade should be a minimum thickness of 4 inches and should be cast over new compacted fill. The subgrade below concrete slabs shall be pre-saturated to a depth of 18 inches prior to placing the concrete. On-grade concrete slabs shall be placed on a 2-inch clean sand bed over a moisture barrier membrane to mitigate expansion potential.

Subgrade soils disturbed due to installation of utility lines or from footing excavations should either be completely removed or be properly compacted prior to concrete pour.

It should be recognized that minor cracks normally occur in concrete slabs due to shrinkage during curing or redistribution of stresses and thus, some cracks should be anticipated. Such cracks are not necessarily indicative of excessive vertical movements. It is cautioned that slabs in areas to receive ceramic tile or other rigid, crack sensitive floor coverings be designed and constructed to reduce hairline cracking. Extra reinforcing and careful control of concrete slump to reduce shrinkage are recommended.

8.4.1 Slab Reinforcement

Concrete slabs on grade should be reinforced with at least No. 4 bars spaced 16 inches on centers, both ways. All slab reinforcement should be supported on concrete chairs or brick to ensure the desired placement near mid-depth.

The above criteria are recommended to minimize potential distress to floor slabs related to the effects of subgrade soil conditions. The Structural Engineer for the project may need to address other factors that may require modification of the above recommendations.

8.4.2 Moisture Barrier

The floor slab shall be underlain by a 4-inch thick layer of granular material. A minimum 10-mil synthetic sheet should be placed below the floor slab to serve as a vapor retarder where required t o protect moisture sensitive floor coverings and to minimize moisture passing through the floor slab.

The vapor retarder shall be in accordance with ASTM E 1745-97. The sheets of the vapor retarder material should be evaluated for holes and/or punctures prior to placement and the edges overlapped and taped. If materials underlying the vapor retarder contain sharp, angular particles, a layer of clean sand approximately 2 inches thick should be provided to protect it from puncture.

8.5 Site Grading

A preconstruction conference shall be held at the site prior to the beginning of grading operations with the owner, contractor, civil engineer, and soil engineer in attendance. Special soil handling requirements can be discussed at that time. Earthwork shall be observed, and compacted fill tested by a representative of Pacific Geotech who shall also inspect and approve all excavations. Any questionable material encountered during grading should be brought immediately to the attention of Pacific Geotech.

Grading shall commence with the removal of all existing vegetation and existing improvements from the area to be graded. Wood, roots, asphalt, concrete and other debris shall be exported from the site and shall not be mixed with the fill soils. All existing underground improvements planned for removal shall be completely excavated and the resulting depressions shall be properly backfilled in accordance with the procedures described herein.

During the rainy season between November 1 and April 30, excavated areas shall be protected from rainwater. Temporary provisions should be made to adequately direct surface runoff to the street.

8.5.1 Building Pad Subgrade Preparation

Within the proposed building pad areas, the subsurface soils shall be overexcavated to a minimum depth of 2 feet below base of the proposed footings, and replaced as new compacted fill.

The soil engineer shall inspect all excavations to determine that conditions anticipated in the report have been encountered and to provide additional recommendations for the correction of hazards found during grading.

The area of removal shall extend at least 5 feet beyond the building perimeters. The exposed bottom surface in each removal area should first be scarified to a depth of at least 8 inches, processed, watered or air dried as necessary to achieve near optimum moisture content, and then compacted in-place to at least 90 percent of the maximum laboratory density.

8.5.2 Parking Area and Driveway Subgrade Preparation

Within the proposed parking and driveway areas, the subsurface fill soils shall be excavated to a minimum depth of 2 feet below the existing grade and replaced as new compacted fill.

8.5.3 Fill Placement

All new fill shall be brought to near optimum moisture, placed in layers not exceeding 8 inches thick, and compacted to at least 90 percent of the maximum laboratory density.

Compaction characteristics of all fill soils shall be determined by ASTM D-1557 standard. The field density and degree of compaction shall be determined by ASTM D-1556, or by other ASTM standard methods that are acceptable to the governing public agency. Field density tests should be taken at every two vertical feet or for every 500 cubic yards of fill placed, whichever is more restrictive.

8.6 Drainage

Impervious surfaces within 10 feet of the building foundation shall be sloped a minimum of 2 percent away from the building. If physical obstructions or lot lines prohibit 10 feet of horizontal distance, 2-percent swales shall be provided to divert water away from the foundations.

It is important that drainage patterns established at the time of fine-grading are maintained throughout the life of the structures. Property owners should be aware that improperly designed and maintained irrigation systems for landscaping may cause distress to the foundation system and cracking of concrete slabs.

Where slabs or pavement are not feasible adjacent to the buildings, the ground surface should be provided with a minimum gradient of 2 percent away from the structures.

8.7 Trench Backfill

Utility trenches shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D-1557 standard density. Density testing, along with probing, should be performed by a Pacific Geotech representative, to verify proper compaction.

If utility contractors indicate that it is undesirable to use compaction equipment in proximity to a buried conduit, we recommend using a light weight mechanical equipment or covering the conduit with clean granular material prior to initiating mechanical compaction procedures.

Where utility trenches are proposed parallel to building footings (interior and/or exterior trenches), the bottom of the trench should not extend below a 1 horizontal to 1 vertical plane projection downward from the outside bottom edge of the adjacent footing. Where this condition occurs, the adjacent footing should be deepened.

8.8 Stormwater Infiltration

Based on the project site located within a high potential for liquefaction as shown on the Riverside County Parcel Report and shallow groundwater encountered at the depths of 19 to 24 feet below the existing grade, infiltrated runoff water may saturate subsurface soils and increase the geotechnical hazard potential of structures on or adjacent to the site subject to liquefaction, therefore; the subject site is infeasible for the storm water infiltration system from a geotechnical engineering viewpoint

9. GEOTECHNICAL INSPECTION

This report presents recommendations based on the assumption that the subsurface conditions do not deviate appreciably from those found during our current site exploration. The possibility of different localized soil conditions cannot be discounted. It is the responsibility of the owner or his representative to bring any deviations or unexpected conditions observed during construction to the attention of Pacific Geotech. This way any required supplemental recommendations can be made with a minimum of delay to the project. Construction should be observed and/or tested at the following stages by Pacific Geotech:

- Grading and compaction
- All footing excavations before placement of steel
- Trench backfills
- When any unusual conditions are encountered

If any of these inspections to verify site geotechnical conditions are not performed by Pacific Geotech, liability for the safety and stability of the project is limited only to the actual portions of the project approved by Pacific Geotech.

It is the responsibility of the property owner and the contractor to review the recommendations herein, and to inform Pacific Geotech of the starting date of construction, the pre-construction conference, and anticipated period during which testing and/or observations by Pacific Geotech will be needed.

The report is subject to review by controlling public agencies having jurisdiction.

10. GRADING SPECIFICATIONS

The following guidelines may be used in preparation of the grading plan and job specifications.

1) All site grading operations should conform to the local building and safety codes and to the rules and regulations of those governmental agencies having jurisdiction over the subject construction.

2) The grading contractor is responsible to notify governmental agencies, as required, and the Soils Engineer prior to initiating grading operations and any time grading is resumed after an interruption.

3) A diligent search for septic tanks, cesspools or underground lines should be performed during grading operations. Any abandoned water or oil wells encountered should be properly capped and treated in accordance with best accepted practices.

4) The on-site soils are suitable for use in compacted fills provided all trash, vegetation and other deleterious materials are removed prior to placement.

5) Where import materials are required for use on site, the Soils Engineer should be notified at least 48 hours in advance of importing in order to sample and test materials from proposed borrow sites. No import materials should be delivered for use on site without prior sampling and testing by the Soils Engineer.

6) All new fill shall consist of approved clean on-site or similar earth material, free of trash or debris, roots, vegetation or other deleterious material and shall be placed in thin horizontal lifts not exceeding 8 inches in loose thickness prior to compaction. Each lift should be watered or dried as needed, thoroughly blended to achieve near optimum moisture conditions then thoroughly compacted by mechanical methods.

7) No rock over 3 inches in greatest dimension shall be used in fill unless otherwise approved by the Soils Engineer.

8) No fill materials should be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations should not be resumed until the field tests by the Soils Engineer indicate that the moisture content and density of the fill are as previously specified.

9) No jetting or water tamping of fill soils shall be permitted.

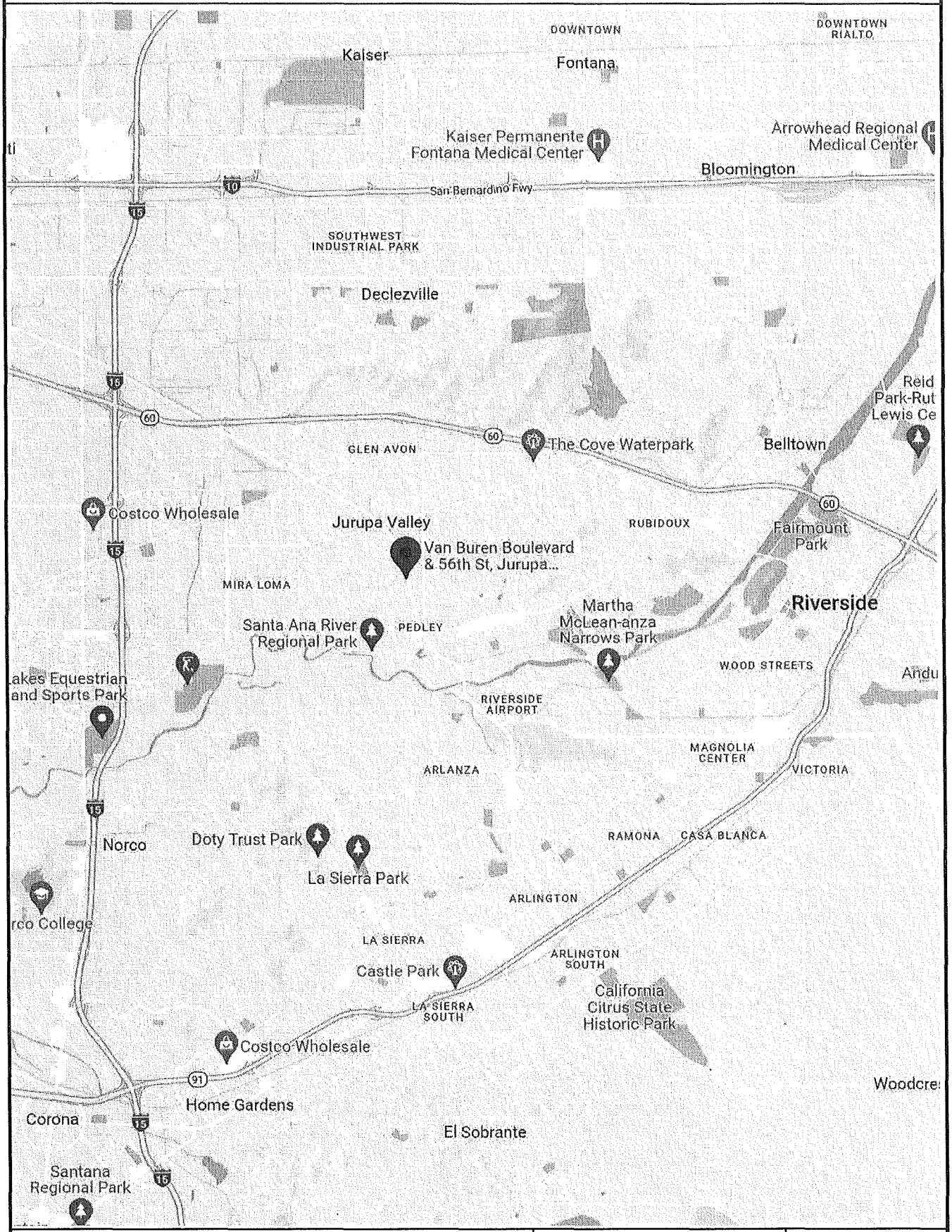
10) Unless otherwise specified, all other fills and backfills should be compacted to at least 90 percent of maximum laboratory density.

