NOVA

GEOTECHNICAL EVALUATION
SHINOHARA II BURN SITE
ASSESSOR'S PARCEL NUMBERS 644-042-02 AND -10
CHULA VISTA, CALIFORNIA

PREPARED FOR:
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PREPARED BY:
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October 2, 2013
Project No. 2013030

NOVA

GEOTECHNICAL ■ MATERIALS ■ SPECIAL INSPECTIONS
SBE ■ SLBE ■ SCOOP

Ms. Nicki Field
Senior Project Professional
SCS Engineers
8799 Balboa Avenue, Suite 290
San Diego, CA 92123

October 2, 2013
Project No. 2013030

Subject: Geotechnical Evaluation
Shinohara II Burn Site
Assessor's Parcel Numbers 644-042-02 and -10
Chula Vista, California

Dear Ms. Field:

In accordance with your authorization, NOVA Services, Inc. (NOVA) has prepared this geotechnical evaluation report for the Shinohara II Burn Site project in the City of Chula Vista, California. This report presents our geotechnical findings, conclusions, and recommendations regarding the proposed project.

We appreciate the opportunity to be of service.

Respectfully submitted,
NOVA Services, Inc.

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Distribution: (1) Addressee

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1. INTRODUCTION

According to your request and our proposal dated February 14, 2013, NOVA Services, Inc. (NOVA) has performed a geotechnical evaluation for the Shinohara II Burn Site located within Assessor's Parcel Numbers 644-042-02 and -10 in the City of Chula Vista, California. This report presents the results of our background review, subsurface evaluation, laboratory testing, geotechnical analyses, conclusions regarding the geotechnical conditions at the subject site, and recommendations for design and construction of the proposed project.

2. SCOPE OF SERVICES

Our scope of services for this project included the following tasks:

- Review of available geotechnical information, including the Waste Characterization Report prepared by SCS Engineers (2013) for the site and previous geotechnical/geological reports, topographic maps, geologic data, fault maps, and aerial photographs.
- Field reconnaissance to observe site conditions and to mark the proposed exploratory boring locations.
- Contacting County of San Diego Department of Environmental Health Services to obtain boring permit LMWP-000457 for the subsurface exploration.
- Performing a exploration program consisting of drilling, logging, and sampling three exploratory soil borings and obtaining two surficial soil samples to evaluate subsurface conditions.
- Geotechnical laboratory testing on selected soil samples.
- Compiling and analyzing the data obtained from our research, subsurface exploration, and laboratory testing.
- Preparing this report to present our findings, conclusions, and recommendations regarding the design and construction of the project.

3. SITE AND PROJECT DESCRIPTION

The subject site is located on the southern bank of the Otay River in Chula Vista, California and has a surface area of approximately 4.5 acres as shown in Figure 1, Site Location Map. The site is bounded to the north and east by the Otay River, to the west by vacant land and to the south by an access road associated with the adjacent residential development. The site consist of two parcels as follows: the western parcel with an approximate area of 3.5 acres is located within assessor parcel number (APN) 644-042-10 and is owned by the Shinohara Family Trust, the eastern parcel with an approximate area of 1 acre is located within APN 644-042-02 is owned by the City of Chula Vista.

The site is flat with elevations ranging from El. 95 feet above mean sea level (msl) to the west and El. 106 (msl) to the east. The river bed is at approximate El. 91 along the toe of the northern and eastern banks. Vegetation consists of grass with medium size trees on the northern and eastern slopes. Site elevations are based on the topographic survey performed by SCS (2012) and Google Earth (2013) data.

According to the Waste Characterization Report by SCS (2013), the site was previously used to dump fill, construction debris and soil containing burnt ash. The waste materials extend to depths of up to 30 feet below existing grade. The preliminary closure plan for the site consists of placing a minimum 2-foot cover of clean compacted soil graded at 3 percent, providing storm water collection and conveyance facilities, constructing improved channel walls with slope scour protection along the natural drainage course to prevent washout during the 100-year storm event, placing erosion control, seeding, final cover planting and establishing a maintenance and inspection plan for the post-closure period.

4. SUBSURFACE EXPLORATION AND LABORATORY TESTING

Our subsurface exploration was conducted on June 20, 2013. The exploration consisted of drilling, logging, and sampling three exploratory borings to maximum depths of approximately 51½ feet below existing ground surface at the locations shown in Figure 2, Boring Location Map. The borings were used to evaluate subsurface conditions and collect relatively undisturbed and bulk soil samples at selected depths for laboratory testing. The borings were drilled using a truck-mounted drill rig equipped with 8-inch diameter hollow-stem augers and were backfilled with bentonite. Logs of the borings are included in Appendix A. In addition, two surface soil samples were collected at the locations shown in Figure 2.

Laboratory testing of representative soil samples included gradation with hydrometer analyses, expansion index, Atterberg limits, direct shear, Proctor density, R-value and permeability. The results of the in-situ dry density and moisture content tests are presented on the boring logs in Appendix A. The results of the other laboratory tests performed are presented in Appendix B.

5. GEOLOGY AND SUBSURFACE CONDITIONS

Our discussion of the geologic conditions at the site is based on our current field exploration and review of available geotechnical and geologic literature. Our findings regarding regional and local geology, including faulting seismicity, and groundwater conditions at the subject site are provided in the following sections.

5.1. Regional Geologic Setting

The project area is situated in the Peninsular Ranges Geomorphic Province. This geomorphic province encompasses an area that extends approximately 900 miles from the Transverse Ranges and the Los Angeles Basin south to the southern tip of Baja California (Norris and Webb, 1990; Harden, 1998). The province varies in width from approximately 30 to 100 miles and is comprised in San Diego County of a relatively narrow, low-relief coastal plain and a central high relief mountainous zone.

The project site is situated within the coastal plain zone. The regional geology is controlled by both alluvial and marine influences. Quaternary aged alluvial deposits interbedded with marine embayment deposits underlie the area. The coastal plain is underlain by near-shore marine sedimentary rocks deposited at various intervals between the late-Mesozoic through Quaternary ages. The plain increases in elevation from west to east across marine terrace surfaces uplifted during Pleistocene time. Sedimentary rocks consist of sandstones, siltstones, and claystones that were deposited during the Cretaceous, Tertiary, and Quaternary periods. The geology in the vicinity of the site is presented in Figure 3, Regional Geologic Map.

The Peninsular Ranges Province is traversed by a group of sub-parallel faults and fault zones trending roughly northwest. The Rose Canyon, Coronado Bank, Newport-Inglewood and San Clemente faults are active faults located west of the project area and the Elsinore, Earthquake Valley, San Jacinto, and San Andreas faults are active fault systems located east of the project area. Major tectonic activity associated with these and other faults within this regional tectonic framework is right-lateral, strike-slip movement. Further discussion of faulting relative to the site is provided in the Faulting and Seismicity section of this report.

5.2. Site Geology

Geologic units encountered during our subsurface evaluation included surficial soils consisting of undocumented fill overlying alluvial deposits. The following sections provide generalized descriptions of the materials encountered. Detailed descriptions are provided in Appendix A.

5.2.1. Artificial Fill - Undocumented (Map Symbol Afu)

Artificial fill materials were encountered at the existing surface extending to approximate depths ranging from 16 to 21 feet below existing ground surface (bgs). The fill materials consist of dark to light brown, moist to saturated, loose to dense, fine to coarse silty sand with clay, gravel and cobbles. As mentioned above, the site was used for waste disposal, and the undocumented fill contains burnt ash, brick, concrete and glass fragments. Based on the laboratory testing performed by SCS (2012), the waste materials contain pesticides and other contaminants.

5.2.2. Young Alluvial Flood Plain Deposits (Map Symbol Qya)

Young alluvial flood plain deposit materials were encountered underlying fill in exploratory borings B-2 and B-3 extending to depths of 31 and 25 feet bgs, respectively. Young alluvial materials consist generally of gray to olive gray, wet to saturated, loose to medium dense, silty to clayey sand with mica and few shells.

5.2.3. Old Alluvial Flood Plain Deposits (Map Symbol Qoa)

Old alluvial flood plain deposit materials were encountered underlying fill in boring B-1 and young alluvium in borings B-2 and B-3 extending to the maximum exploratory depth of 51½ feet bgs. Old alluvial materials consist generally of light brown to yellowish brown and light to dark gray, saturated, medium dense to very dense, silty sand and sandy silt with clay and gravel.

5.3. Groundwater

Groundwater was encountered during our subsurface exploration at approximate depths of 16, 32 and 20 feet bgs in borings B-1, B-2 and B-3, corresponding to Elevations 89, 72 and 82 feet above mean sea level (msl), respectively. Surface water is present to the north of the site within the Otay River basin. According to SCS (2012), the topographic elevation of the surface water is interpreted to range from approximate El. 85 to El. 90 feet (msl). Fluctuations in the groundwater level may occur due to variations in rainfall, irrigation, ground surface topography, subsurface geologic conditions and structure, and other factors.

6. FAULTING AND SEISMICITY

The subject site is not located within a State of California Earthquake Fault Zone (formerly known as an Alquist-Priolo Special Studies Zone, Hart and Bryant, 1997). However, the site is located in a seismically active area, as is the majority of southern California, and the potential for strong ground motion in the project area is considered significant during the design life of the proposed structure. The nearest known active fault corresponds to the Rose Canyon fault system located approximately 6.9 miles west of the site. This system has the potential to be the dominant source of strong ground motion. Figure 4 shows the approximate site location relative to the major faults in the region.

Table 1 lists selected known active faults within a search radius of 25 miles, the approximate fault-to-site distances and the maximum moment magnitude (M_{max}) as published by the 2008 USGS National Seismic Hazard Maps webpage (USGS, 2008).

Table 1 – Principal Active Faults

Fault	Approximate Fault-to-Site Distance[1] miles (kilometers)	Maximum Moment Magnitude [2] (M_{max})
Rose Canyon	6.9 (11.1)	6.9
Rose Canyon (Offshore)	8.8 (14.2)	6.9
Coronado Bank	15.2 (24.4)	7.4
Palos Verdes	15.7 (25.3)	7.3

Notes: [1] USGS (2008)
[2] Ellsworth Relation, USGS (2008)

The potential seismic hazards at the subject site are surface fault rupture and ground motion, liquefaction, seismically induced settlement, seiches and tsunamis. A brief description of these and other hazards and the potential for their occurrence on site are discussed below.

6.1. Surface Fault Rupture

Based on our review of the referenced literature and our site reconnaissance, no active faults are known to cross the project site. Therefore, the probability of damage from surface fault rupture is considered to be low. However, lurching or cracking of the ground surface as a result of nearby seismic events is possible.

6.2. Strong Ground Motion

The 2010 California Building Code (CBC) recommends that the seismic design be based on the horizontal peak ground acceleration (PGA) having a 2 percent probability of exceedance in 50 years which is defined as the Maximum Considered Earthquake (MCE). The statistical return period for PGA_{MCE} is approximately 2,475 years. The USGS National Seismic Hazards Mapping (2008) website was used to perform a probabilistic seismic hazard deaggregation analysis to estimate the potential peak ground acceleration (PGA) at the site. The analysis was conducted using next generation attenuation relationships from Boore-Atkinson (2008), Campbell-Bozorgnia (2008) and Chiou-Youngs (2008). According to the results of our field investigation and 2010 CBC guidelines, the applicable Site Class is D consisting of a stiff soil profile with average shear wave velocity in the upper 100 feet between 600 ft/s and 1,200 ft/s. Based on the probabilistic analysis, the PGA_{MCE} is 0.40 g.

6.3. Liquefaction

Liquefaction is the phenomenon in which loosely deposited granular soils with silt and clay contents of less than approximately 35 percent and non-plastic silts located below the water table undergo rapid loss of shear strength when subjected to strong earthquake-induced ground shaking. Ground shaking of sufficient duration results in the loss of grain-to-grain contact due

to a rapid rise in pore water pressure, and causes the soil to behave as a fluid for a short period of time. Based on the fine content of the surficial materials onsite and the depth to groundwater, the liquefaction potential at the project site is considered low.

6.4. Dynamic Compaction of Dry Soils

Relatively dry soils (e.g., soils above the groundwater table) with low density or soft consistency tend to undergo dynamic compaction during a seismic event. Earthquake shaking often induces significant cyclic shear strain in a soil mass, which responds to the vibration by undergoing volumetric changes. Volumetric changes in dry soils take place primarily through changes in the void ratio (usually contraction in loose or normally consolidated soft soils, and dilation in dense or overconsolidated stiff soils) and secondarily through particle reorientation. Such volumetric changes are generally non-recoverable. Based on the loose to medium dense consistency of the fill and upper portion of young alluvial soils, the likelihood of dynamic compaction of dry soils is considered high.

6.5. Flooding

Based on our review of the FEMA (2012) flood map, the site is within the Floodway Area in Zone AE which corresponds to "the channel of a stream plus any adjacent floodplain areas that must be kept free so that the 1% annual chance flood can be carried without substantial increases in flood heights."

6.6. Seiches and Tsunamis

Seiches are standing wave oscillations of an enclosed water body after the original driving force has dissipated. Based on our review of site location maps, the area is not located in the vicinity of enclosed bodies of water and is not susceptible to seiches.

Tsunamis are seismic sea waves with a long wavelength (long compared to the ocean depth) generated by sudden movements of the ocean bottom during earthquakes, landslides, or volcanic activity. According to the Tsunami Inundation Map – Imperial Beach Quadrangle (CGS, 2009), the site is not within the potential tsunami inundation area.

7. CONCLUSIONS

Based on the results of our subsurface evaluation, laboratory testing, and data analysis, construction of the proposed capping and levee construction at the waste disposal site is feasible from a geotechnical standpoint, provided the recommendations of this report are incorporated in the design and construction of the project. Geotechnical considerations include the following:

- Based on our subsurface exploration and review of pertinent geotechnical reports, the site is underlain by undocumented fill and alluvial deposits.

- The undocumented fills and upper portion of alluvial deposits are considered unsuitable in their present state and will require remedial excavation and recompaction in the proposed levee areas.
- In general the alluvial materials are suitable for reuse as compacted fill and are considered excavatable with conventional, heavy-duty earth moving construction equipment.
- Groundwater was encountered during our subsurface exploration at approximate depths ranging form 16 to 32 feet bgs.
- Active or potentially active faults do not cross the subject property. The nearest known active fault is the Rose Canyon Fault, which is located approximately 6.9 miles west of the site.
- The potential for strong ground motions to occur at the site is significant. Accordingly, the potential for strong seismic accelerations should be considered in the design of proposed improvements.

8. RECOMMENDATIONS

Based on our understanding of the project, the following earthwork recommendations are presented. Our office should review the project plans once they are available and provide additional recommendations, if needed.

8.1. Earthwork and Site Preparation

In general, earthwork should be performed in accordance with the recommendations presented in this report. NOVA should be contacted for questions regarding the recommendations or guidelines presented herein. In addition, Typical Earthwork Guidelines for the project are included as Appendix C. In the event of a conflict, the recommendations presented in the following sections of this report should supersede those in Appendix C.

8.1.1. Site Preparation

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

8.1.2. Removals

For construction of the levees along the eastern and northern limits of the waste disposal site, we recommend the removal of fill and the upper portion of alluvial soils to a depth of 2 to 3 feet below the levee bottom elevation. These removals should be performed extending at a 1:1 (horizontal to vertical) downward projection to competent

alluvial material. The extent and depths of removals should be evaluated by the geotechnical consultant in the field based on the materials exposed. Additional removals may be recommended if soft or loose conditions are encountered.

8.1.3. Excavation Characteristics

Our evaluation of the excavation characteristics of the on-site materials is based on the results of our exploration. In our opinion, the on-site materials are generally expected to be excavatable with conventional heavy-duty earthmoving equipment. Buried concrete debris may be difficult to excavate in some areas.

8.1.4. Excavation Bottom Stability

Unstable bottom conditions may be mitigated by overexcavation of the bottom to suitable depths and placement of a layer of geogrid reinforcement material. Recommendations for stabilizing excavation bottoms should be based on evaluation in the field by the geotechnical consultant at the time of construction.

8.1.5. Materials for Fill

In general, clean alluvial on-site soils are suitable for use as fill. Soils to be used as fill should not contain contaminated materials, rocks, or lumps over 4 inches in largest dimension, and not more than 40 percent larger than 3/4 inch. Utility trench backfill material should not contain rocks or lumps over 3 inches in largest dimension. Larger chunks, if generated during excavation, may be broken into acceptably sized pieces or disposed of offsite. Materials for use as fill should be evaluated by the geotechnical consultant prior to filling or importing.

8.1.6. Compacted Fill

Prior to placement of compacted fill, the contractor should request an evaluation of the exposed ground surface by NOVA. Unless otherwise recommended, the exposed ground surface should then be scarified to a depth of approximately 8 inches and watered or dried, as needed, to achieve generally consistent moisture contents at or near the optimum moisture content. The scarified materials should then be compacted to 90 percent relative compaction in accordance with ASTM Test Method D1557. The evaluation of compaction by NOVA should not be considered to preclude any requirements for observation or approval by governing agencies. It is the contractor's responsibility to notify NOVA and the appropriate governing agency when project areas are ready for observation, and to provide reasonable time for that review.