11) The compaction characteristics of all fill soils shall be determined by ASTM D-1557 standard. The field density and degree of compaction shall be determined by ASTM D-1556, or by other ASTM standard methods that are acceptable to the governing public agency. Field density tests should be taken at every two vertical feet or for every 500 cubic yards of fill placed, whichever is more restrictive.

12) Observation and testing of all compaction shall be under the direction of the Soils Engineer. The Soils Engineer shall advise the owner and grading contractor immediately if any unsatisfactory soils related conditions exist and shall have the authority to reject the compacted fill ground until such time as corrective measures necessary are taken to comply with the specifications.

13) The Soils Engineer should be notified at least 2 days in advance of the start of grading. A joint meeting between a representative of the client, the contractor, and the Soils Engineer is recommended prior to grading to discuss specific procedures and scheduling.

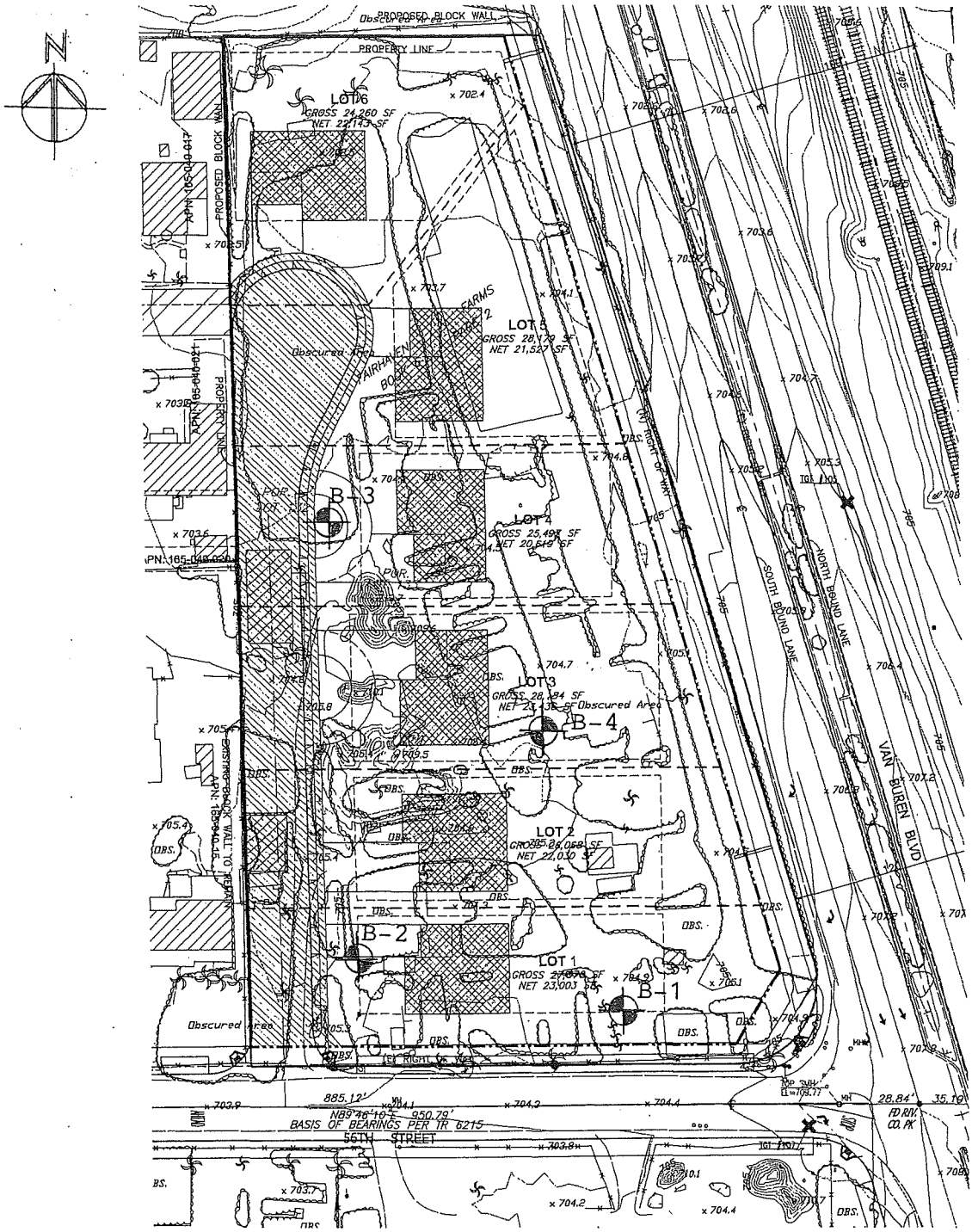
VICINITY MAP



PROJECT LOCATION	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.	1977-S	PLATE	1

PACIFIC GEOTECH, INC

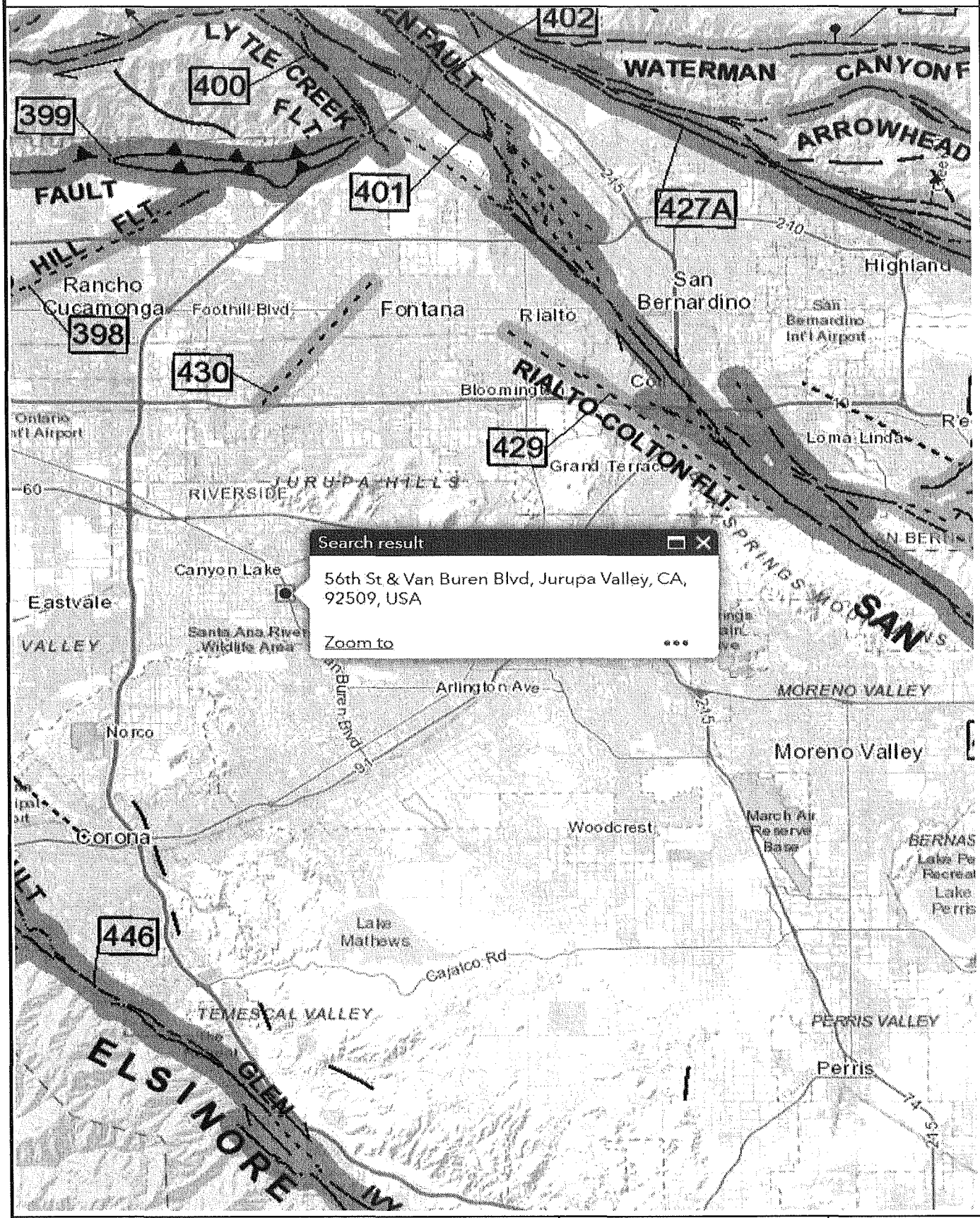
SITE PLAN & BORING LOCATION



SCALE: 1"=100'

PROJECT LOCATION	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.	1977-S	PLATE	2

FAULT MAP



PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.:	1977-S	PLATE	3

APPENDIX

LOG OF TEST BORING

LABORATORY TEST

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well-graded gravels or gravel-sand mixtures, little or no fines.
			GP	Poorly-graded gravels or gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well-graded sands or gravelly sands, little or no fines.
			SP	Poorly-graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amt. of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silt-clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.

Reference: The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No. 3-357, Vol. 1, March, 1953 (Revised April, 1960)

PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.: 1977-S	PLATE A

LOG OF TEST BORING

BORING No. 1

Sample Type
R: Ring Sample
S: SPT Sample
B: Bulk Sample

Date Drilled: 3/5/22
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs

Ground Surface Elevation:

Depth in Feet	Sample Type	Sample Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol	Description of Material	Color	Consistency	Moisture
						FILL SAND; fine, silty	brown	compact	moist
					SM	**ALLUVIUM** SAND; fine to coarse, silty, fine-grained gravel		dense	
5	R	32	8.7	115.4					slightly moist to moist
	S	21							
10	R	57	7.1	117.7					
	S	33							
15	R	66	11.5	116.2		SAND; fine, slightly clayey, silty	reddish brown		
	S	38							
20	R	70	12.5	119.5		SAND; fine, silty			
	S	41							
25	R	67	10.5	121.7		SAND; fine to coarse, slightly silty to silty	brown		▽ water
	S	35							
30	R	62	10.9	116.1	**SW**	SAND; fine to coarse, clean			
	S	37							
35	R	69	10.2	122.5					
	S	34							
40	R	76	9.4	122.9					

(cont'd)

PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.: 1977-S	PLATE A-1/1

LOG OF TEST BORING

BORING No. 1
(cont'd)

Sample Type
R: Ring Sample (Undisturbed)
S: SPT Sample
B: Bulk Sample

Date Drilled: 3/5/22
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs

Ground Surface Elevation:

Depth in Feet	Sample Type	Sample Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol	Description of Material	Color	Consistency	Moisture
	S	35			SW	**ALLUVIUM** SAND; fine to coarse, clean	brown	dense	wet
45	R	75	9.8	121.8					
	S	38							
50	R	72	8.1	123.5					
	S	44							

End of Boring @ 51 feet
Groundwater @ 24 feet

PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.:	1977-S	PLATE	A-1/2

LOG OF TEST BORING

BORING No. 2

Sample Type
R: Ring Sample
S: SPT Sample
B: Bulk Sample

Date Drilled: 3/5/22
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs

Ground Surface Elevation:

Depth in Feet	Sample Type	Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol	Description of Material	Color	Consistency	Moisture
						FILL SAND; fine, silty	brown	compact	moist
	R	24	13.1	113.1	ML	**ALLUVIUM** SILT; very fine-sandy, slightly clayey	reddish brown	firm	
5	R	33	10.1	118.5					
10	R	37	8.3	117.1		SILT; very fine-sandy, fine-grained gravel			
15	R	65	10.4	121.3		SILT; very fine-sandy	brown		
20	R	28	14.4	113.9					

End of Boring @ 20 feet
No Groundwater

PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.: 1977-S	PLATE A-2

LOG OF TEST BORING

BORING No. 3

Sample Type
R: Ring Sample
S: SPT Sample
B: Bulk Sample

Date Drilled: 3/5/22
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs

Ground Surface Elevation:

Depth in Feet	Sample Type	Sample Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol	Description of Material	Color	Consistency	Moisture
						FILL SAND; fine, silty	brown	compact	moist
					ML	**ALLUVIUM** SILT; very fine-sandy, slightly clayey	reddish brown	firm	
5	R	31	7.6	118.3		SILT; very fine-sandy			
10	R	28	9.9	109.6			grayish brown		
15	R	43	17.1	112.5					
20	R	48	19.7	115.7					▽ water

End of Boring @ 20 feet
Groundwater @ 19 feet

PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.:	1977-S	PLATE	A-3

LOG OF TEST BORING

BORING No. 4

Sample Type
R: Ring Sample
S: SPT Sample
B: Bulk Sample

Date Drilled: 3/5/22
Drilling Equipment: Hollow Stem Auger
Driving Weight: 140 lbs

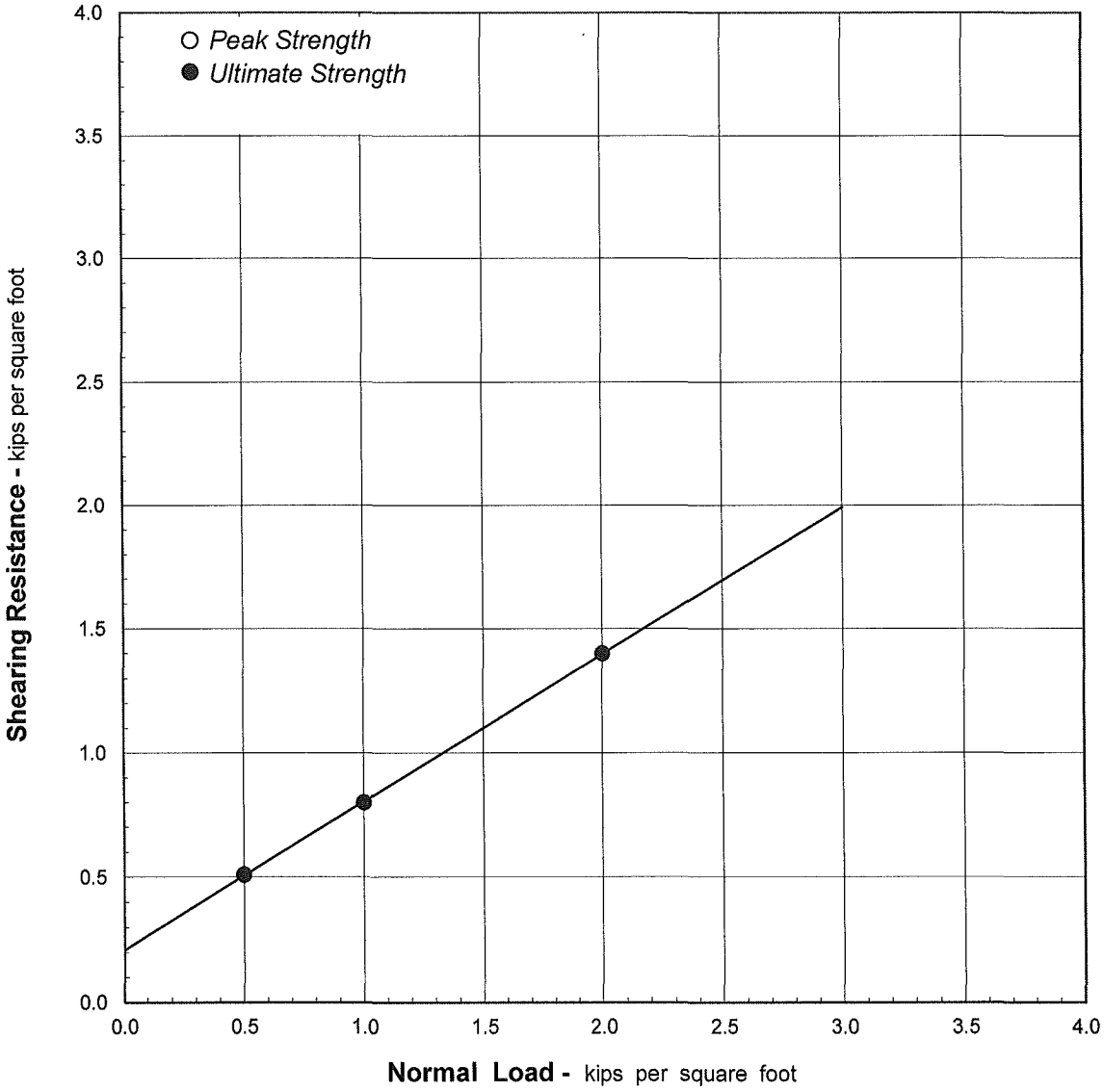
Ground Surface Elevation:

Depth in Feet	Sample Type	Blow/12"	Moisture Content (% of Dry Weight)	Dry Unit Weight (lbs./cu.ft.)	USCS Symbol	Description of Material	Color	Consistency	Moisture
						FILL SAND; fine, silty	brown	compact	moist
	R	36	8.7	120.7	**ML**	**ALLUVIUM** SILT; very fine-sandy	reddish brown	firm	
5	R	34	10.3	121.4					
10	R	31	9.3	107.5					
15	R	41	1.1	104.9	**SW**	SAND; fine to coarse, clean		dense	
20	R	39	2.3	106.5		SAND; fine to coarse, clean, gravelly			