Fill materials should be moisture conditioned to near optimum moisture content prior to placement. The optimum moisture content will vary with material type and other

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

Compacted fill should be placed in horizontal lifts of approximately 8 inches in loose thickness. Prior to compaction, each lift should be watered or dried as needed to achieve near optimum moisture condition, mixed, and then compacted by mechanical methods, using sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other appropriate compacting rollers, to a relative compaction of 90 percent as evaluated by ASTM D1557. Successive lifts should be treated in a like manner until the desired finished grades are achieved.

8.1.7. Excavation and Shoring

We recommend that trenches and excavations be designed and constructed in accordance with Occupational Safety and Health Administration (OSHA) regulations. These regulations provide trench sloping and shoring design parameters for trenches up to 20 feet deep based on a description of the soil types encountered. Trenches over 20 feet deep should be designed by the Contractor's engineer based on site-specific geotechnical analyses. For planning purposes, we recommend that the following OSHA soil classifications be used:

Fill	*Type C*
Alluvium	*Type C*

Upon making the excavations, the soil classifications and excavation performance should be evaluated in the field by NOVA in accordance with OSHA regulations. For trench or other temporary excavations, OSHA requirements regarding personnel safety should be met by laying back the slopes no steeper than 1.5:1 (horizontal:vertical) for fill and alluvial materials. Temporary excavations that encounter seepage may be stabilized by placing sandbags or gravel along the base of the seepage zone. Excavations encountering seepage should be evaluated on a case-by-case basis.

We recommend that excavated areas be backfilled as soon as practicable. The stability of the excavations decreases over time as the soil dries and weathers. On-site safety of personnel is the responsibility of the contractor.

9. LIMITATIONS

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

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. NOVA should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. This report is intended for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project areas. The independent evaluations may include, but not be limited to, review of other geotechnical reports prepared for the adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified and additional recommendations, if warranted, will be provided upon request. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which NOVA has no control. This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

10. SELECTED REFERENCES

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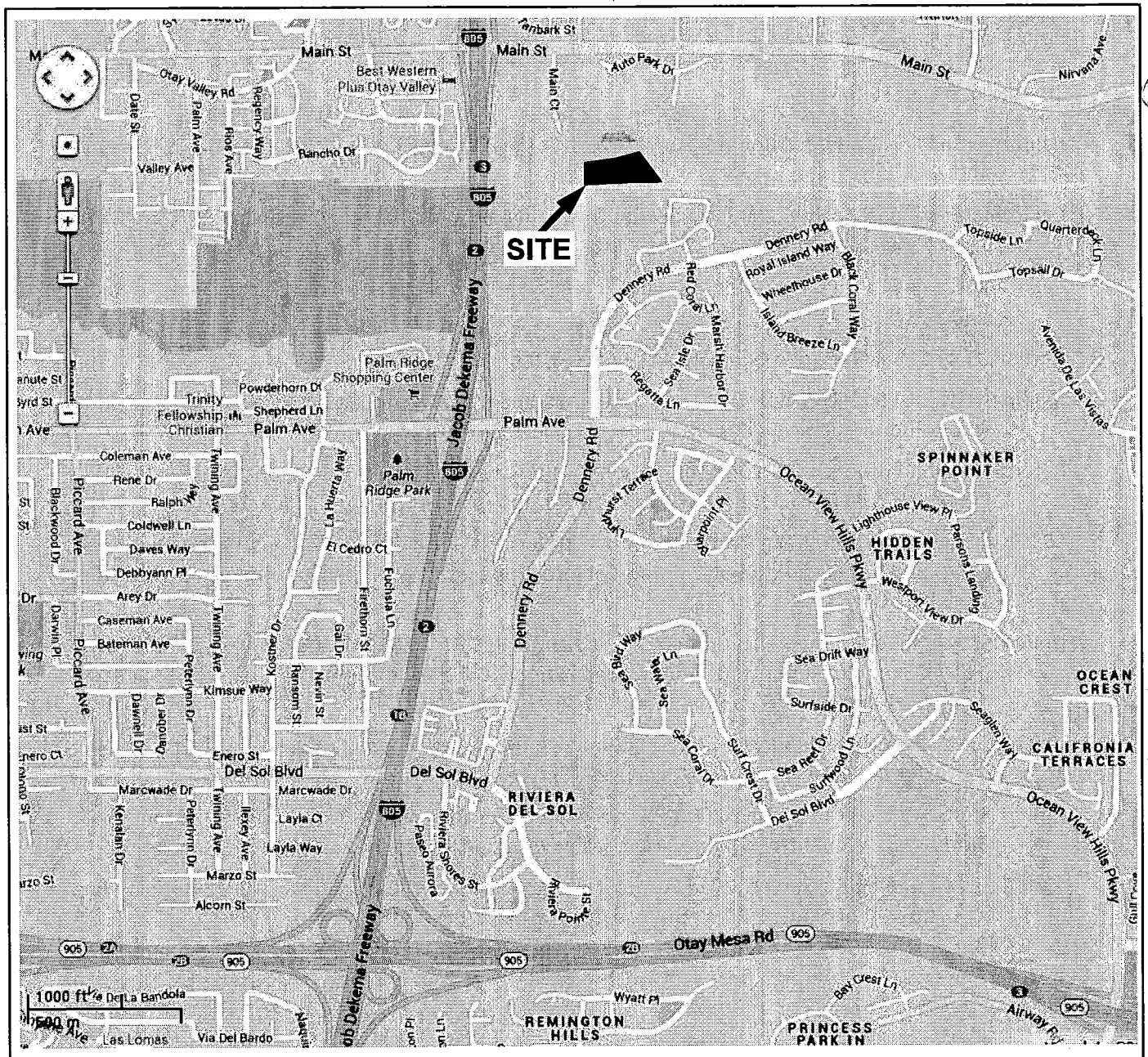

N

SCALE 1" = 2000'

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

SOURCE: GOOGLE MAPS, 2013.

NOVA

SITE LOCATION MAP

SHINOHARA II BURN SITE
APN 644-042-02 AND -10
CHULA VISTA, CALIFORNIA

DATE:	PROJECT No.:	FIGURE
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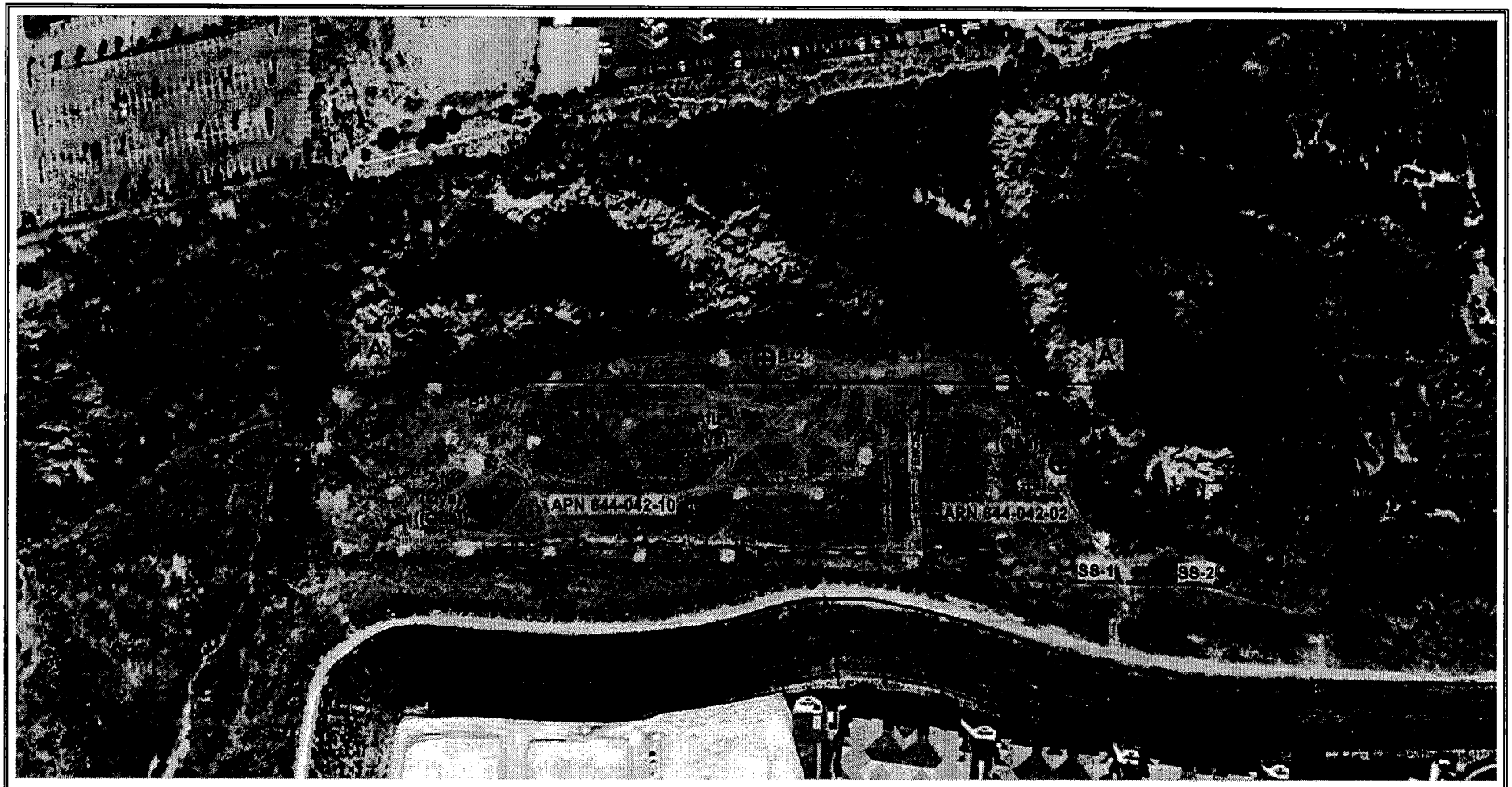

LEGEND

Afu	ARTIFICIAL FILL – UNDOCUMENTED	**B-3** TD=51.0'	APPROXIMATE LOCATION OF BORING TD – TERMINATION DEPTH IN FEET
Qya	YOUNG ALLUVIAL VALLEY DEPOSITS (bracketed where buried)	**SS-2**	APPROXIMATE LOCATION OF SURFICIAL SOIL SAMPLE
Qoa	OLDER ALLUVIAL VALLEY DEPOSITS (bracketed where buried)	A A'	APPROXIMATE LOCATION OF GEOLOGIC CROSS SECTION
			PROJECT LIMITS

N

SCALE: 1" = 10'

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

REFERENCE: GOOGLE EARTH, 2013.

NOVA

BORING LOCATION MAP

SHINOHARA II BURN SITE
APN 644-042-02 AND -10
CHULA VISTA, CALIFORNIA

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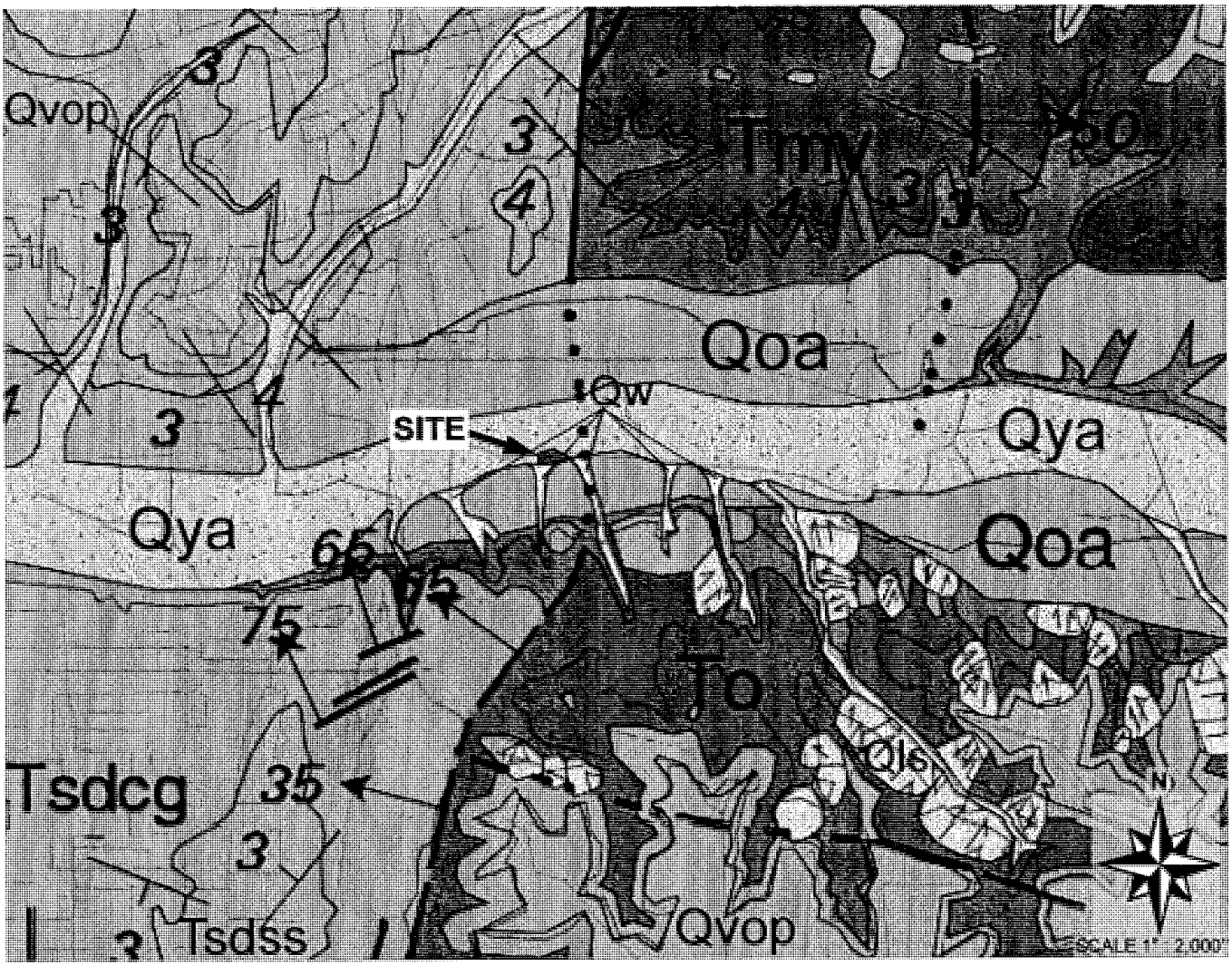

LEGEND

- Qya — YOUNG ALLUVIAL FLOOD PLAIN DEPOSITS
- Qls — LANDSLIDE DEPOSITS
- Qoa — OLD ALLUVIAL FLOOD PLAIN DEPOSITS
- Qw — WASH DEPOSITS
- Qvop — VERY OLD PARALIC DEPOSITS
- Tmv — MISSION VALLEY FORMATION
- To — OTAY FORMATION
- Tsdcg / Tsdss — SAN DIEGO FORMATION

- ANTICLINE – SOLID WHERE KNOWN, DASHED WHERE APPROX., DOTTED WHERE CONCEALED. ARROW INDICATES DIRECTION OF AXIAL PLUNGE.
- 20 — STRIKE AND DIP OF BEDS
- GEOLOGIC CONTACT, DOTTED WHERE CONCEALED.
- FAULT – SOLID WHERE ACCURATELY LOCATED, DASHED WHERE APPROX. LOCATED, DOTTED WHERE CONCEALED.

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

SOURCE: GEOLOGIC MAP OF THE SAN DIEGO 30' x 60' QUADRANGLE, 2005.

NOVA

REGIONAL GEOLOGIC MAP

SHINOHARA II BURN SITE
APN 644-042-02 AND -10
CHULA VISTA, CALIFORNIA

DATE:	PROJECT NO.	FIGURE:
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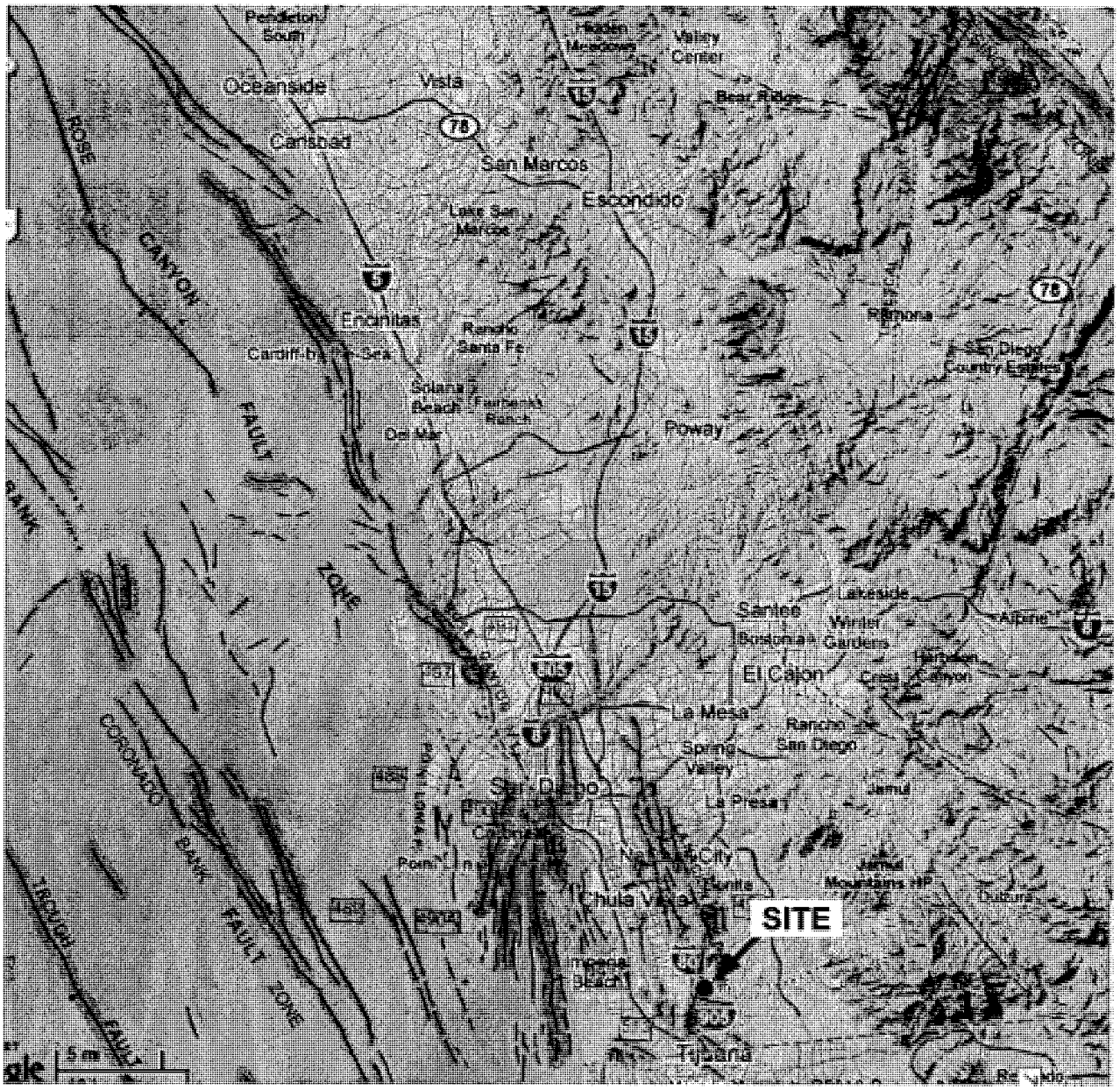

LEGEND

- HOLOCENE FAULT DISPLACEMENT
- LATE QUATERNARY FAULT DISPLACEMENT
- QUATERNARY FAULT DISPLACEMENT
- PRE-QUATERNARY FAULT DISPLACEMENT

N

SCALE 1" = 8 MILES

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

SOURCE: 2010 FAULT ACTIVITY MAP OF CALIFORNIA, CALIFORNIA GEOLOGICAL SURVEY.

NOVA

FAULT LOCATION MAP

SHINOHARA II BURN SITE
APN 644-042-02 AND -10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
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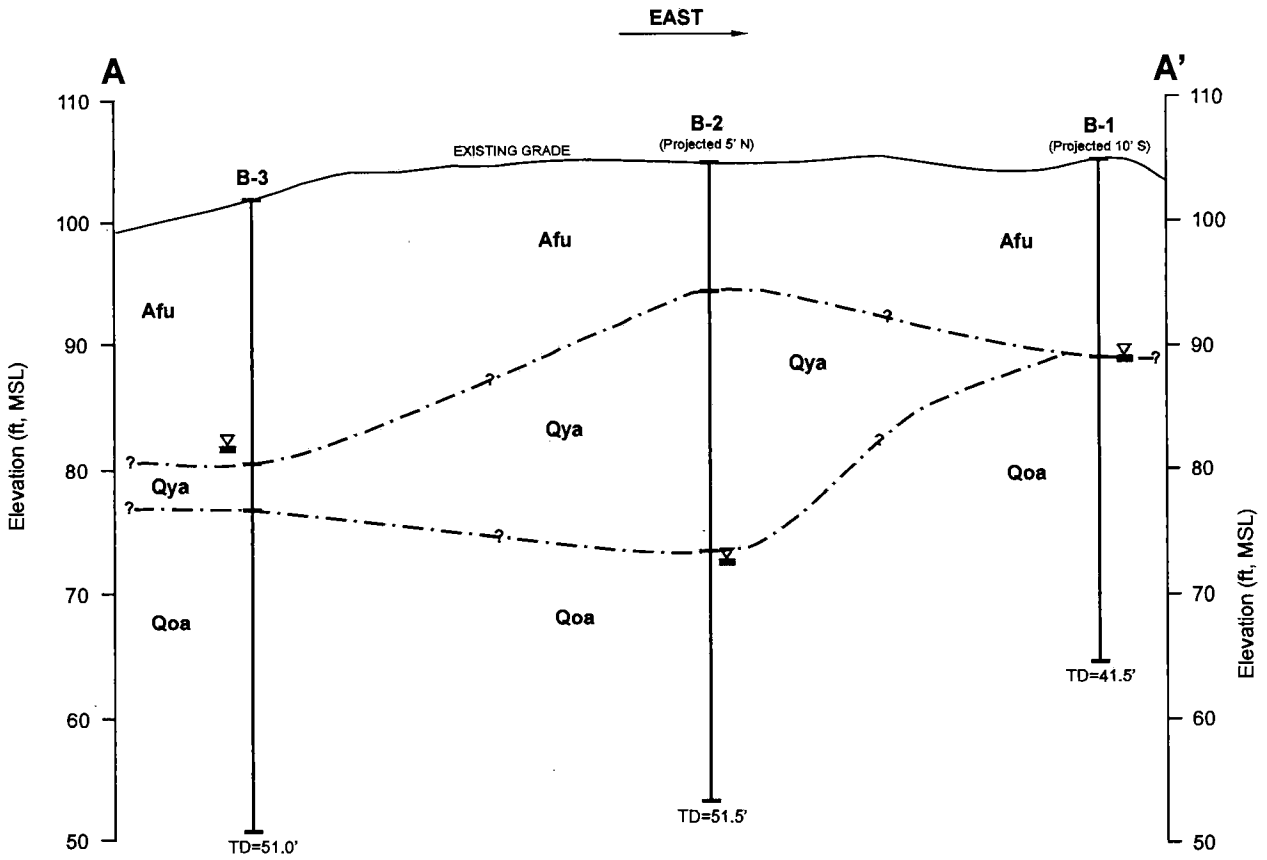


LEGEND

Afu	ARTIFICIAL FILL – UNDOCUMENTED
Qya	YOUNG ALLUVIAL FLOOD PLAIN DEPOSITS
Qoa	OLD ALLUVIAL FLOOD PLAIN DEPOSITS
B-3 TD=51.0'	APPROXIMATE LOCATION OF EXPLORATORY BORING (NOVA, 2013) TD – TERMINATION DEPTH IN FEET
———	EXISTING GRADE
⧖	APPROXIMATE LOCATION OF WATER TABLE
— · — · —	APPROXIMATE LOCATION OF GEOLOGIC CONTACT (QUERIED WHERE UNCERTAIN)

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

CROSS SECTION A-A'
SCALE 1"=10'

NOVA

GEOLOGIC CROSS SECTION

SHINOHARA II BURN SITE
APN 644-042-02 AND -10
CHULA VISTA, CALIFORNIA

DATE:	PROJECT NO.:	FIGURE:
9/13	2013030	5

APPENDIX A

BORING LOGS

Field Procedure for the Collection of Disturbed Samples

Disturbed soil samples were obtained in the field using the following methods.

Bulk Samples

Bulk samples of representative earth materials were obtained from the exploratory boring. The samples were bagged and transported to the laboratory for testing.

The Standard Penetration Test (SPT) Sampler

Disturbed drive samples of earth materials were obtained by means of a Standard Penetration Test sampler. The sampler is composed of a split barrel with an external diameter of 2 inches and an unlined internal diameter of 1-3/8 inches. The sampler was driven into the ground 12 to 18 inches with a 140-pound hammer free-falling from a height of 30 inches in general accordance with ASTM D 1586. The blow counts were recorded for every 6 inches of penetration; the blow counts reported on the logs are those for the last 12 inches of penetration. Soil samples were observed and removed from the sampler, bagged, sealed and transported to the laboratory for testing.

Field Procedure for the Collection of Relatively Undisturbed Samples

Relatively undisturbed soil samples were obtained in the field using the following method.

The Modified Split-Barrel Drive Sampler

The sampler, with an external diameter of 3.0 inches, was lined with 1-inch long, thin brass rings with inside diameters of approximately 2.4 inches. The sample barrel was driven into the ground with the weight of a 140-pound hammer, in general accordance with ASTM D 3550. The driving weight was permitted to fall freely. The approximate length of the fall, the weight of the hammer, and the number of blows per foot of driving are presented on the boring logs as an index to the relative resistance of the materials sampled. The samples were removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

BORING LOG

PROJECT:	Shinohara II Burn Site	**PROJECT NO.:**	2013030	**LOG OF BORING NO.:**	**B-1**
BORING LOCATION:	See Figure 2	**ELEVATION AND DATUM:**	105' ± (MSL)		
DRILLING CONTRACTOR:	Pacific Drilling	**DATE STARTED:**	6/20/13	**DATE FINISHED:**	6/20/13
DRILLING METHOD:	Hollow Stem Auger	**TOTAL DEPTH:**	40.5'		
DRILLING EQUIPMENT:	Marl M5 Truck Mounted	**DEPTH TO WATER:**	**Start:** 16'	**Completion:** 16'	
SAMPLING METHOD:	Bulk, Mod. Cal., and SPT	**LOGGED BY:**	BE/AB		
HAMMER WT.: 140 lbs	**DROP:** 30-inches (Autotrip)	**REVIEWED BY:**	AB		

Depth (ft.)	SAMPLES: Bulk	SAMPLES: Mod. Cal	SAMPLES: SPT	Blows / ft.	USCS Classification	GEOTECHNICAL DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	REMARKS
0					SM	**FILL:** Dark brown, moist, medium dense, fine to coarse, silty SAND with trace clay and coarse gravel; few cobbles, burnt ash and glass fragments.			
1									
2									
3									
4									
5						@5': Reddish brown, medium dense to dense; with brick, concrete and coarse gravel.			
6				42					
7									
8									
9									
10						@10': Dark brown, very dense, clayey; with concrete fragments; hydrocarbon odor.			
11				70					
12									
13									
14									
15									

Sample Symbols

- Sampling Unsuccessful
- Bulk Sample
- Modified Split-Barrel Drive Sampler
- Chunk Sample
- Standard Penetration Test
- Groundwater

BORING LOG

PROJECT: Shinohara II Burn Site **PROJECT NO.:** 2013030 **BORING NO.:** B-1 cont'd

Depth (ft.)	SAMPLES: Bulk	SAMPLES: Mod. Cal	SAMPLES: SPT	Blows / ft.	USCS Classification	GEOTECHNICAL DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	REMARKS
15					SM	**FILL:** (continued) Dark to light brown, wet to saturated, dense, silty SAND; trace clay; with burnt ash and concrete fragments.			
16				60		@ 16': Groundwater encountered during drilling.		▽	
17					SP	**OLD ALLUVIAL FLOOD PLAIN DEPOSITS:** Light gray, saturated, dense, coarse SAND; trace silt.			
18									
19									
20						@20': Very dense; with cobbles and reddish brown shale fragments.			
21				42					
22									
23									
24									
25				50/ 4"		@25': Claystone and cobble fragments.			
26									
27									
28									
29									
30				50/ 5.5"	ML	Light gray, saturated, very dense, sandy SILT with clay.	99.4	25.9	
31									
32									
33									
34									
35									

Sample Symbols: ☐ Sampling Unsuccessful; ■ Modified Split-Barrel Drive Sampler; ■ Standard Penetration Test; ☒ Bulk Sample; ◺ Chunk Sample; ▽ Groundwater

Boring Log

PROJECT: Shinohara II Burn Site **PROJECT NO.:** 2013030 **BORING NO.:** B-1 cont'd

Depth (ft.)	SAMPLES: Bulk	SAMPLES: Mod. Cal	SAMPLES: SPT	Blows / ft.	USCS Classification	GEOTECHNICAL DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	REMARKS
35			■	74/ 11"	ML	**OLD ALLUVIAL FLOOD PLAIN DEPOSITS:** (continued) Light gray, saturated, very dense, sandy SILT with clay.			
36			■						
37									
38									
39									
40		■		80/ 6"		@40': Clayey SILT with sand.	110.6	18.3	
41						Total Depth = 40.5 feet. Groundwater encountered during drilling at approximately 16 feet. Backfilled on 6/20/13 in accordance with the California Well Standards Bulletins and the San Diego County Code of Regulatory Ordinances.			
42									
43									
44									
45									
46									
47									
48									
49									
50									
51									
52									
53									
54									
55									

Sample Symbols: ☐ Sampling Unsuccessful; ■ Modified Split-Barrel Drive Sampler; ■ Standard Penetration Test; ☒ Bulk Sample; ◺ Chunk Sample; ▽ Groundwater

Boring Log

PROJECT:	Shinohara II Burn Site	**PROJECT NO.:**	2013030	**LOG OF BORING NO.:**	**B-2**
BORING LOCATION:	See Figure 2	**ELEVATION AND DATUM:**	104' ± (MSL)		
DRILLING CONTRACTOR:	Pacific Drilling	**DATE STARTED:**	6/20/13	**DATE FINISHED:**	6/20/13
DRILLING METHOD:	Hollow Stem Auger	**TOTAL DEPTH:**	51.5'		
DRILLING EQUIPMENT:	Marl M5 Truck Mounted	**DEPTH TO WATER:**	**Start:** 32'	**Completion:** 32'	
SAMPLING METHOD:	Bulk, Mod. Cal., and SPT	**LOGGED BY:**	RP/AB		
HAMMER WT.: 140 lbs	**DROP:** 30-inches (Autotrip)	**REVIEWED BY:**	AB		

Depth (ft.)	SAMPLES: Bulk	SAMPLES: Mod. Cal	SAMPLES: SPT	Blows / ft.	USCS Classification	GEOTECHNICAL DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	REMARKS
0					SM	**FILL:**			
1						Brown to dark brown, moist, medium dense, fine to coarse, silty SAND; with burnt ash, brick, concrete and glass fragments.			
2									
3									
4									
5						@5': Reddish brown, with clay.			
6				17					
7									
8									
9									
10					SC	**YOUNG ALLUVIAL FLOOD PLAIN DEPOSITS:**			
11				4		Olive gray, wet, loose, clayey SAND.			
12									
13									
14									
15									

Sample Symbols: ☐ Sampling Unsuccessful; ▬ Modified Split-Barrel Drive Sampler; ▬ Standard Penetration Test; ☒ Bulk Sample; ◺ Chunk Sample; ▽ Groundwater

BORING LOG

PROJECT: Shinohara II Burn Site **PROJECT NO.:** 2013030 **BORING NO.:** B-2 cont'd

Depth (ft.)	SAMPLES: Bulk	SAMPLES: Mod. Cal	SAMPLES: SPT	Blows / ft.	USCS Classification	GEOTECHNICAL DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	REMARKS
15					SM	**YOUNG ALLUVIAL FLOOD PLAIN DEPOSITS:** (continued)			
16				8		Olive gray, wet, loose, silty SAND with clay.			
17									
18									
19									
20					SM-ML	Olive gray, wet, loose to medium dense, fine, silty SAND to sandy SILT; micaceous, with few shells.			
21				9		@20': No recovery.			
22				8					
23									
24									
25						@25': Trace clay.			
26				19					
27									
28									
29									
30									
31				75					
32					SM	**OLD ALLUVIAL FLOOD PLAIN DEPOSITS:**			
33				32		Light brown, saturated, very dense, silty SAND; trace clay. @ 32': Groundwater encountered during drilling.	98.8	25.5	
34									
35									

Sample Symbols: Sampling Unsuccessful; Modified Split-Barrel Drive Sampler; Standard Penetration Test; Bulk Sample; Chunk Sample; Groundwater

Boring Log

PROJECT: Shinohara II Burn Site **PROJECT NO.:** 2013030 **BORING NO.:** B-2 cont'd

Depth (ft.)	SAMPLES: Bulk	SAMPLES: Mod. Cal	SAMPLES: SPT	Blows / ft.	USCS Classification	GEOTECHNICAL DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	REMARKS
35					ML	**OLD ALLUVIAL FLOOD PLAIN DEPOSITS:** (continued)			
36				22		Dark grey, saturated, dense, sandy SILT; micaceous.			
37									
38									
39									
40									
41				29					
42									
43									
44									
45									
46				27					
47									
48									
49									
50						@50': Very dense.			
51				61			91.1	31.5	
52						Total Depth = 51.5 feet. Groundwater encountered during drilling at approximately 32 feet. Backfilled on 6/20/13 in accordance with the California Well Standards Bulletins and the San Diego County Code of Regulatory Ordinances.			
53									
54									
55									