End of Boring @ 20 feet
No Groundwater

PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.: 1977-S	PLATE A-4

DIRECT SHEAR TEST

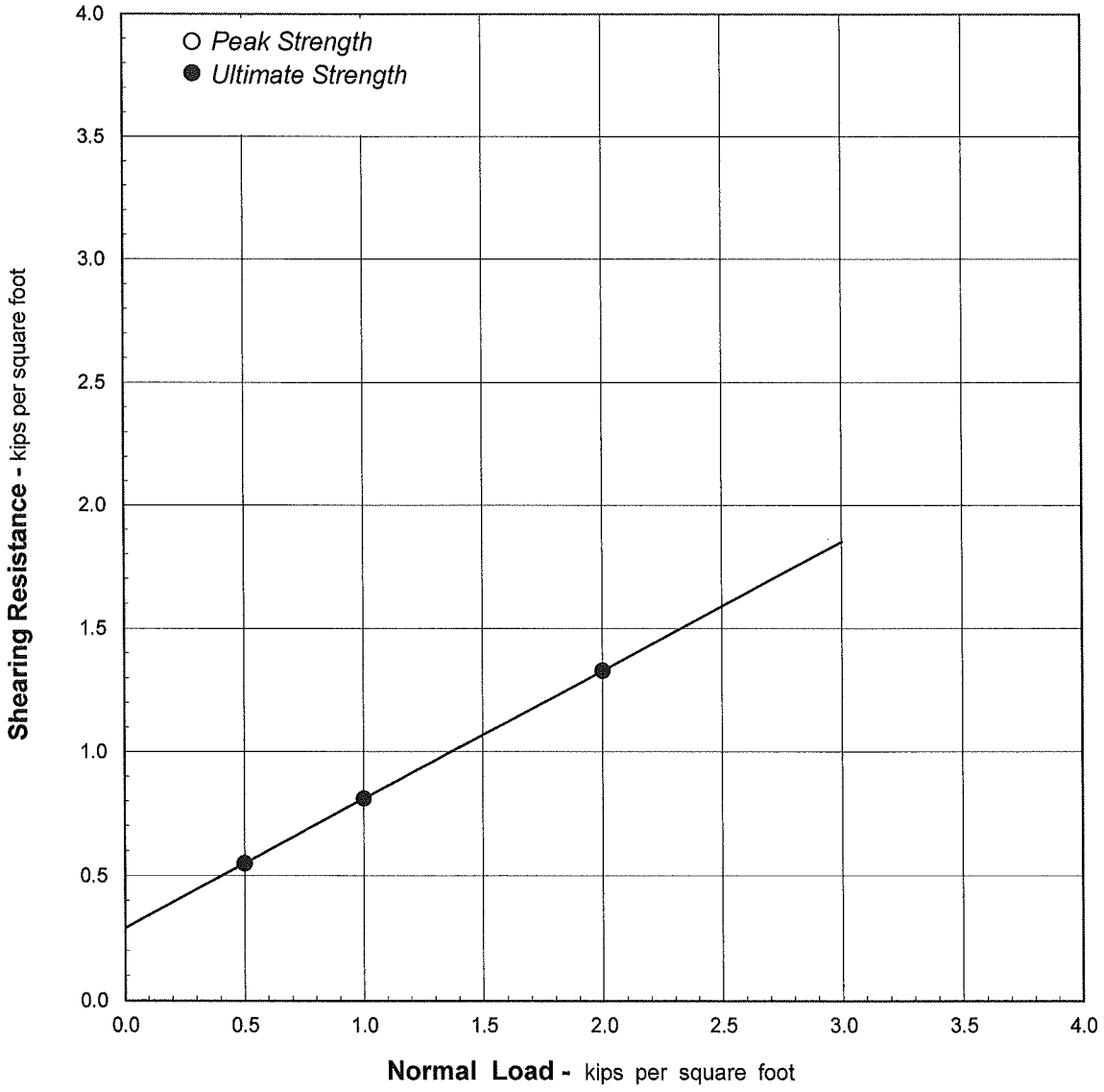


Symbol	Boring No.	Depth (feet)	USCS Symbol	Initial Moisture Content (% of dry wt.)	Saturated Moisture Content (% of dry wt.)	Dry Unit Weight (lbs./cu.ft.)	Cohesion (lbs./sq.ft.)	Angle of Friction (degree)
●	1	5	SW	8.7	16.8	115.4	210	31

Samples were tested under saturated and drained conditions.

PROJECT LOCATION	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No. 1977-S	PLATE A-5

DIRECT SHEAR TEST



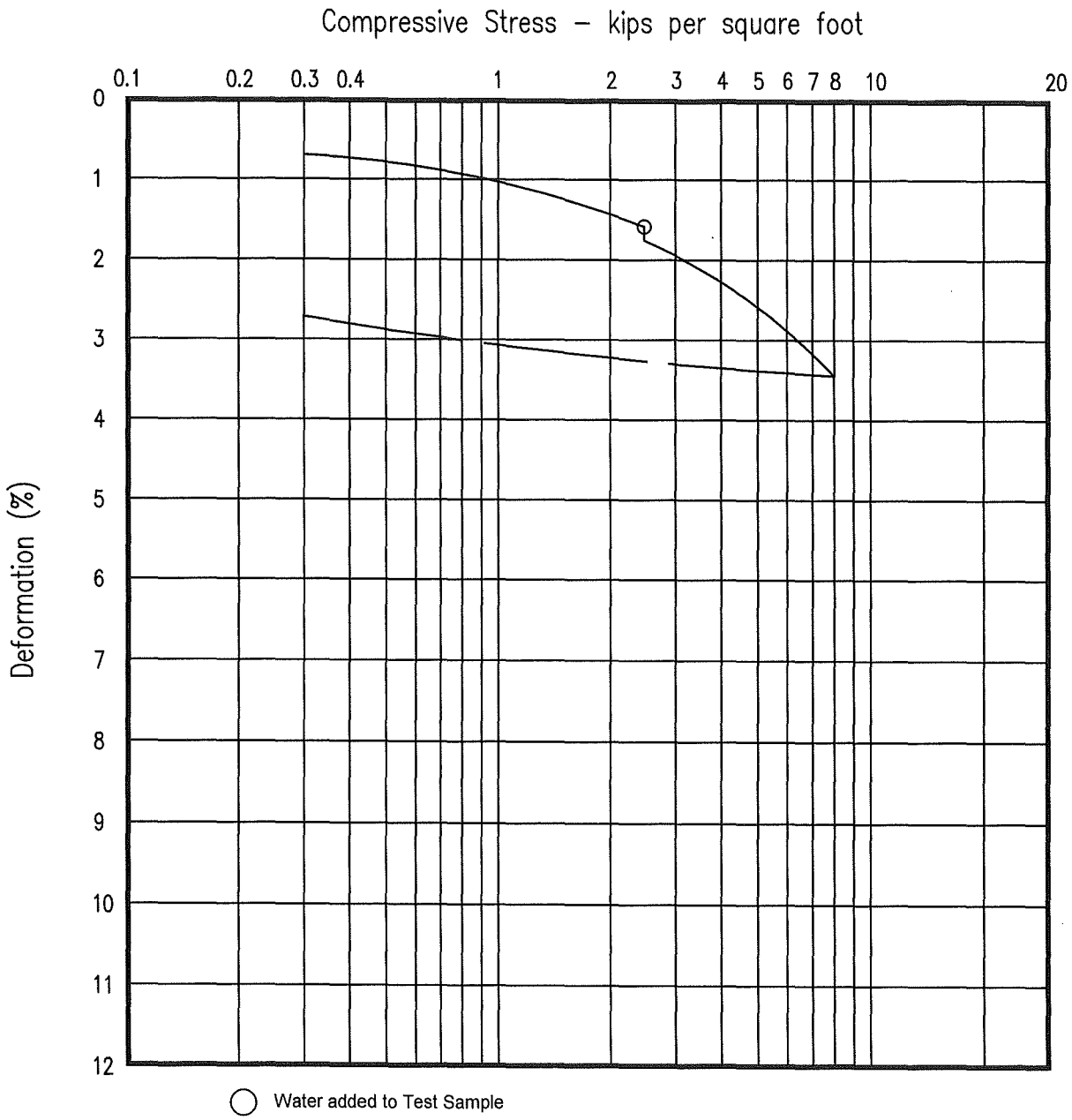
Symbol	Boring No.	Depth (feet)	USCS Symbol	Initial Moisture Content (% of dry wt.)	Saturated Moisture Content (% of dry wt.)	Dry Unit Weight (lbs./cu.ft.)	Cohesion (lbs./sq.ft.)	Angle of Friction (degree)
●	2	2	ML	13.1	18.2	113.1	290	27

Samples were tested under saturated and drained conditions.

PROJECT LOCATION	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No. 1977-S	PLATE A-6

CONSOLIDATION TEST

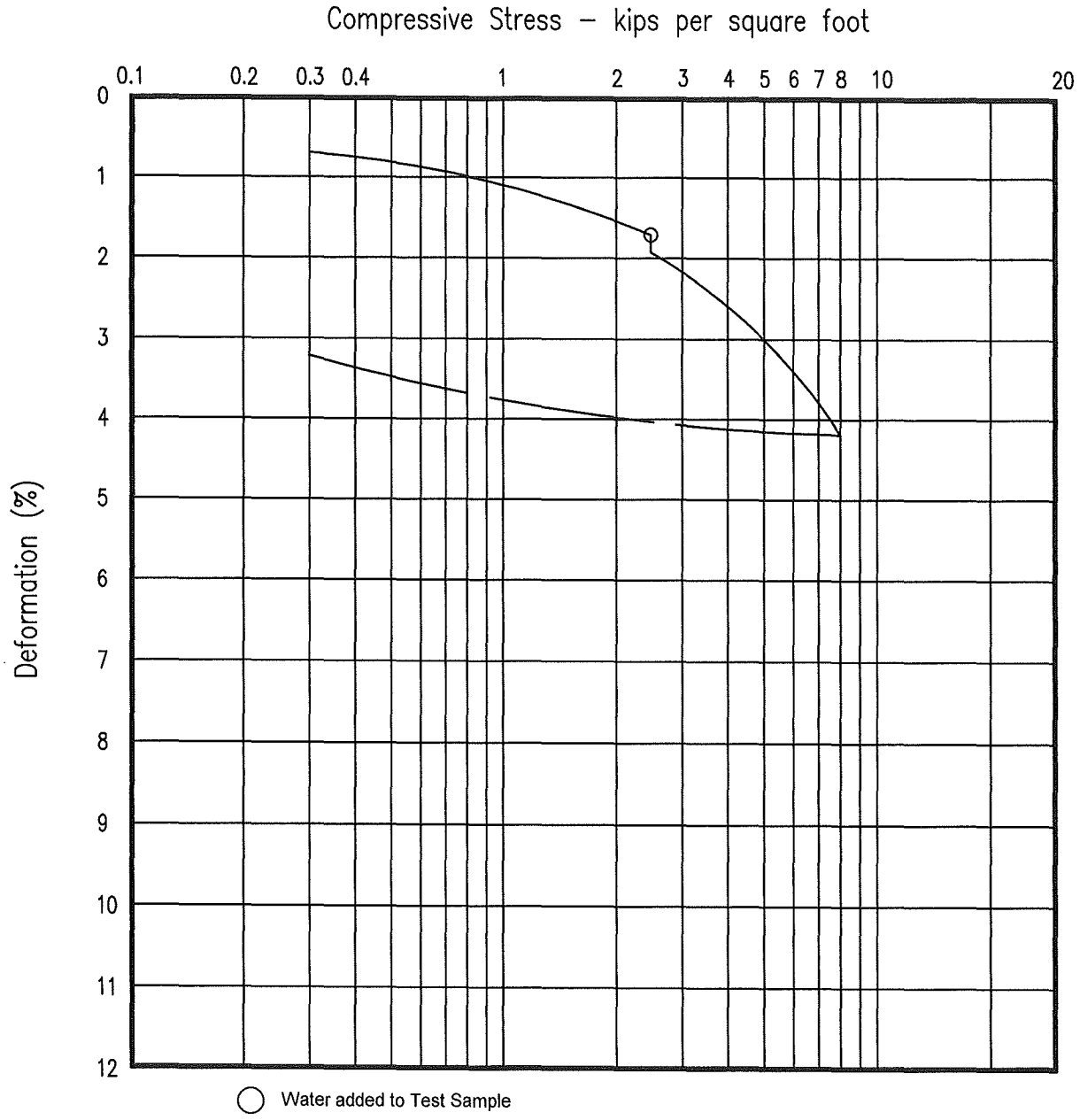
Boring No. : 4
Depth: 10 feet
Soil Type: very fine-sandy SILT