Sample Symbols: Sampling Unsuccessful; Modified Split-Barrel Drive Sampler; Standard Penetration Test; Bulk Sample; Chunk Sample; Groundwater

Boring Log

PROJECT:	Shinohara II Burn Site	**PROJECT NO.:**	2013030	**LOG OF BORING NO.:**	B-3
BORING LOCATION:	See Figure 2	**ELEVATION AND DATUM:**	102' ± (MSL)		
DRILLING CONTRACTOR:	Pacific Drilling	**DATE STARTED:**	6/20/13	**DATE FINISHED:**	6/20/13
DRILLING METHOD:	Hollow Stem Auger	**TOTAL DEPTH:**	51'		
DRILLING EQUIPMENT:	Marl M5 Truck Mounted	**DEPTH TO WATER:**	**Start:** 20'	**Completion:** 20'	
SAMPLING METHOD:	Bulk, Mod. Cal., and SPT	**LOGGED BY:**	RP/AB		
HAMMER WT.: 140 lbs		**DROP:** 30-inches (Autotrip)	**REVIEWED BY:**	AB	

Depth (ft.)	SAMPLES: Bulk	SAMPLES: Mod. Cal	SAMPLES: SPT	Blows / ft.	USCS Classification	GEOTECHNICAL DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	REMARKS
0					SM	**FILL:**			
1						Brown, medium dense, silty SAND, traceclay; with glass fragments, brick, burnt ash.			
2									
3									
4									
5									
6				21					
7									
8									
9									
10						@10': Loose.			
11				5					
12									
13									
14									
15									

Sample Symbols

- Sampling Unsuccessful
- Modified Split-Barrel Drive Sampler
- Standard Penetration Test
- Bulk Sample
- Chunk Sample
- Groundwater

Boring Log

PROJECT: Shinohara II Burn Site **PROJECT NO.:** 2013030 **BORING NO.:** B-3 cont'd

Depth (ft.)	SAMPLES: Bulk	SAMPLES: Mod. Cal	SAMPLES: SPT	Blows / ft.	USCS Classification	GEOTECHNICAL DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	REMARKS
15		■			SM	**FILL:** (continued)			
16		■		12		Grayish brown, wet, loose, silty SAND, trace clay; with glass fragments.			
17									
18									
19									
20			■			@20': Dark grayish brown, saturated, medium dense, clayey; with concrete fragments. Groundwater encountered during drilling.		▽	
21			■	19					
22					SM	**YOUNG ALLUVIAL FLOOD PLAIN DEPOSITS:** Gray, saturated, medium dense, silty SAND; 1-inch clay lens at bottom of sampler.			
23									
24									
25		■		82	SM	**OLD ALLUVIAL FLOOD PLAIN DEPOSITS:** Dark gray, saturated, very dense, silty SAND; with clay and coarse gravel.			
26									
27									
28									
29									
30		■		26	SM-ML	Yellowish brown to gray, saturated, medium dense, fine, silty SAND to sandy SILT; micaceous.			
31								86.6	34.2
32									
33		■		41	ML	Gray, saturated, medium dense, fine, sandy SILT; micaceous.		87.3	33.7
34									
35									

Sample Symbols: ☐ Sampling Unsuccessful; ■ Modified Split-Barrel Drive Sampler; ■ Standard Penetration Test; ☒ Bulk Sample; ◺ Chunk Sample; ▽ Groundwater

BORING LOG

PROJECT: Shinohara II Burn Site **PROJECT NO.:** 2013030 **BORING NO.:** B-3 cont'd

Depth (ft.)	SAMPLES: Bulk	SAMPLES: Mod. Cal	SAMPLES: SPT	Blows / ft.	USCS Classification	GEOTECHNICAL DESCRIPTION	Dry Density (pcf)	Moisture Content (%)	REMARKS
35					ML	**OLD ALLUVIAL FLOOD PLAIN DEPOSITS:** (continued)			
36				48		Gray, saturated, dense, SILT with sand; micaceous.	90.1	32.8	
37									
38				32		@37.5': Medium dense.			
39									
40						@40': Very dense, 12-inch lens of silty SAND.			
41				79/ 11"		@41': Sandy SILT.	95.8	27.8	
42									
43									
44									
45					SM	Gray, saturated, very dense, fine, silty SAND; micaceous.			
46				77/ 11"					
47									
48									
49									
50				50/ 6"	SP-SM	Gray, saturated, fine to coarse, poorly graded SAND with silt.	113.3	17.2	
51						Total Depth = 51.0 feet. Groundwater encountered during drilling at approximately 20 feet. Backfilled on 6/20/13 in accordance with the California Well Standards Bulletins and the San Diego County Code of Regulatory Ordinances.			
52									
53									
54									
55									

Sample Symbols: Sampling Unsuccessful; Modified Split-Barrel Drive Sampler; Standard Penetration Test; Bulk Sample; Chunk Sample; Groundwater

APPENDIX B
LABORATORY TESTING

Classification

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

Hydrometer Analyses

Hydrometer analysis tests were performed on selected representative soil samples in general accordance with ASTM D 422. The fine grain-size distribution curves are shown on Figures B-1 through B-10. The test results were utilized in evaluating the soil classifications in accordance with the USCS.

Atterberg Limits

Tests were performed on selected representative fine-grained soil samples to evaluate the liquid limit, plastic limit, and plasticity index in general accordance with ASTM D 4318. These test results were utilized to evaluate the soil classification in accordance with the Unified Soil Classification System. The test results and classification are shown on Figures B-11 and B-12.

Expansion Index Tests

The expansion index of selected materials was evaluated in general accordance with ASTM D 4829. Specimens were molded under a specified compactive energy at approximately 50 percent saturation (plus or minus 1 percent). The prepared 1-inch thick by 4-inch diameter specimens were loaded with a surcharge of 144 pounds per square foot and were inundated with tap water. Readings of volumetric swell were made for a period of 24 hours. The results of these tests are presented on Figure B-13.

Sand Equivalent Tests

The sand equivalent of selected materials was evaluated in general accordance with ASTM D 2419. The results of these tests are presented on Figure B-14.

Direct Shear Tests

Direct shear tests were performed on relatively undisturbed and remolded samples in general accordance with ASTM D 3080 to evaluate the shear strength characteristics of selected materials. The samples were inundated during shearing to represent adverse field conditions. The results are shown on Figures B-15 through B-17.

Proctor Density Tests

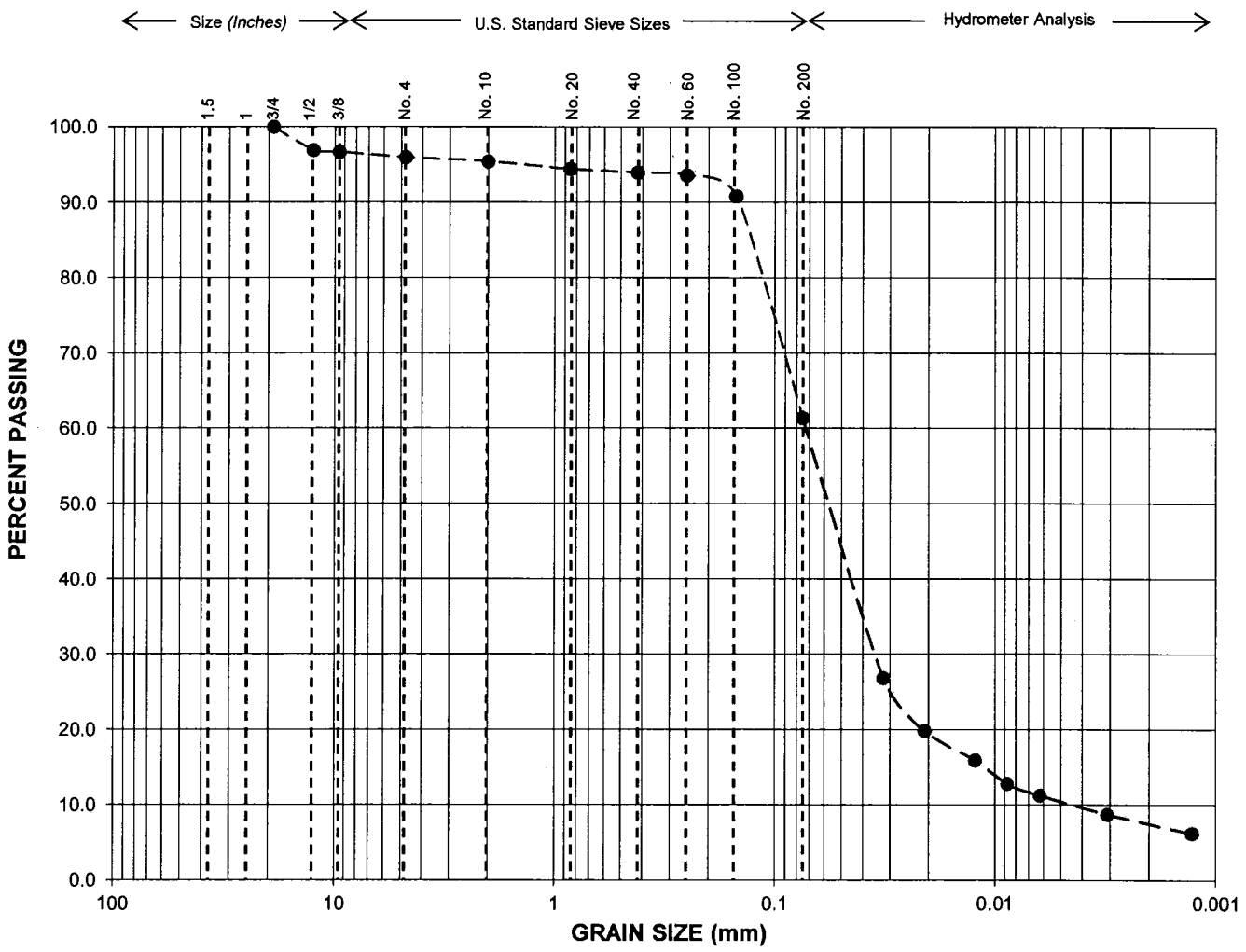
The maximum dry density and optimum moisture content of selected representative soil samples were evaluated using the Modified Proctor method in general accordance with ASTM D 1557. The results of these tests are summarized on Figure B-18 through B-20.

R Value

The resistance value, or R value, for near-surface site soils was evaluated in general accordance with California Test (CT) 301. Samples were prepared and evaluated for exudation pressure and expansion pressure. The equilibrium R-value is reported as the lesser or more conservative of the two calculated results. The test results are summarized on Figure B-21.

Hydraulic Conductivity Tests

Hydraulic Conductivity test were performed on relatively undisturbed samples in general accordance with ASTM D 5084. The average permeability values for the tested samples are presented on Tables B-22 through B-30.



GRAVEL		SAND			SILT OR CLAY
Coarse	Fine	Coarse	Medium	Fine	

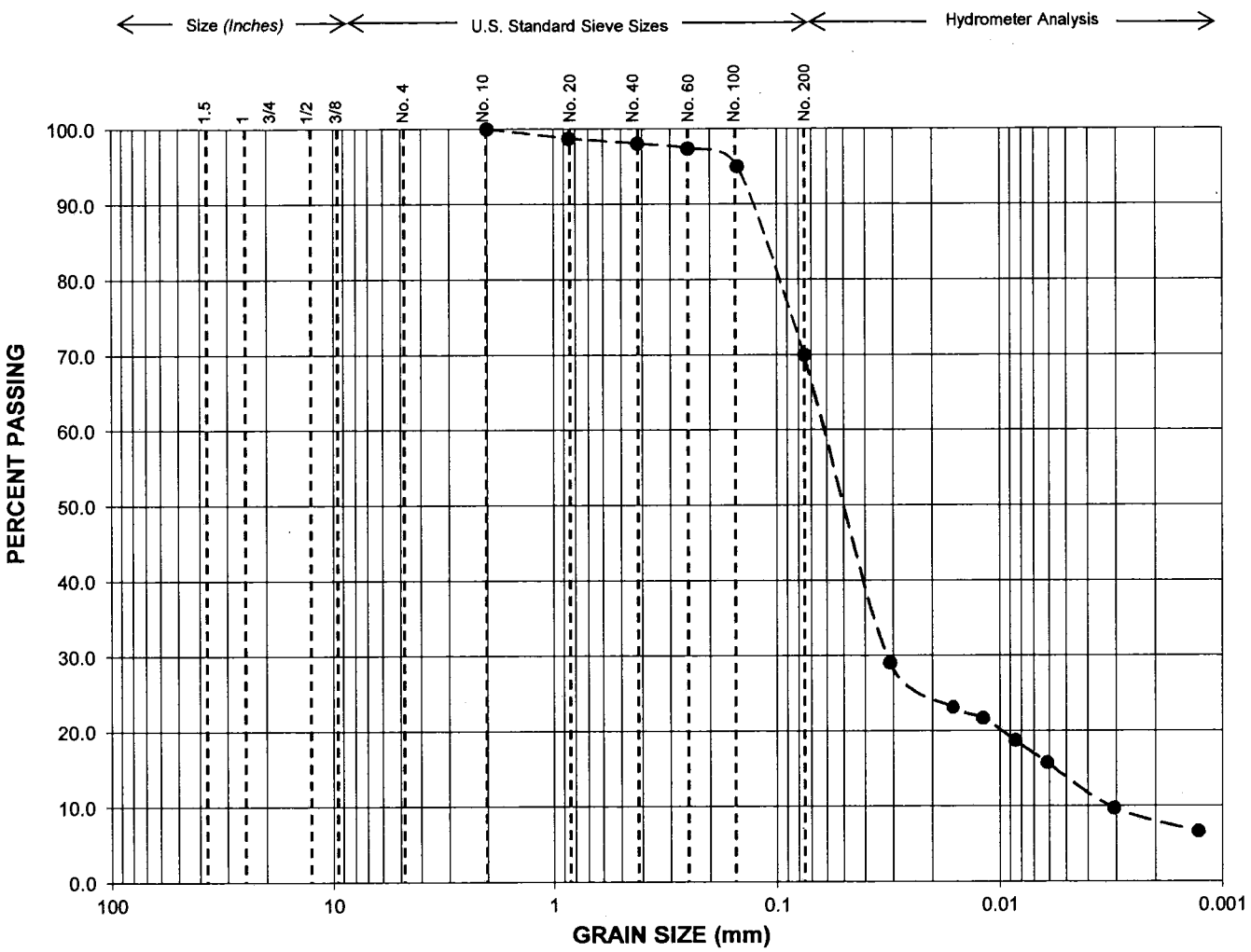
Sample Location:	B-1
Depth (ft):	30.5 - 31.0
USCS Classification:	ML
Passing No. 200 (%):	61

NOVA

GRADATION/HYDROMETER TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
7/13	2013030	**B-1**



GRAVEL		SAND			SILT OR CLAY
Coarse	Fine	Coarse	Medium	Fine	

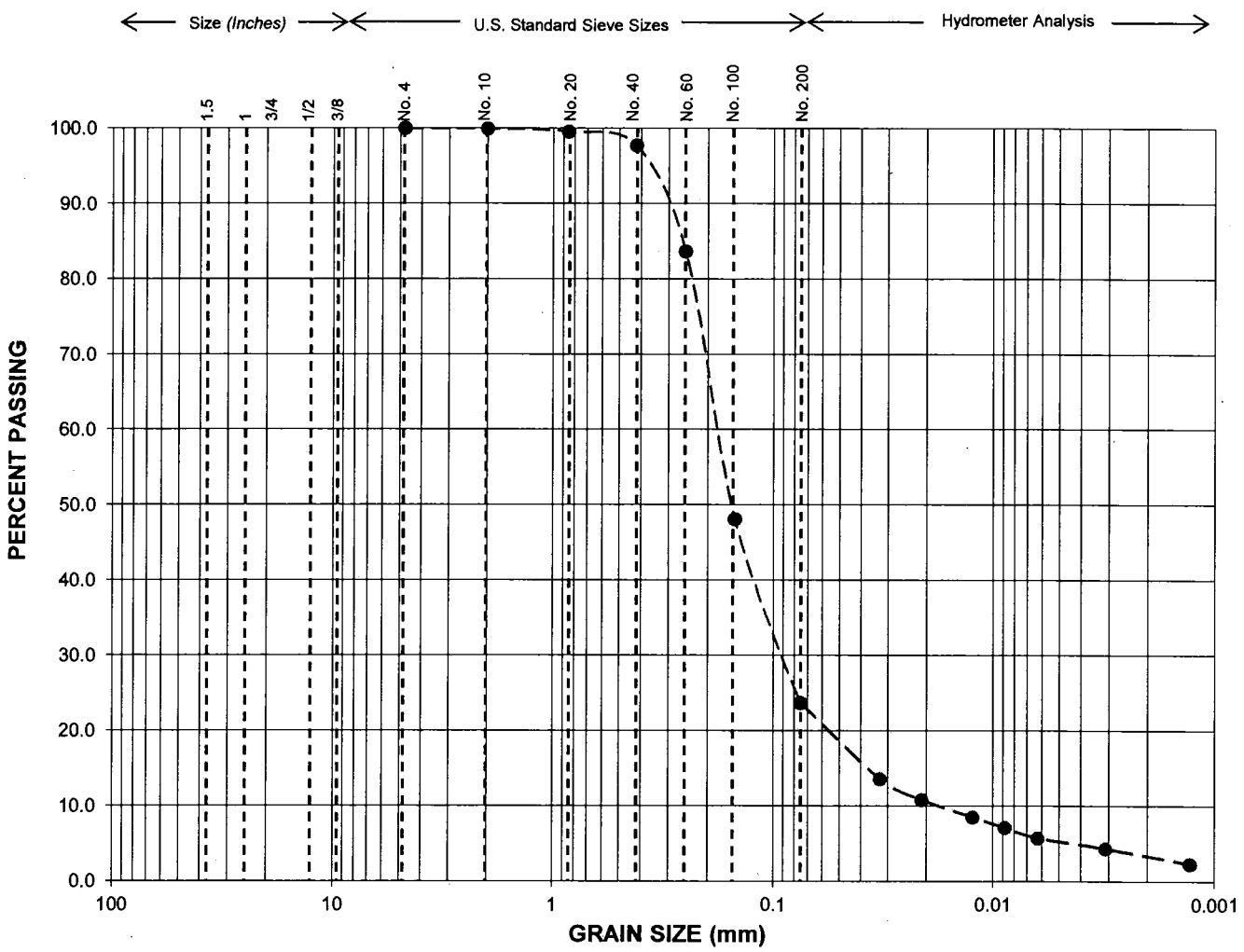
Sample Location:	B-1
Depth (ft):	40.0 - 40.5
USCS Classification:	ML
Passing No. 200 (%):	70

NOVA

GRADATION/HYDROMETER TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
7/13	2013030	B-2



GRAVEL		SAND			SILT OR CLAY
Coarse	Fine	Coarse	Medium	Fine	

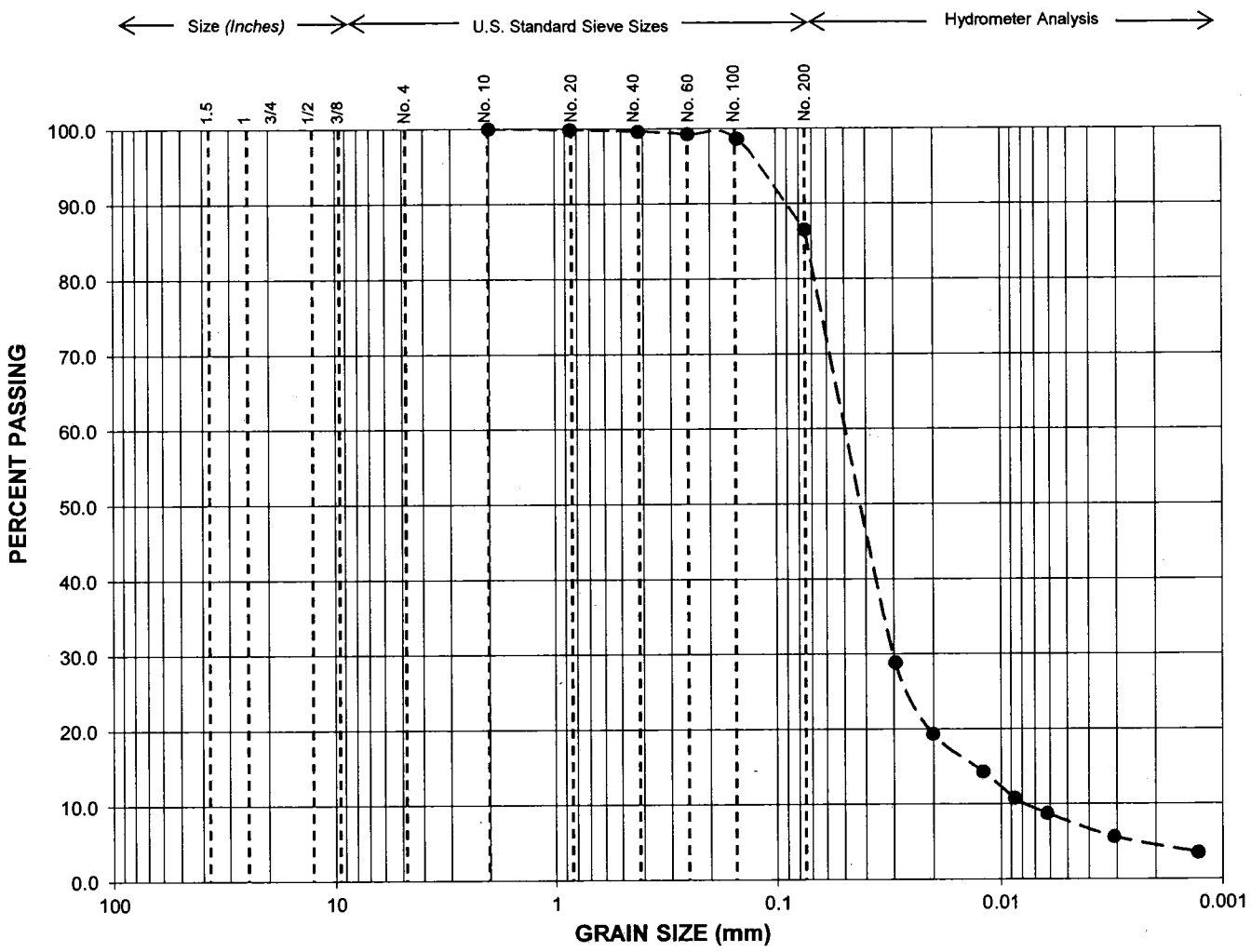
Sample Location:	B-2
Depth (ft):	32.5 - 33.0
USCS Classification:	SM
Passing No. 200 (%):	24

NOVA

GRADATION/HYDROMETER TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
7/13	2013030	B-3



GRAVEL		SAND			SILT OR CLAY
Coarse	Fine	Coarse	Medium	Fine	

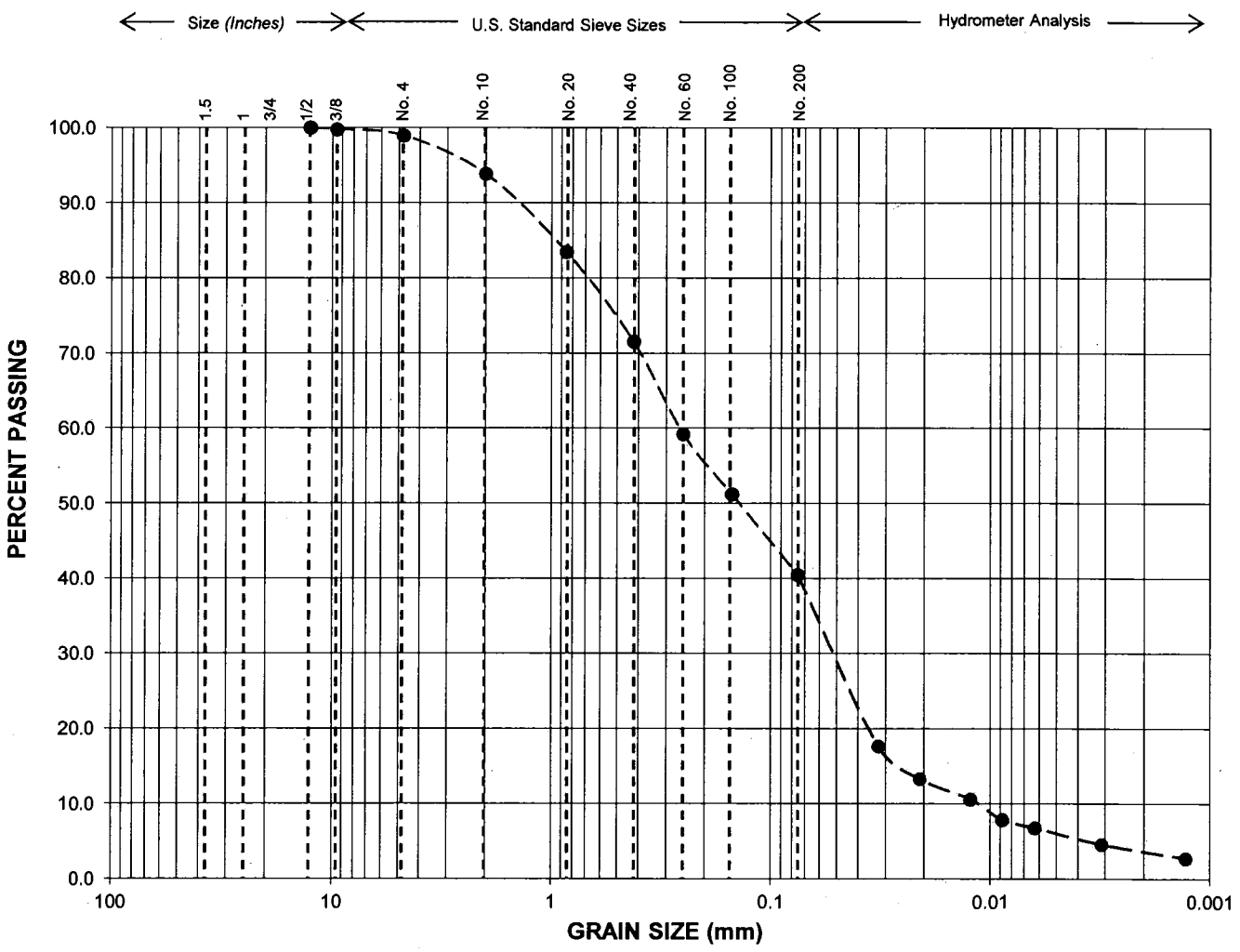
Sample Location:	B-2
Depth (ft):	50.5 - 51.0
USCS Classification:	ML
Passing No. 200 (%):	87

NOVA

GRADATION/HYDROMETER TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
7/13	2013030	B-4



GRAVEL		SAND			SILT OR CLAY
Coarse	Fine	Coarse	Medium	Fine	

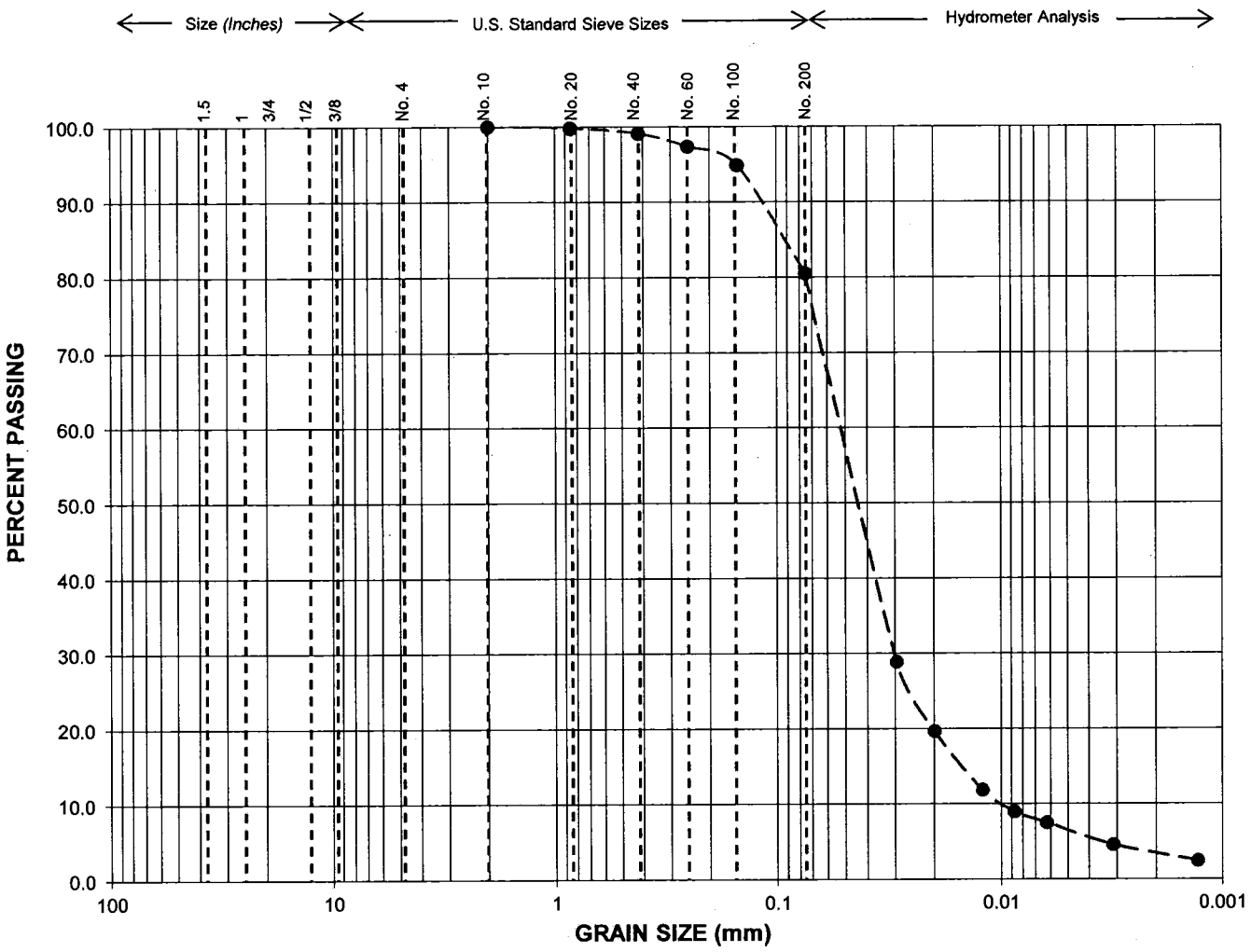
Sample Location:	B-3
Depth (ft):	31.0 - 31.5
USCS Classification:	SM
Passing No. 200 (%):	40

NOVA

GRADATION/HYDROMETER TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
7/13	2013030	B-5



GRAVEL		SAND			SILT OR CLAY
Coarse	Fine	Coarse	Medium	Fine	

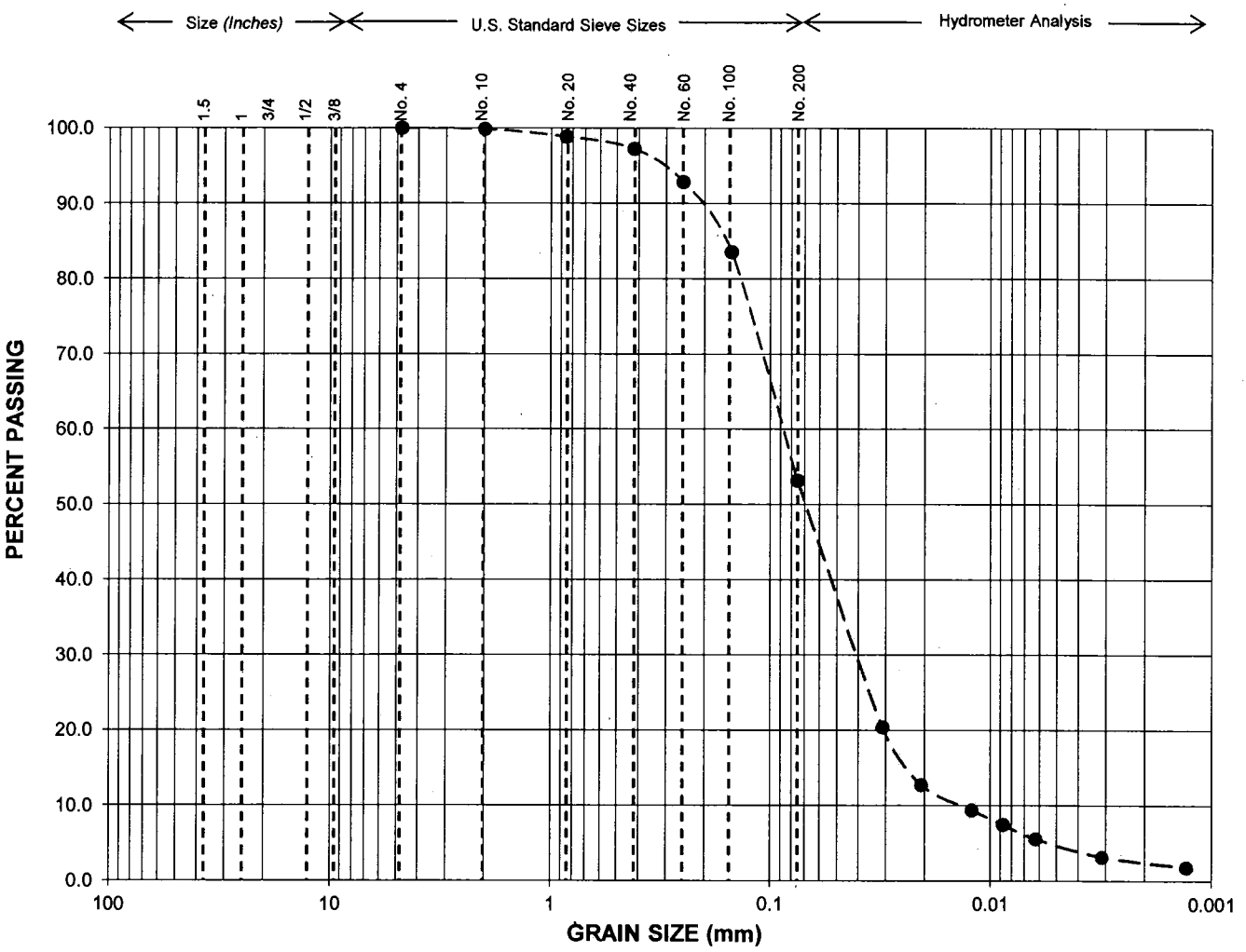
Sample Location:	B-3
Depth (ft):	35.5 - 36.0
USCS Classification:	ML
Passing No. 200 (%):	81