PROJECT LOCATION	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No. 1977-S	PLATE A-7

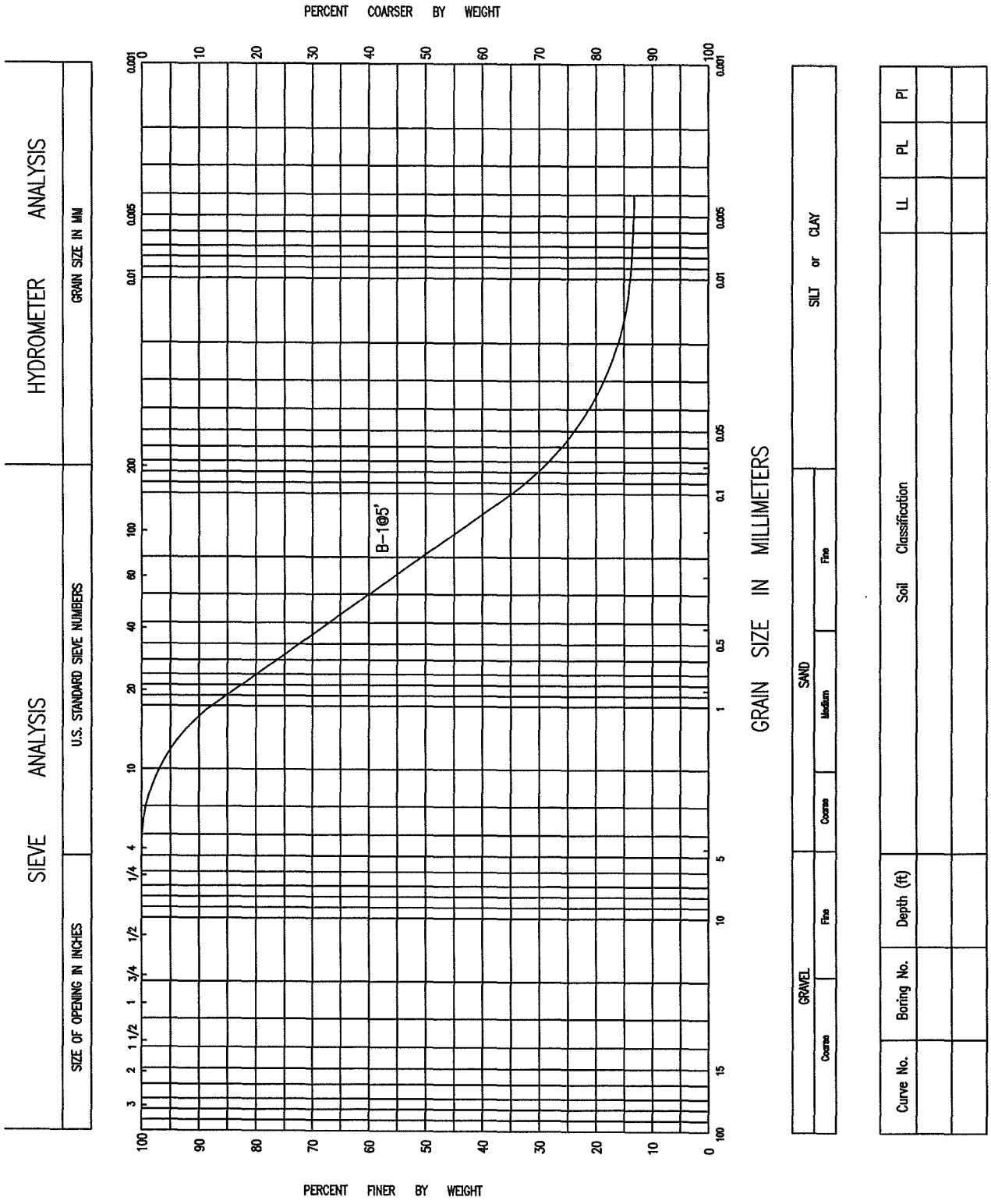
CONSOLIDATION TEST

Boring No. : 4
Depth: 15 feet
Soil Type: fine to coarse, clean SAND



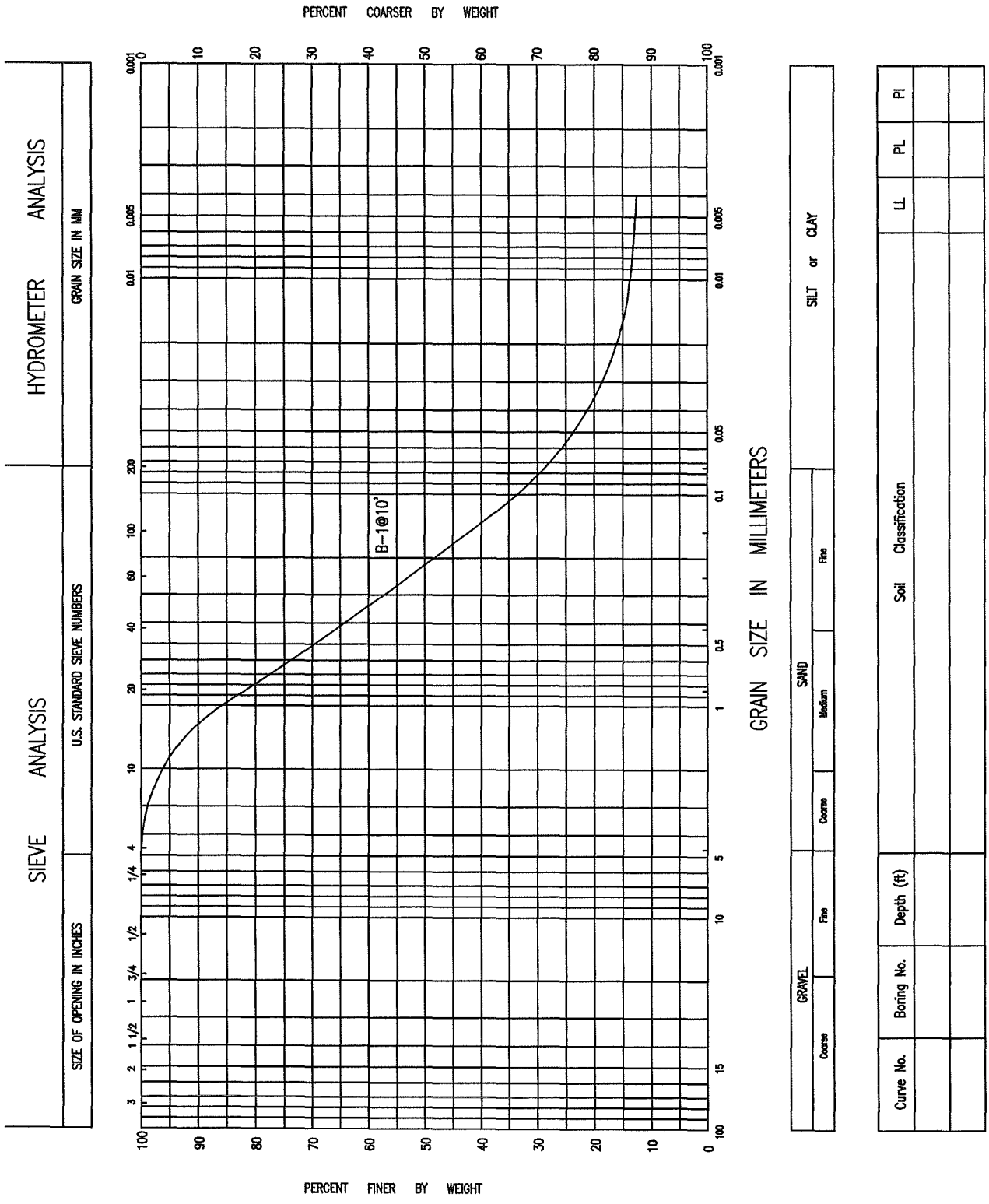
PROJECT LOCATION	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No. 1977-S	PLATE A-8