NOVA

GRADATION/HYDROMETER TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
7/13	2013030	B-6



GRAVEL		SAND			SILT OR CLAY
Coarse	Fine	Coarse	Medium	Fine	

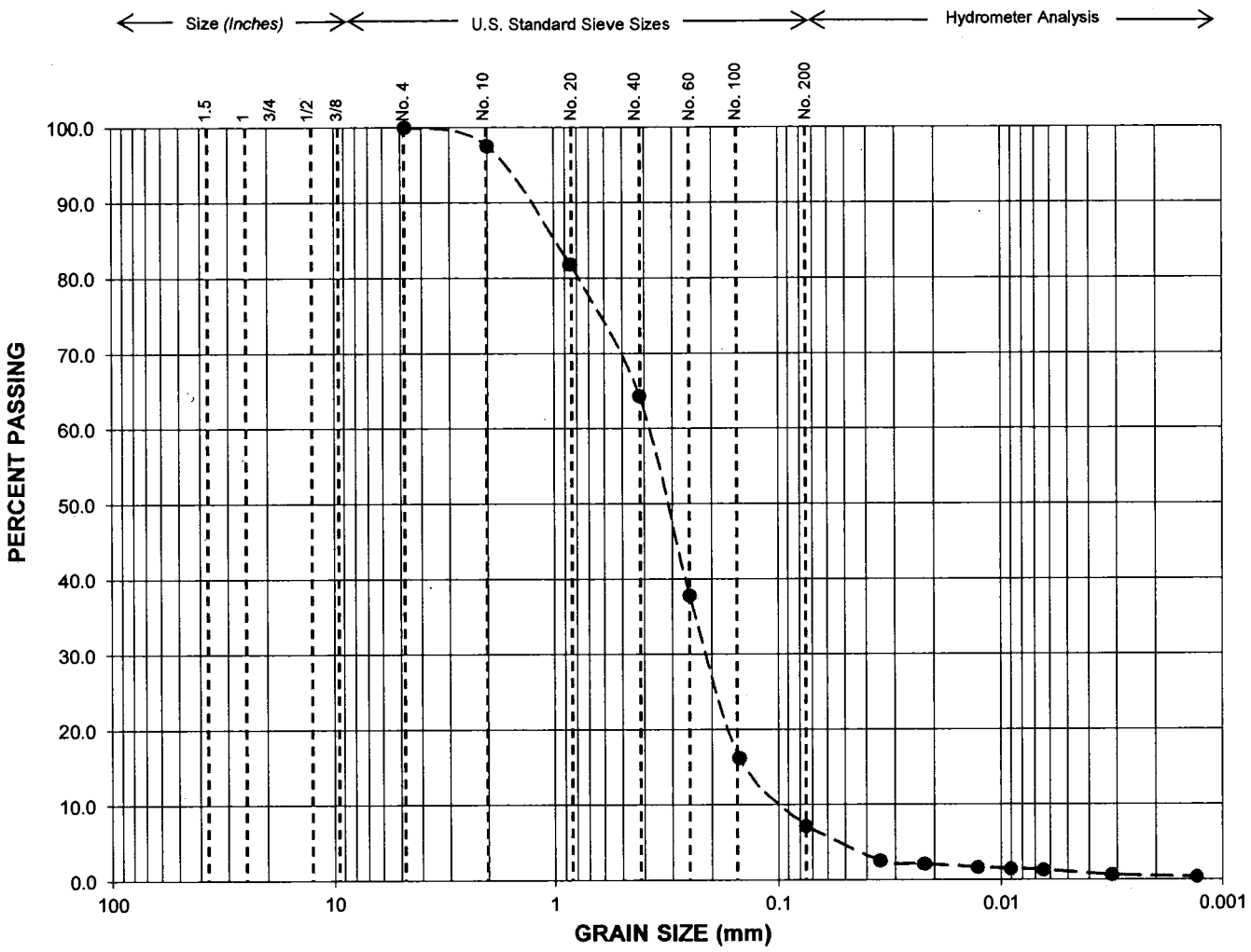
Sample Location:	B-3
Depth (ft):	40.5-41.0
USCS Classification:	ML
Passing No. 200 (%):	53

NOVA

GRADATION/HYDROMETER TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
7/13	2013030	B-7



GRAVEL		SAND			SILT OR CLAY
Coarse	Fine	Coarse	Medium	Fine	

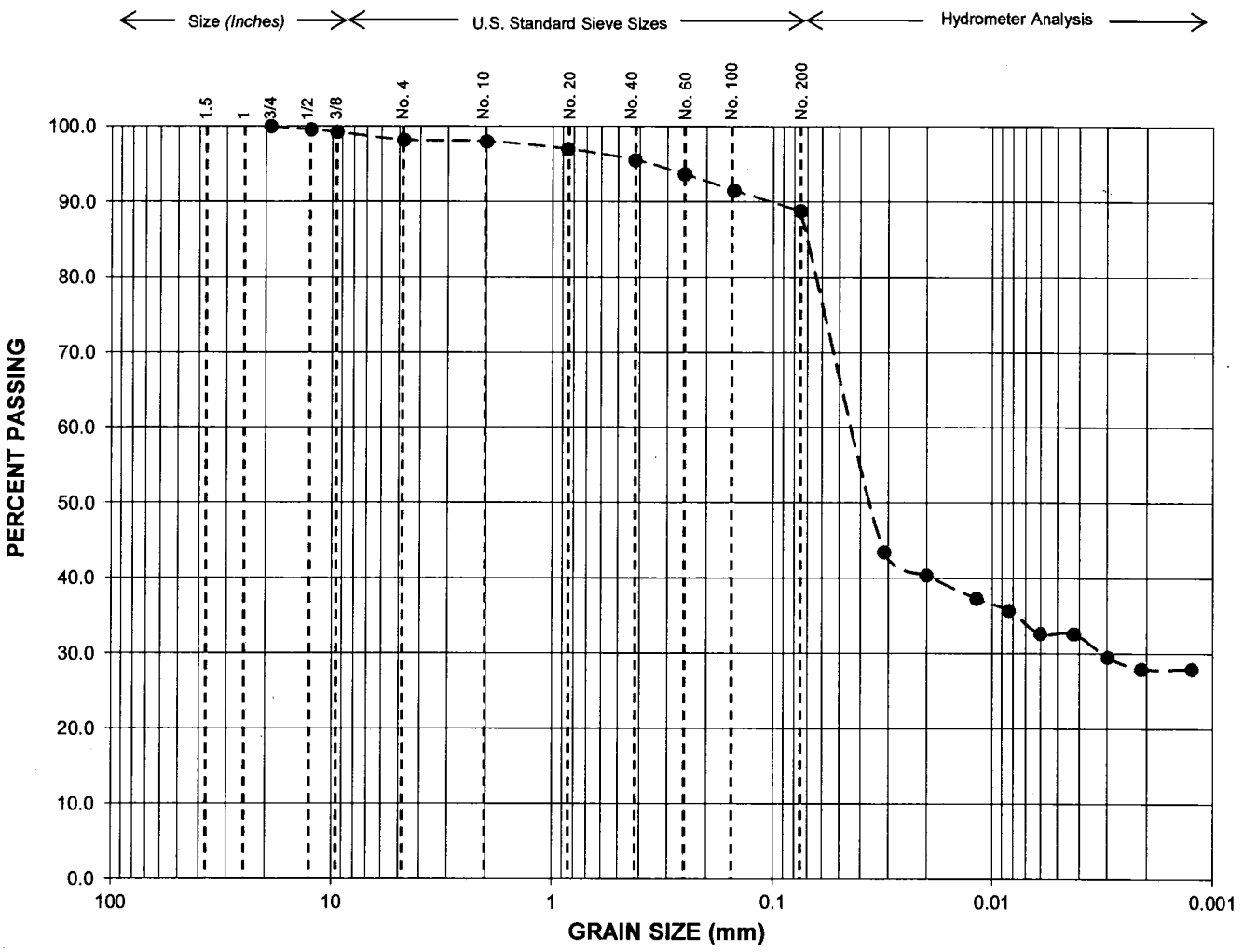
Sample Location:	B-3
Depth (ft):	51.0-51.5
USCS Classification:	SP
Passing No. 200 (%):	7

NOVA

GRADATION/HYDROMETER TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
7/13	2013030	B-8



GRAVEL		SAND			SILT OR CLAY
Coarse	Fine	Coarse	Medium	Fine	

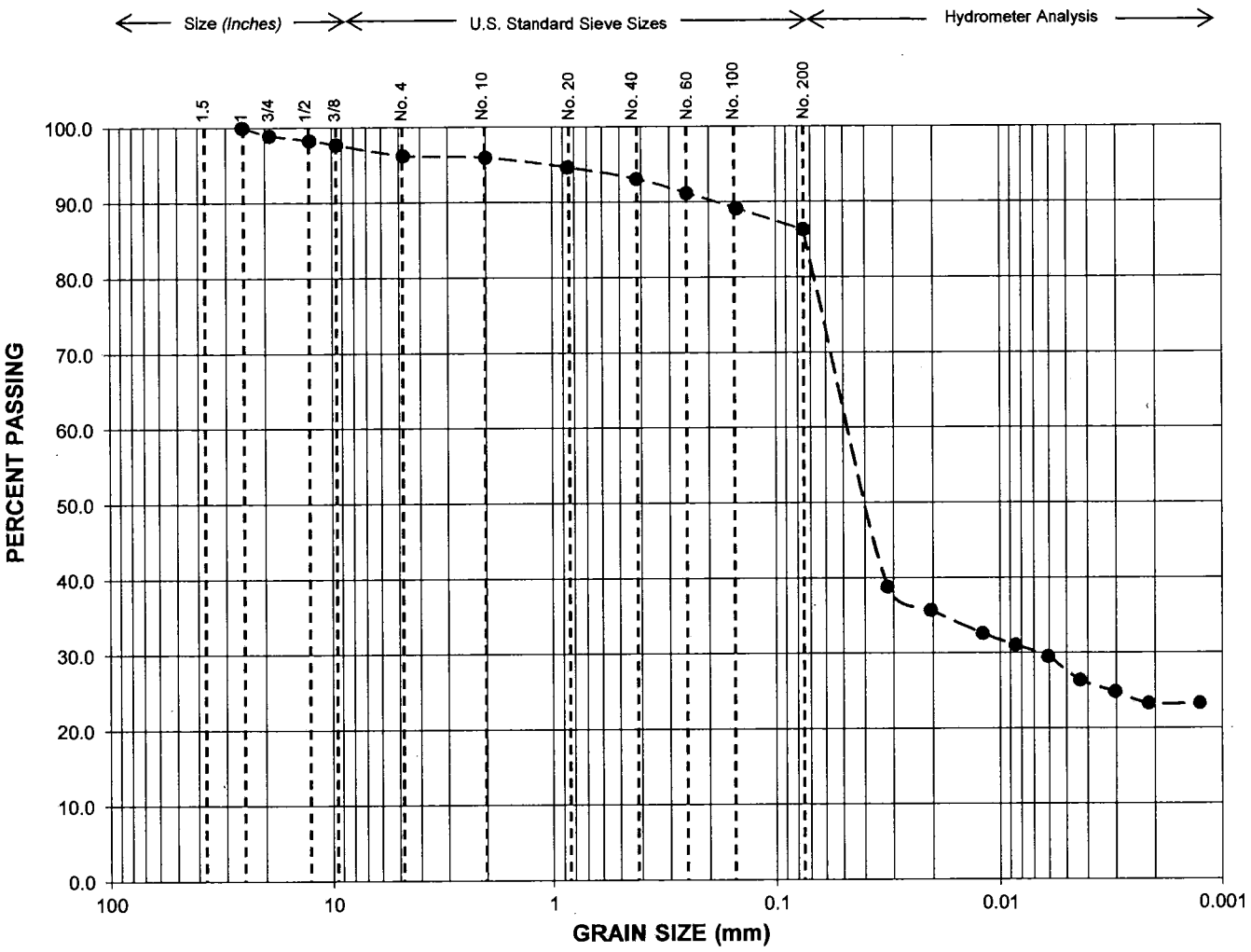
Sample Location:	TP-1
Depth (ft):	0.0-4.0
USCS Classification:	ML
Passing No. 200 (%):	89

NOVA

GRADATION/HYDROMETER TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
7/13	2013030	B-9



GRAVEL		SAND			SILT OR CLAY
Coarse	Fine	Coarse	Medium	Fine	

Sample Location:	SS-2
Depth (ft):	0.0 - 2.0
USCS Classification:	ML
Passing No. 200 (%):	86

NOVA

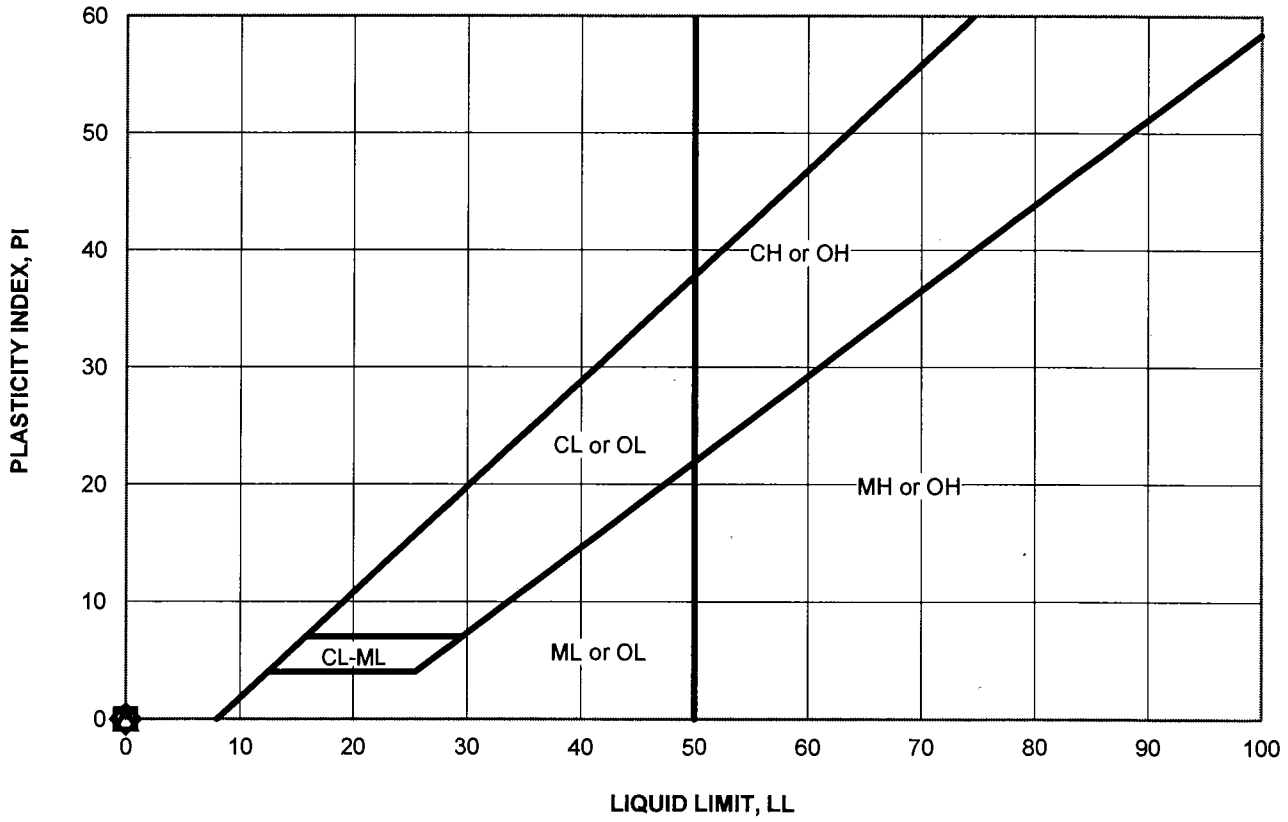
GRADATION/HYDROMETER TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
7/13	2013030	B-10

SYMBOL	SAMPLE LOCATION	SAMPLE DEPTH (FT)	LIQUID LIMIT, LL	PLASTIC LIMIT, PL	PLASTICITY INDEX, PI	USCS (% Finer than No. 40)	USCS (Entire Sample)
△	B-1	15.0 - 16.5	0	0	NP	ML	SM
□	B-1	30.0 - 31.0	0	0	NP	ML	ML
○	B-2	15.0 - 16.5	0	0	NP	ML	SM
◇	B-2	35.0 - 36.5	0	0	NP	ML	ML
⬡	B-2	50.0 - 51.5	0	0	NP	ML	ML
☆	B-3	10.0 - 11.5	0	0	NP	ML	SM