GRADATION CURVE



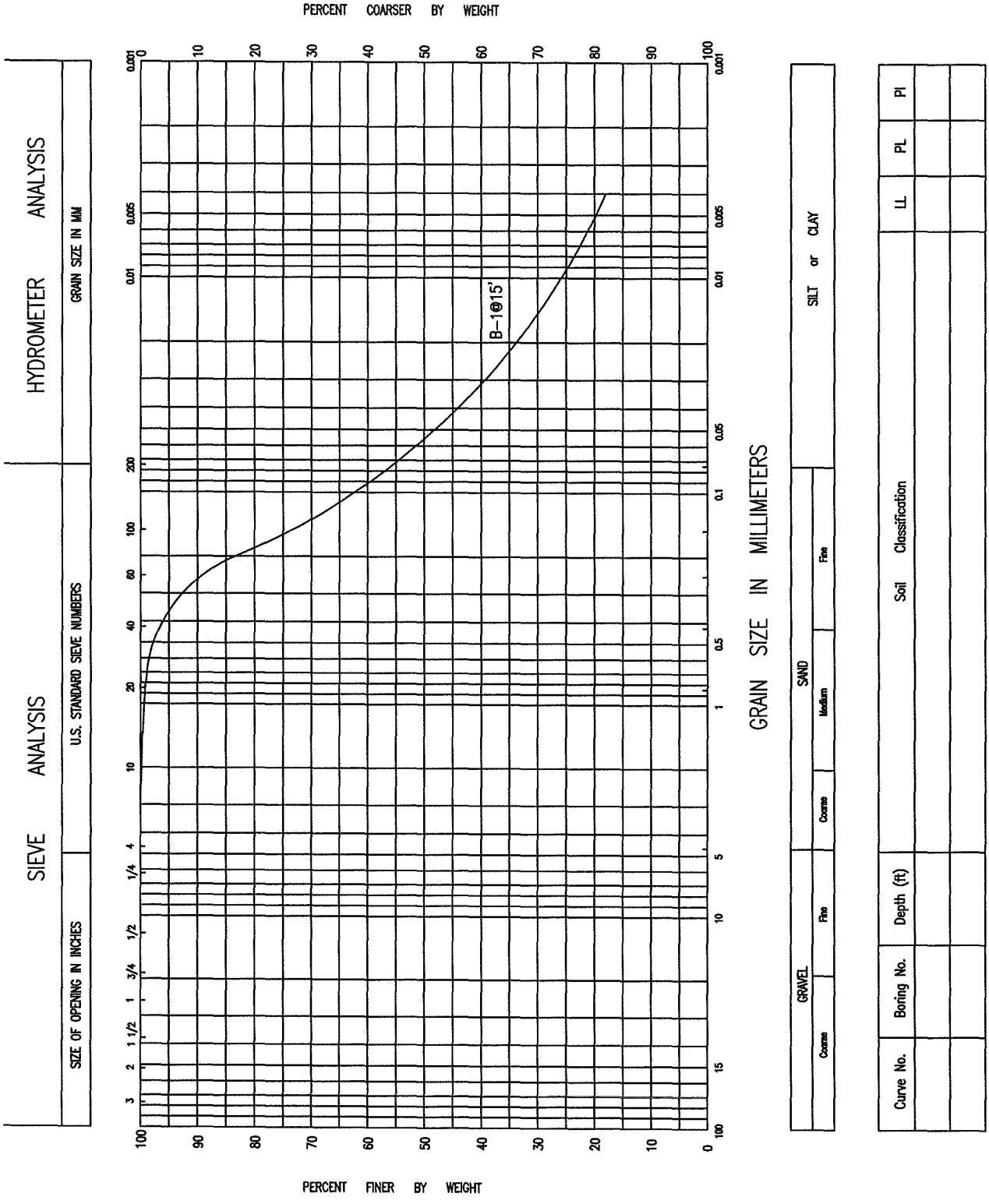
PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.: 1977-S	PLATE A-9

GRADATION CURVE



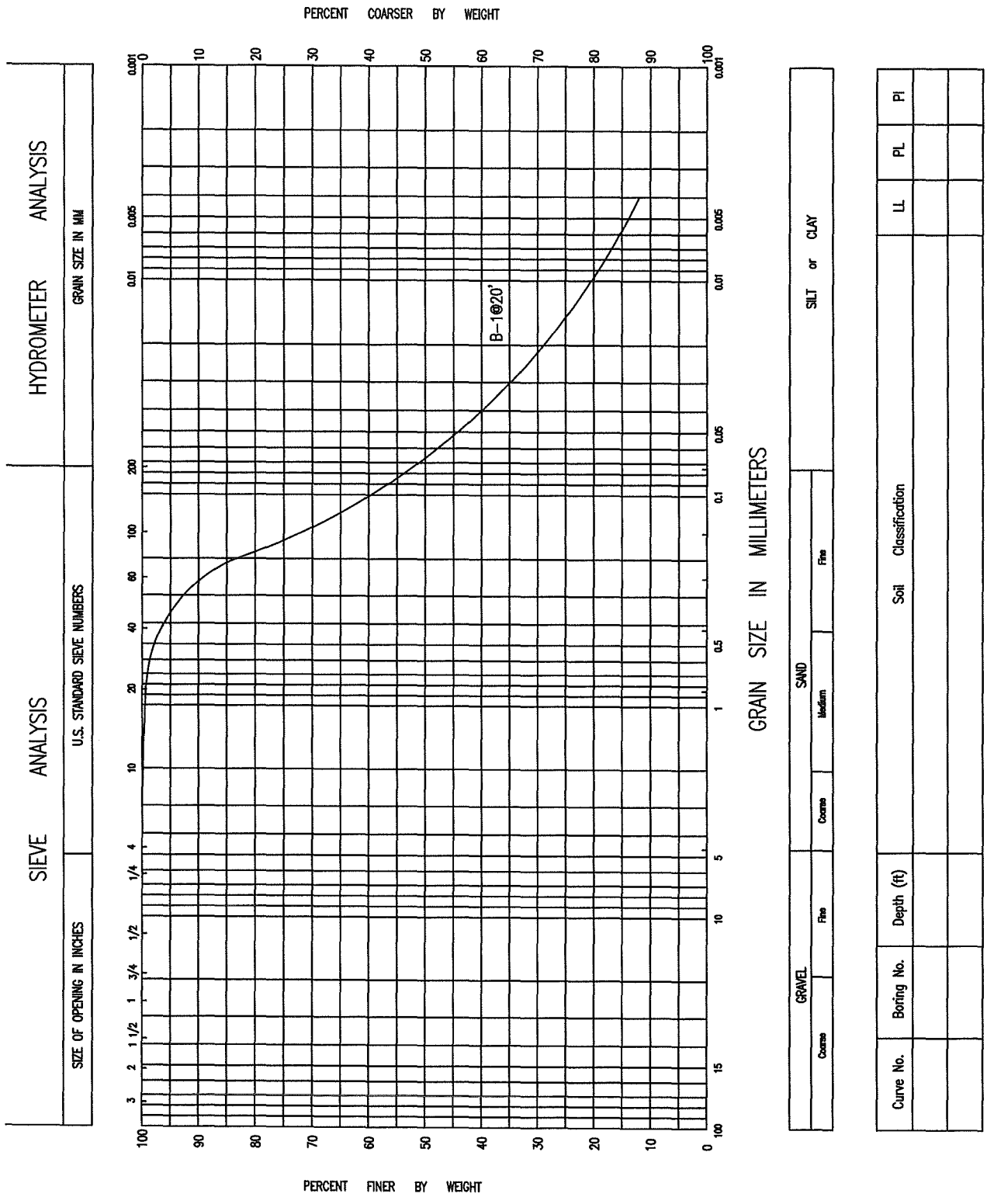
PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.: 1977-S	PLATE A-10

GRADATION CURVE



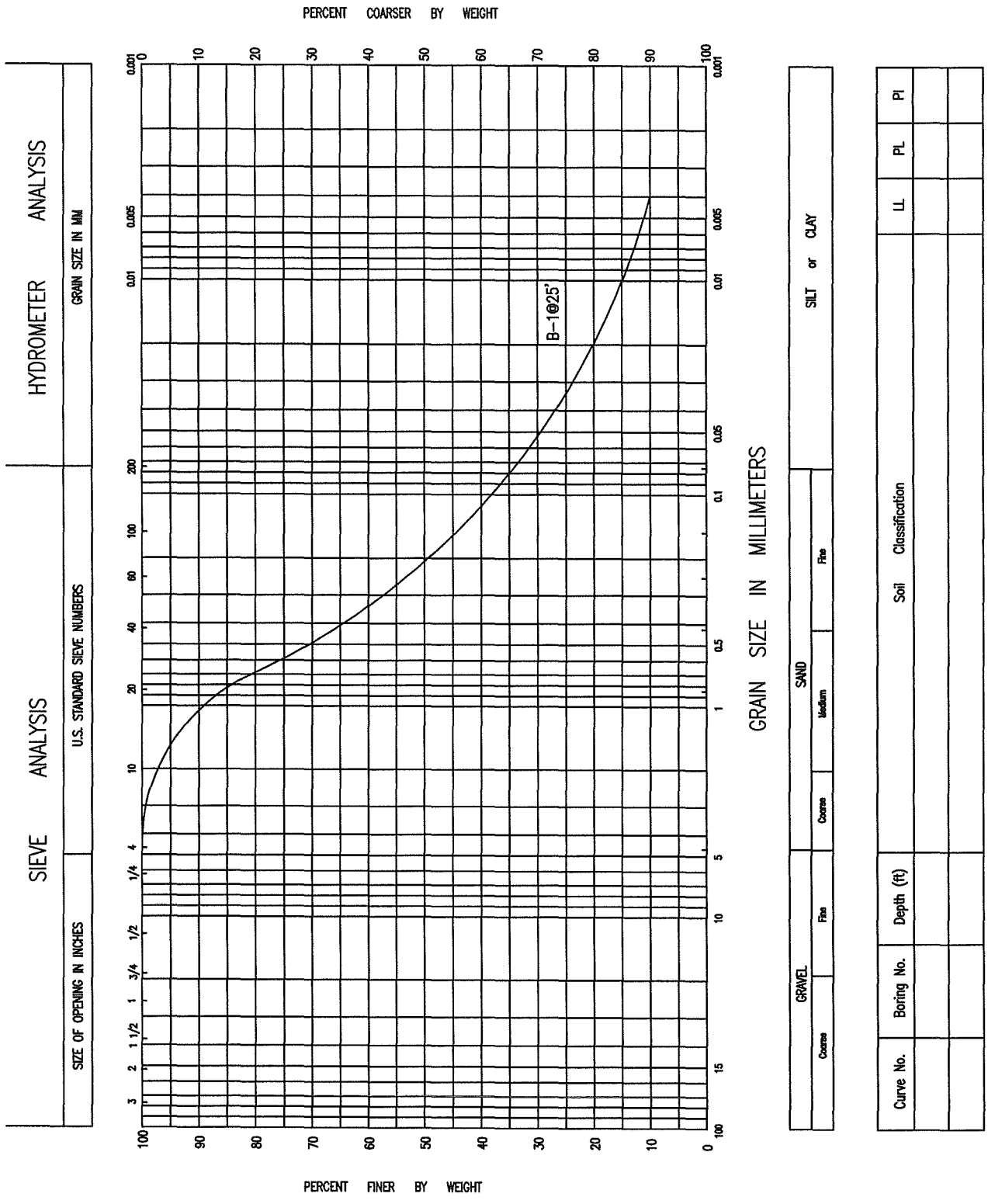
PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.: 1977-S	PLATE A-11

GRADATION CURVE



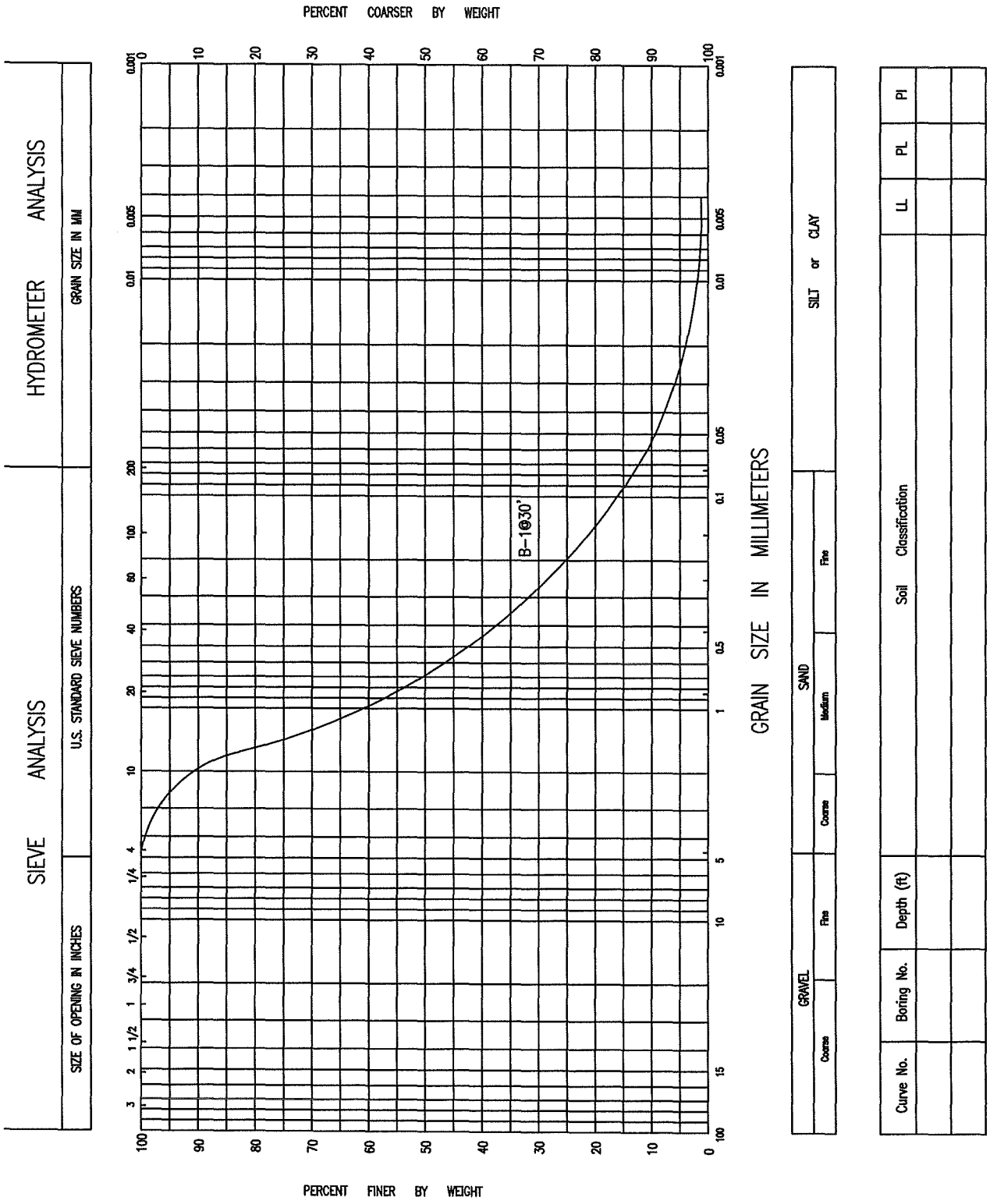
PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.: 1977-S	PLATE A-12

GRADATION CURVE



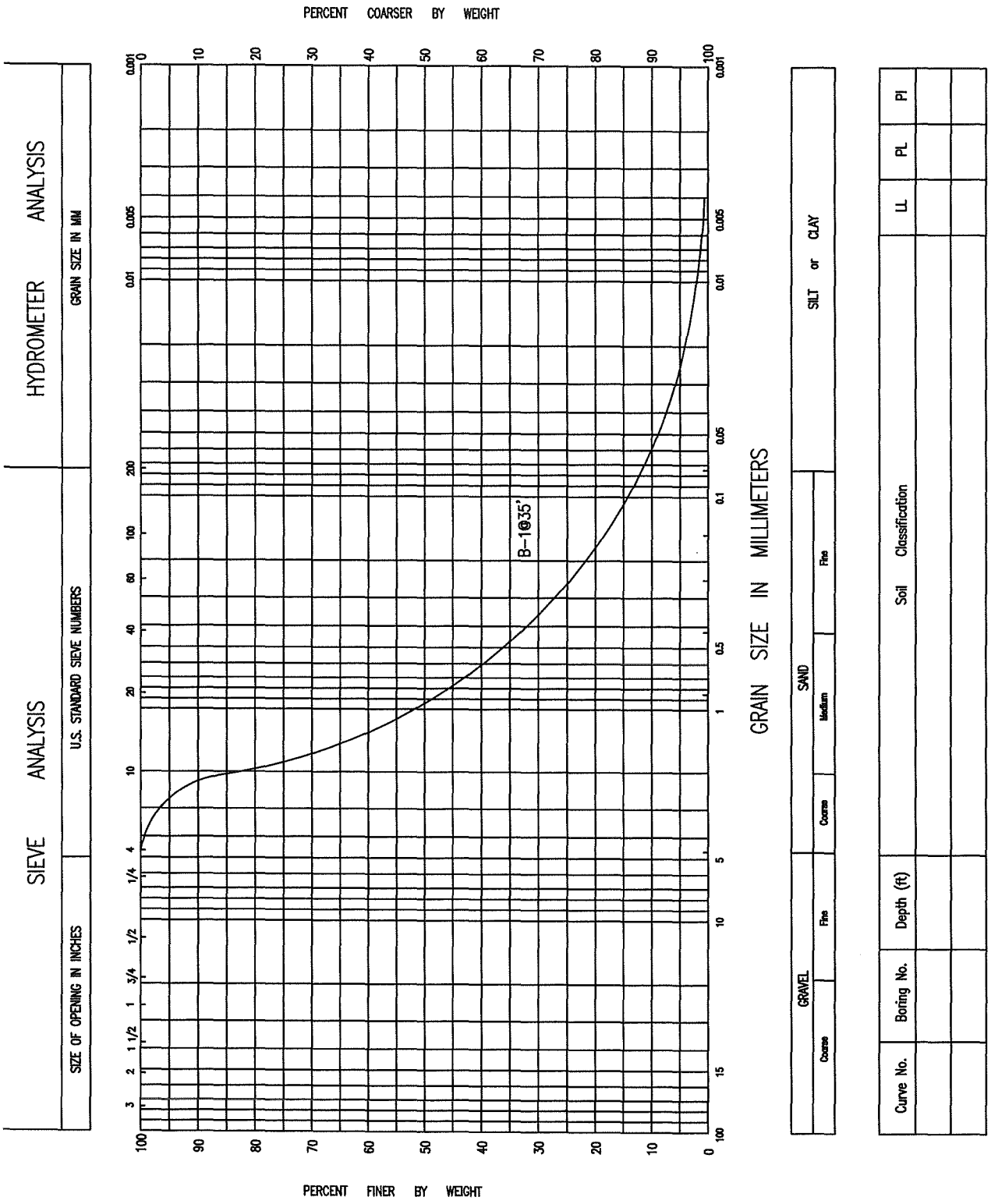
PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.: 1977-S	PLATE A-13

GRADATION CURVE



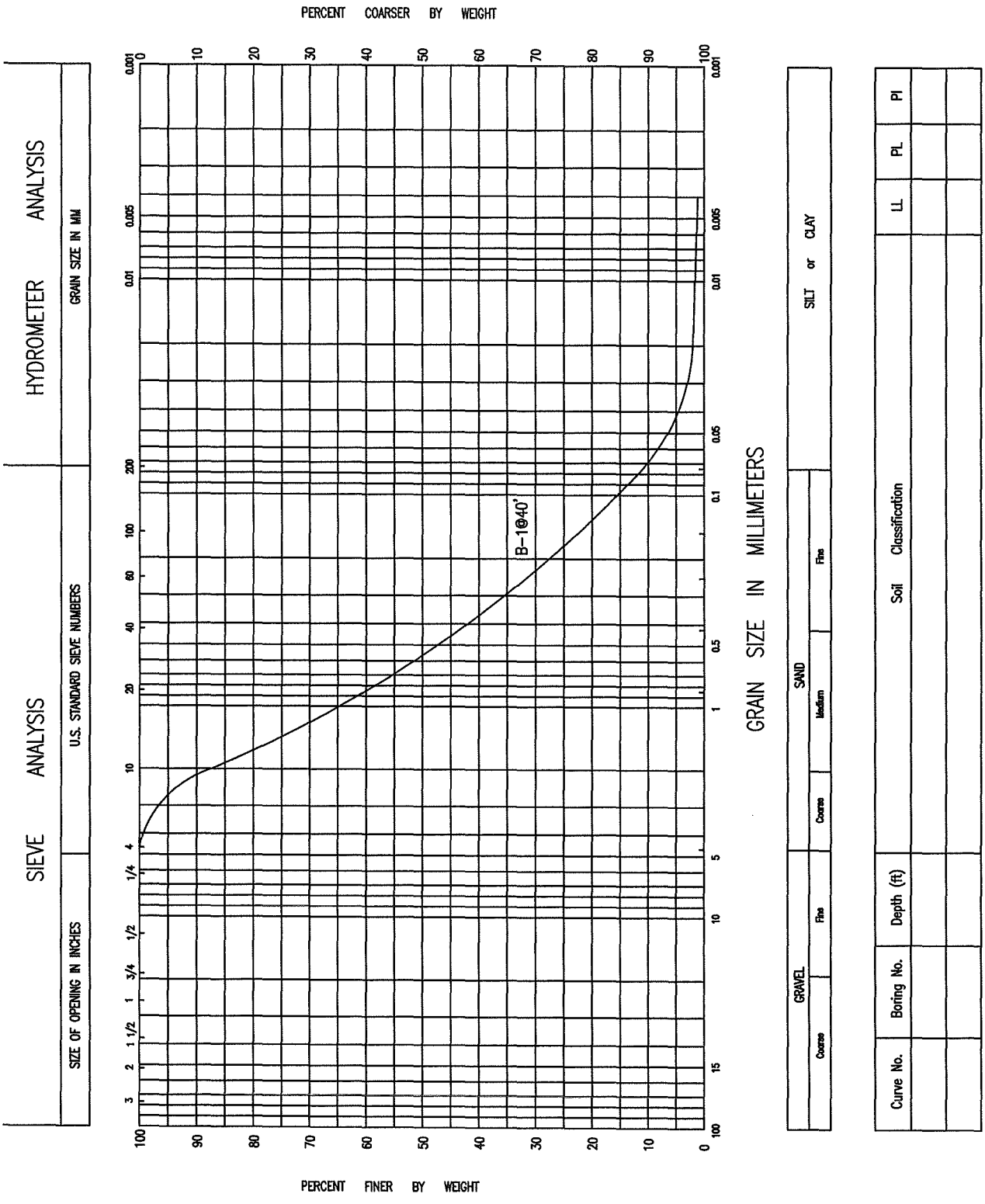
PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.: 1977-S	PLATE A-14