NP - INDICATES NON-PLASTIC



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4318

NOVA

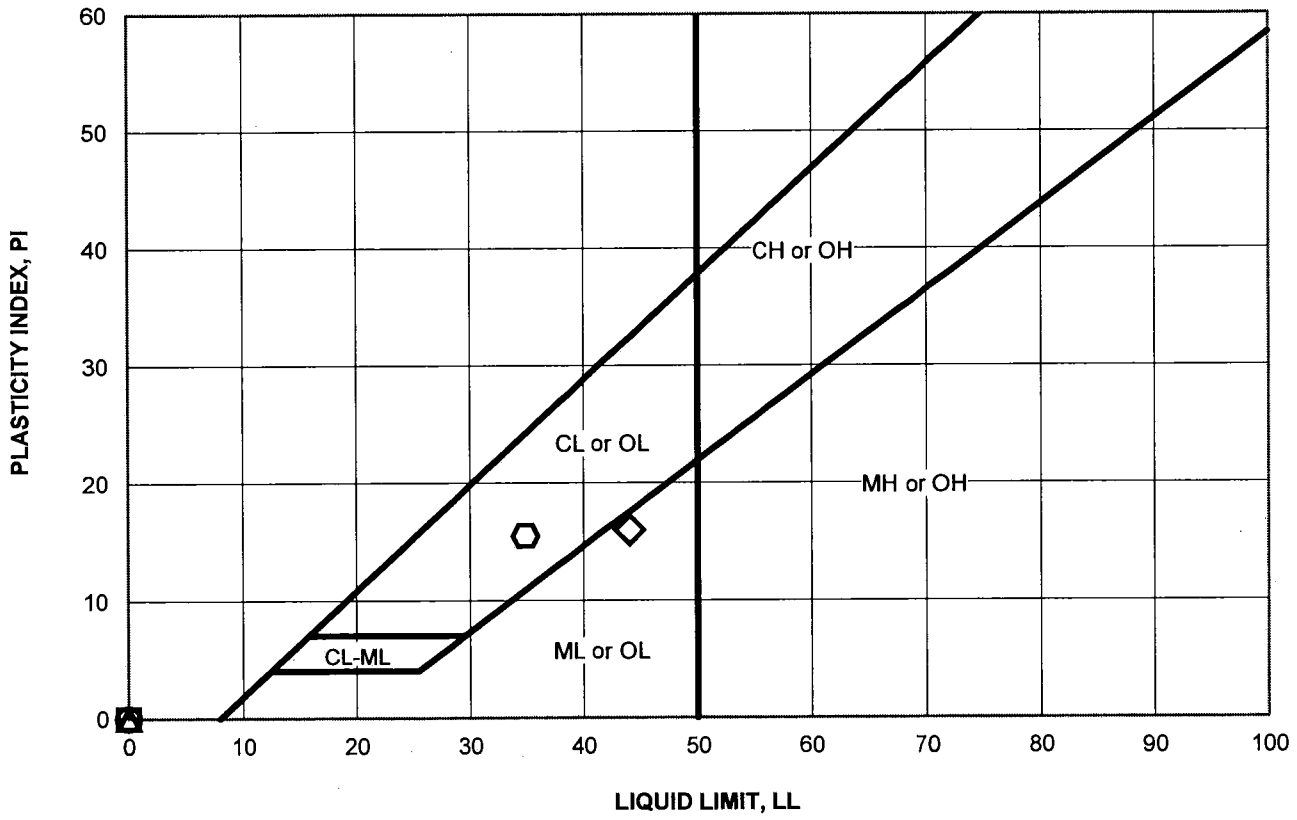
ATTERBERG LIMIT TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
8/13	2013030	B-11

SYMBOL	SAMPLE LOCATION	SAMPLE DEPTH (FT)	LIQUID LIMIT, LL	PLASTIC LIMIT, PL	PLASTICITY INDEX, PI	USCS (% Finer than No. 40)	USCS (Entire Sample)
△	B-3	32.5 - 34.0	0	0	NP	ML	ML
□	B-3	37.5 - 39.0	0	0	NP	ML	ML
○	B-3	45.0 - 46.5	0	0	NP	ML	SM
◇	SS-1	0.0 - 2.0	44	16	28	ML	ML
⬡	SS-2	0.0 - 2.0	35	15	20	CL	ML

NP - INDICATES NON-PLASTIC



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4318

NOVA

ATTERBERG LIMIT TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
8/13	2013030	B-12

SAMPLE LOCATION	SAMPLE DEPTH (ft)	INITIAL MOISTURE (%)	COMPACTED DRY DENSITY (pcf)	FINAL MOISTURE (%)	VOLUMETRIC SWELL (inch)	EXPANSION INDEX	EXPANSION POTENTIAL
B-1	15.0-16.5	9.9	111.4	14.1	0.001	1	Very Low
B-1	30.5-31.0	12.2	103.2	25.7	0.028	28	Low
B-1	40.0-40.5	10.3	108.2	29.2	0.072	72	Medium
B-2	5.0-6.5	9.9	111.3	21.1	0.029	29	Low
B-2	25.0-26.5	12.0	103.3	30.8	0.017	17	Very Low
B-2	32.0-33.5	8.3	89.3	10.4	0.000	0	Very Low
B-2	50.0-51.5	14.8	94.5	26.2	0.019	19	Very Low
B-3	10.0-16.5	11.2	106.4	23.5	0.008	8	Very Low
B-3	35.0-36.5	11.7	102.0	30.9	0.012	12	Very Low
B-3	45.0-46.5	11.5	103.3	25.4	0.012	12	Very Low
TP-1	0.0 - 4.0	10.7	108.6	21.7	0.070	70	Medium
TP-2	0.0 - 4.0	10.2	109.6	18.2	0.053	53	Medium

EXPANSION INDEX	EXPANSION POTENTIAL
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
131 and above	Very High

NOVA

EXPANSION INDEX TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
8/13	2013030	B-13

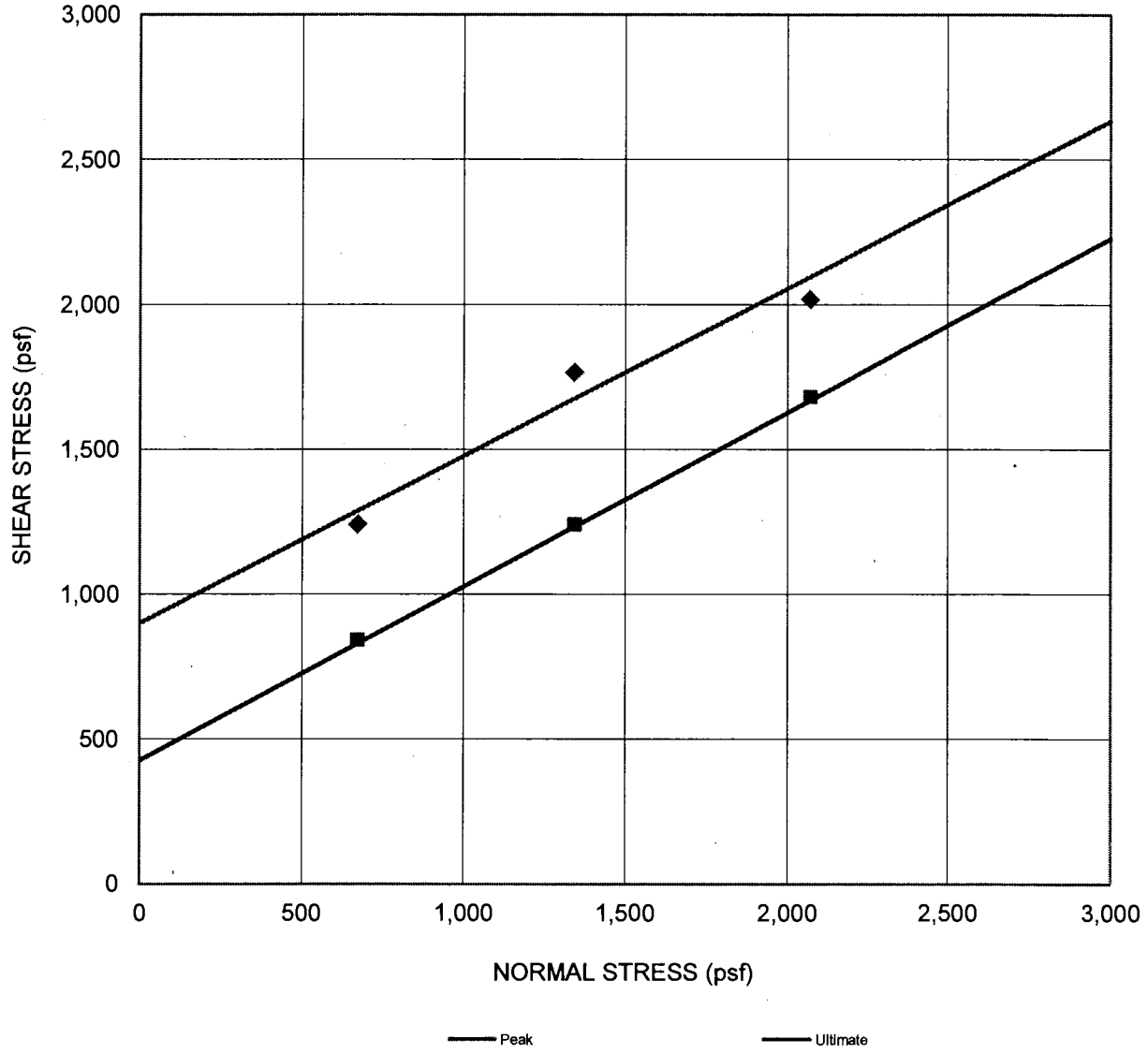
SAMPLE LOCATION	SAMPLE DEPTH (FT)	SOIL DESCRIPTION (USCS)	TEST NO.	SAND READING (mm)	CLAY READING (mm)	SAND EQUIVALENT (%)
B-1	15.0 - 16.5	Silty SAND (SM)	1	24	100	24
			2	24	104	
B-1	30.5 - 31.0	Sandy SILT (ML)	1	4	81	5
			2	4	83	
B-1	40.0 - 40.5	Sandy SILT (ML)	1	5	118	4
			2	5	119	
B-2	5.0 - 6.5	Silty SAND (SM)	1	17	126	12
			2	16	136	
B-3	15 - 16.5	Silty SAND (SM)	1	16	126	13
			2	16	124	
B-3	25.0 - 26.0	Silty SAND (SM)	1	11	131	8
			2	11	136	
B-3	35.0 - 36.5	SILT with Sand (ML)	1	6	83	6
			2	6	87	
TP-1	0.0 - 4.0	Silty SAND (SM)	1	13	140	10
			2	13	140	
TP-2	0.0 - 4.0	Silty SAND (SM)	1	15	140	11
			2	13	142	

NOVA

SAND EQUIVALENT TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
8/13	2013030	B-14



Apparent Cohesion (C):	900 psf	425 psf
Friction Angle (Φ):	30 °	31 °

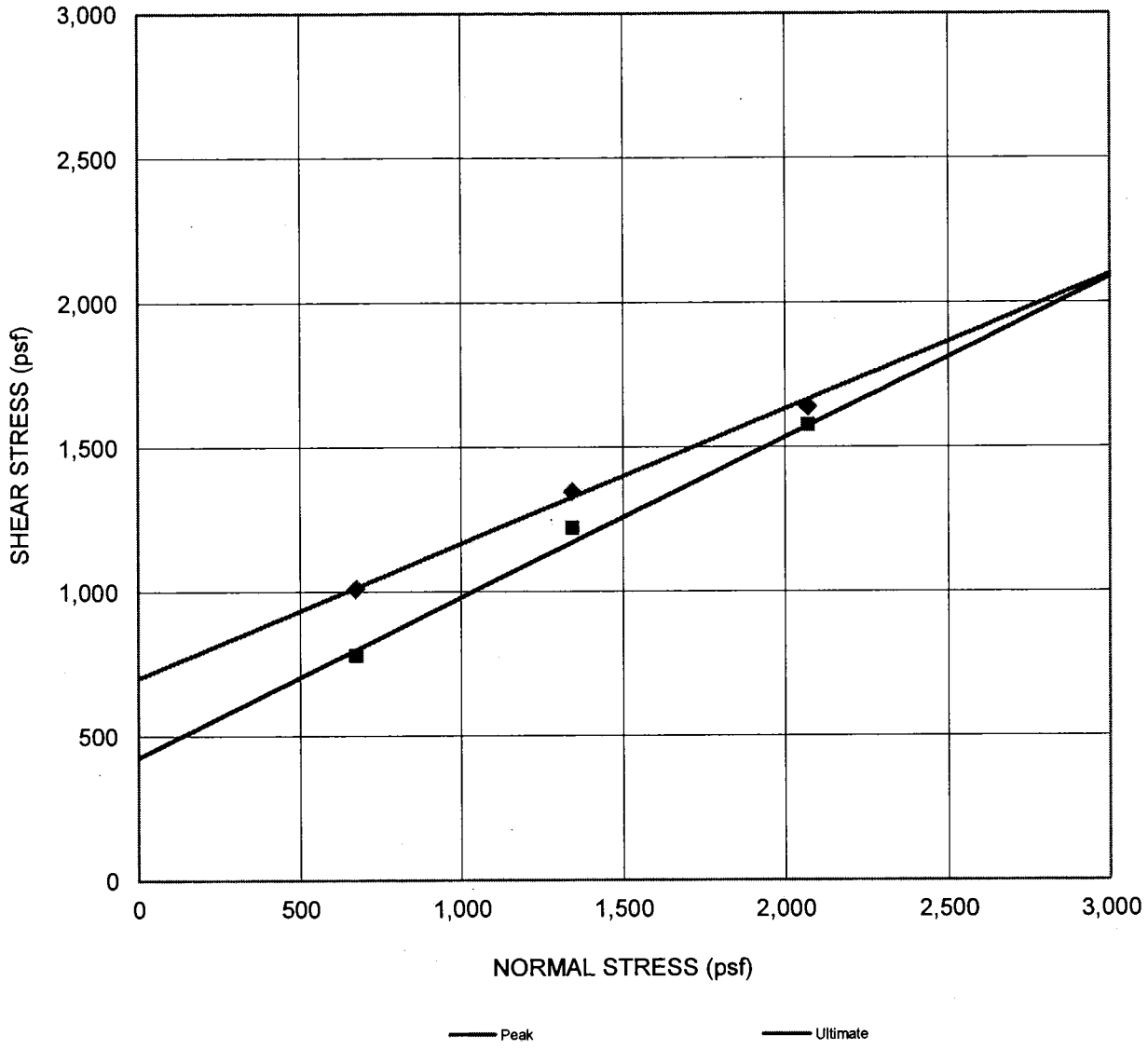
Sample Location:	B-1
Depth (ft):	30.0 - 31.0
USCS Soil Type:	ML

NOVA

DIRECT SHEAR TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
8/13	2013030	**B-15**



Apparent Cohesion (C):	700 psf	425 psf
Friction Angle (Φ):	25 °	29 °

NOTE: Sample remolded to 90% of the laboratory maximum dry density at near optimum moisture ccntent.