GRADATION CURVE



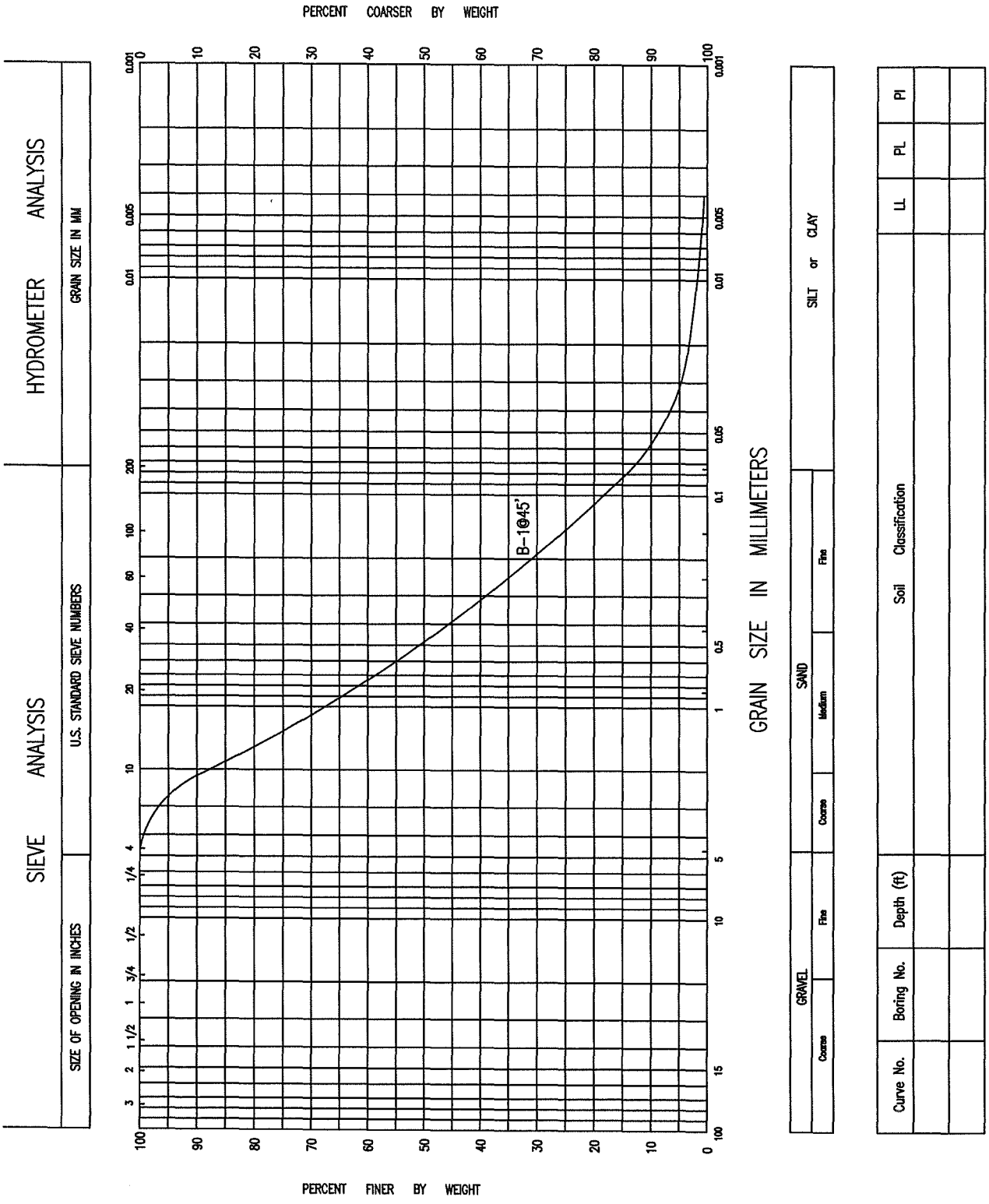
PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.: 1977-S	PLATE A-15

GRADATION CURVE



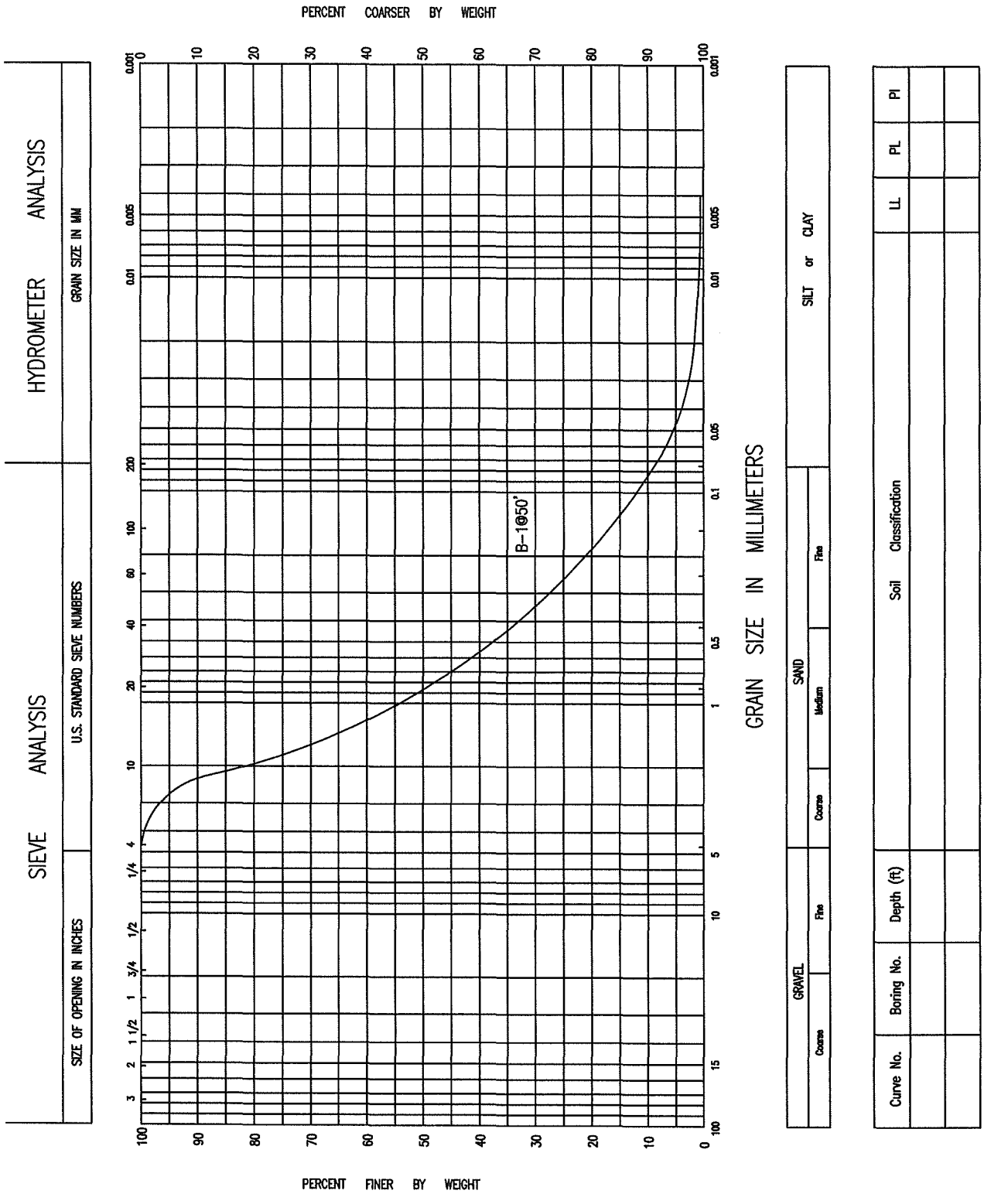
PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.: 1977-S	PLATE A-16

GRADATION CURVE



PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	**PROJECT No.:** 1977-S	**PLATE** A-17

GRADATION CURVE



PROJECT LOCATION:	NWC 56th St & Van Buren Blvd Jurupa Valley, California	PROJECT No.: 1977-S	PLATE A-18

CA

Contact WDL

CALIFORNIA DEPARTMENT OF
WATER RESOURCES

Groundwater Level Report

Station 339750N1175187W001

Station Data | Groundwater Level Data

State Well Number:	02S06W28C001S
Local Well Name:	CHINO-1207333
Site Code:	339750N1175187W001
Latitude (NAD83):	33.975033
Longitude (NAD83):	-117.518707
Basin Subbasin Name (Code):	Chino (8-002.01)
Well Use Type:	Observation
Well Status:	Active
WCR Number:	771216
Reference Point Elevation (NAVD88 ft):	672.410
Ground Surface Elevation (NAVD88 ft):	669.760
Well Depth (feet bgs):	230
Perforated Interval Depths (feet bgs):	75.000 135.000 150.000 230.000