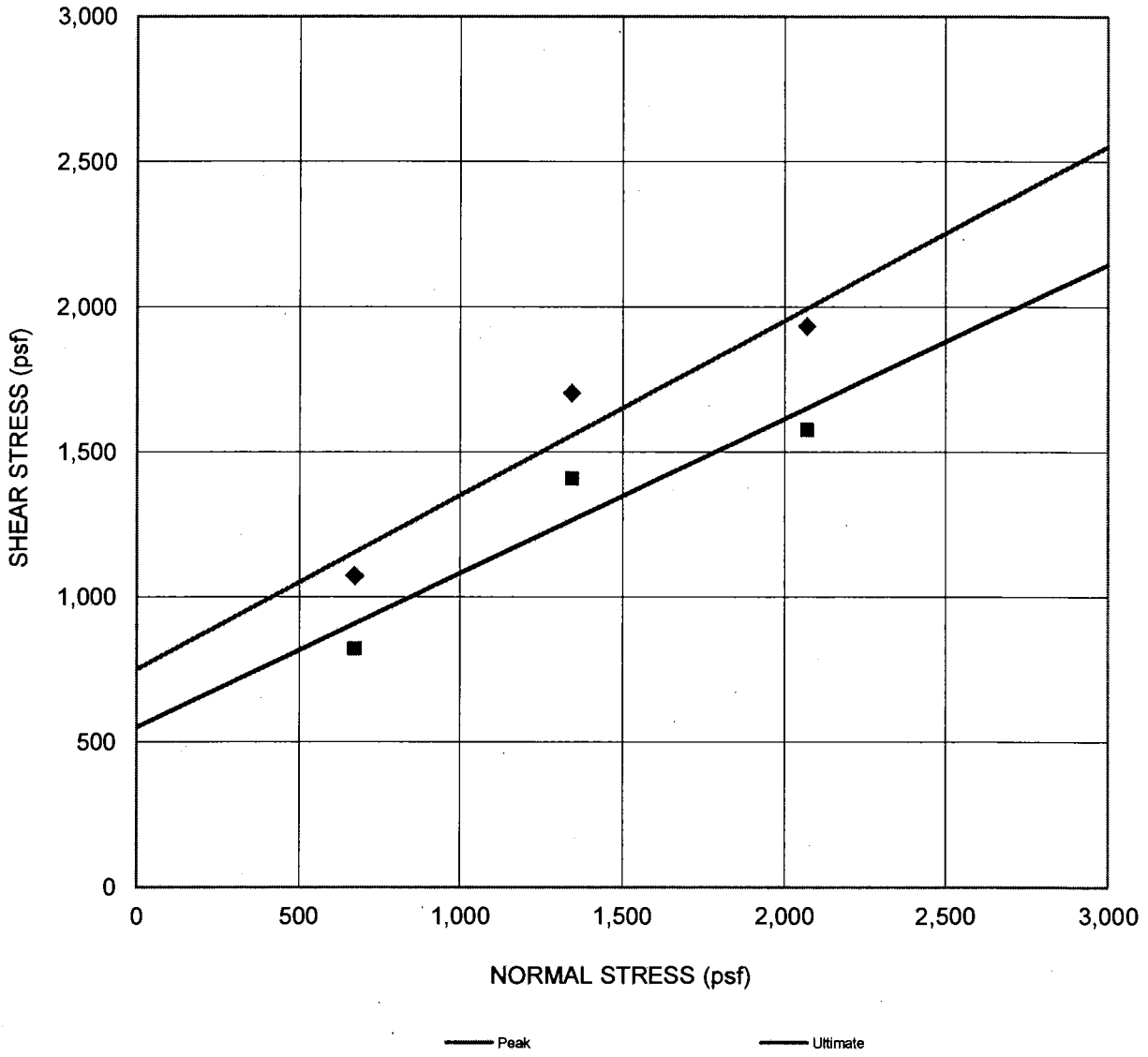
Sample Location:	SS-1
Depth (ft):	0.0 - 2.0
USCS Soil Type:	ML

NOVA

DIRECT SHEAR TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
8/13	2013030	**B-16**



Apparent Cohesion (C):	750 psf	550 psf
Friction Angle (Φ):	31 °	28 °

NOTE: Sample remolded to 90% of the laboratory maximum dry density at near optimum moisture ccntent.

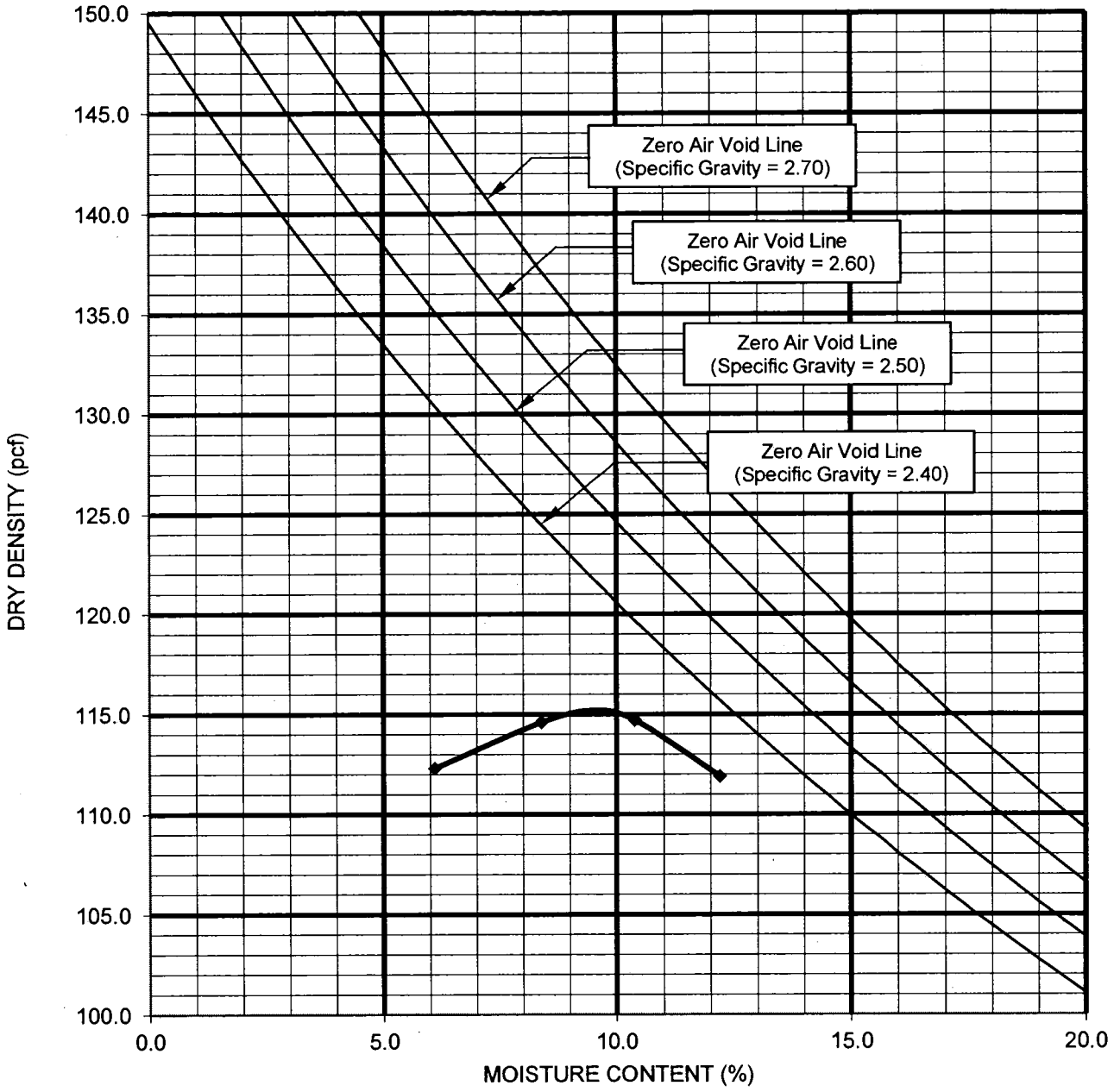
Sample Location:	SS-2
Depth (ft):	0.0 - 2.0
USCS Soil Type:	ML

NOVA

DIRECT SHEAR TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
8/13	2013030	B-17



Sample Location	Depth (ft.)	Soil Description (USCS)	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
B-3	30.0 - 31.5 50.0 - 51.0	Silty SAND to Sandy SILT (SM-ML)	115.2	9.5
Dry Density and Moisture Content Values Corrected for Oversize (ASTM D4718)			n/a	n/a

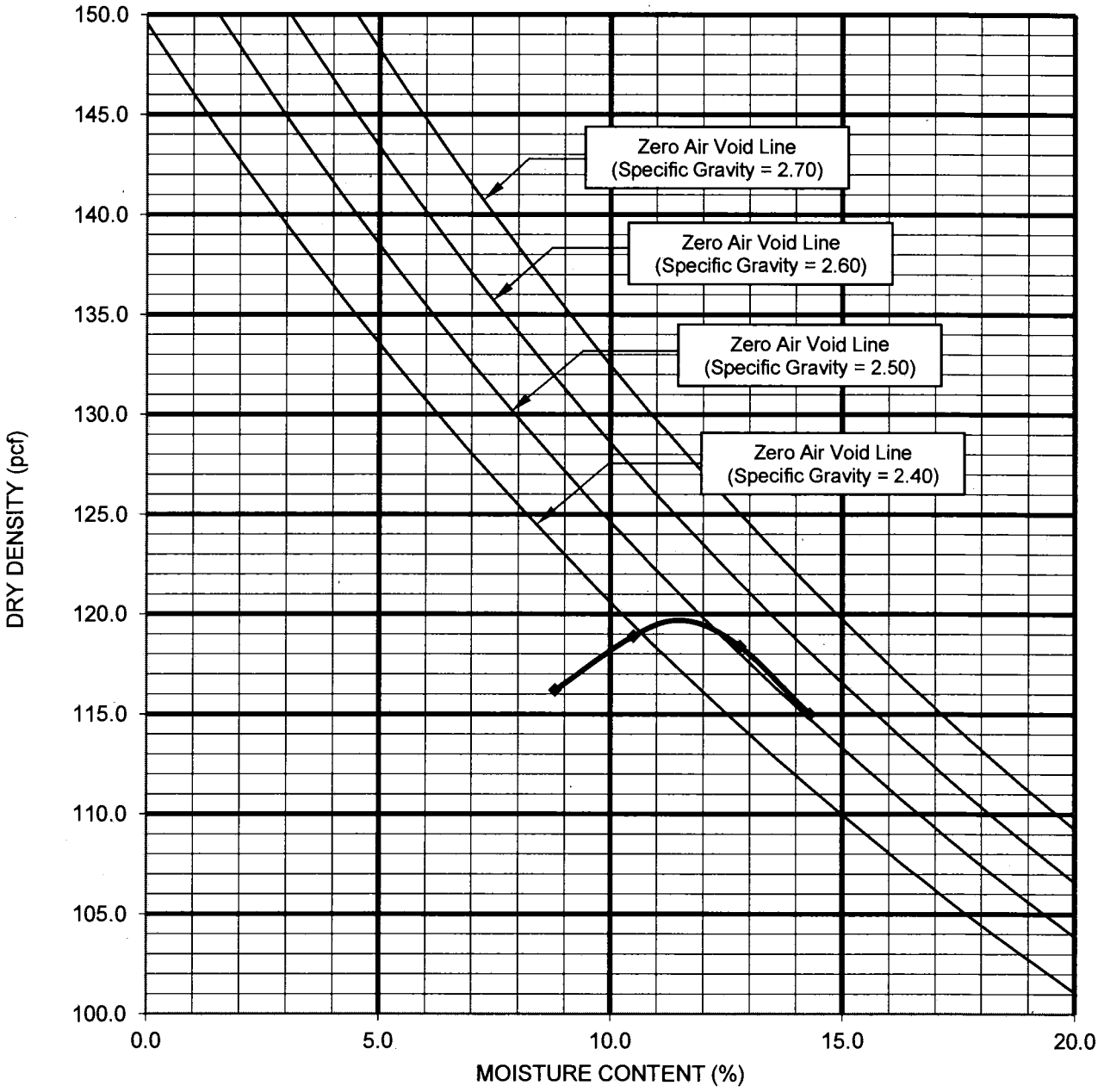
PERFORMED IN GENERAL ACCORDANCE WITH: ☑ ASTM D 1557 ☐ ASTM D 698 METHOD: ☑ A ☐ B ☐ C

NOVA

PROCTOR DENSITY TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
8/12	2013030	B-18



Sample Location	Depth (ft.)	Soil Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
SS-1	0.0 - 2.0	Sandy SILT with gravel (ML)	119.7	11.6
Dry Density and Moisture Content Values Corrected for Oversize (ASTM D4718)			n/a	n/a

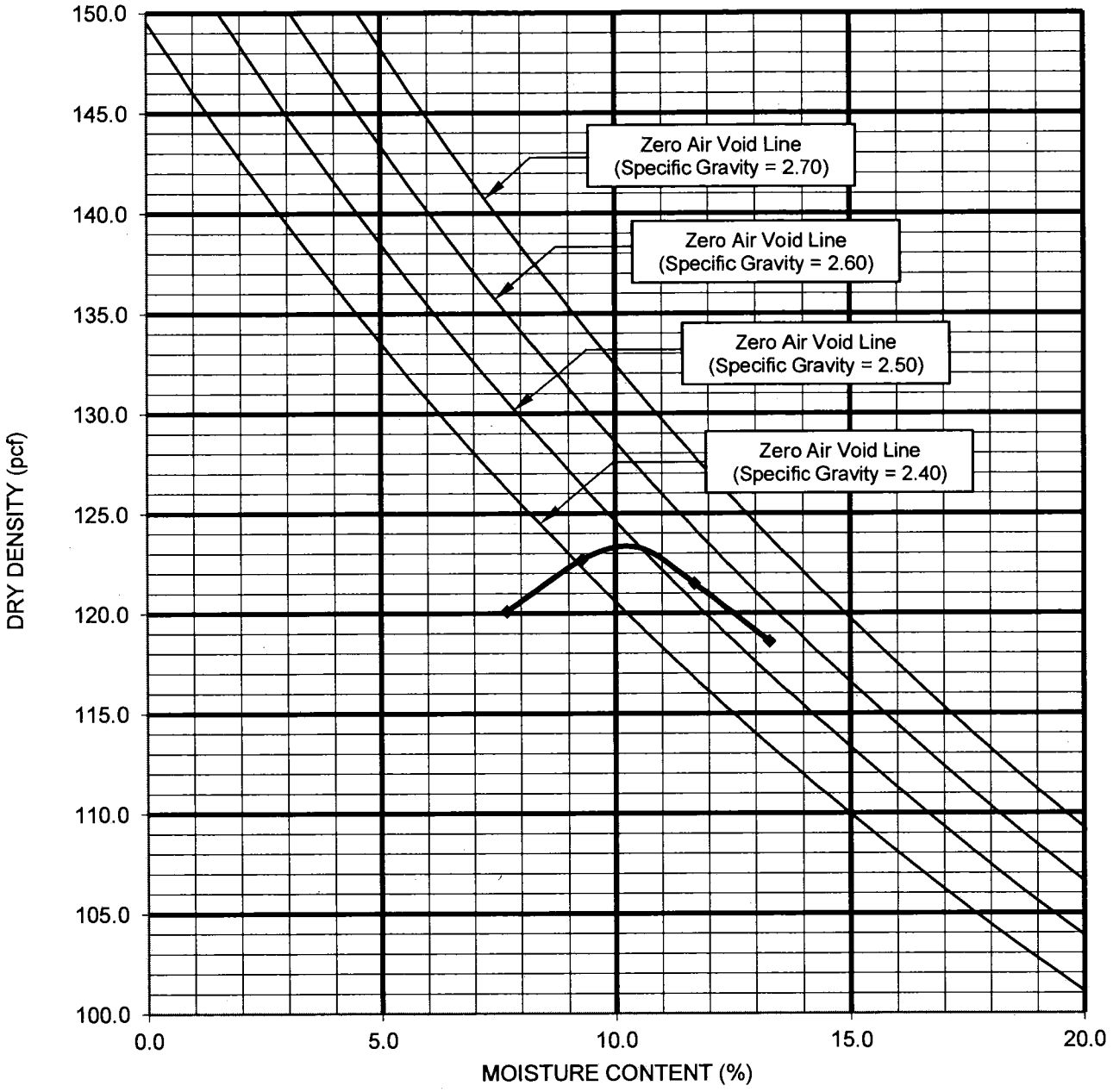
PERFORMED IN GENERAL ACCORDANCE WITH: ☑ ASTM D 1557 ☐ ASTM D 698 METHOD: ☑ A ☐ B ☐ C

NOVA

PROCTOR DENSITY TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
8/12	2013030	B-19



Sample Location	Depth (ft.)	Soil Description	Maximum Dry Density (pcf)	Optimum Moisture Content (%)
SS-2	0.0 - 2.0	Sandy SILT with Clay and Gravel (ML)	123.3	10.2
Dry Density and Moisture Content Values Corrected for Oversize (ASTM D4718)			n/a	n/a

PERFORMED IN GENERAL ACCORDANCE WITH: ☑ ASTM D 1557 ☐ ASTM D 698 METHOD: ☑ A ☐ B ☐ C

NOVA

PROCTOR DENSITY TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
8/12	2013030	B-20

SAMPLE LOCATION	SAMPLE DEPTH (FT)	SOIL TYPE	R-VALUE
SS-1	0.0 - 2.0	ML	22
SS-2	0.0 - 2.0	ML	21

NOVA

R-VALUE TEST RESULTS

SHINOHARA II BURN SITE
APN 644-042-02 AND 10
CHULA VISTA, CALIFORNIA

DATE	PROJECT NO.	FIGURE
9/12	2013030	B-21

NOVA Services

HYDRAULIC CONDUCTIVITY TEST RESULTS
(ASTM D5084)

Project Name:	Shinohara II Burn Site		
Project Number:	2013030	Cell Pressure (psi)	52
Beginning Test Date:	7/8/2013	In Pressure (psi)	50
Ending Test Date:	7/10/2013	Out Pressure (psi)	50
Sample ID:	B1-30.5-31	Burette area (cm^2)	0.872
Sample Description:	Gray sandy SILT with clay	Burette Correction (cm/ml)	1.147
Estimated Specific Gravity:	2.75		

	1	2	3	AVG (inches)	AVG (cm)
Initial Height (in.)	2.36	2.39	2.38	2.38	6.04
Final Height (in.)	2.39	2.38	2.37	2.38	6.05
Initial Diameter (in.)	2.39	2.40	2.38	2.39	6.07
Final Diameter (in.)	2.39	2.39	2.41	2.40	6.09
Initial Area				4.49	28.94

Initial Volume (ft^3)	0.00617	Final Volume (ft^3)	0.00621
Initial Volume (cm^3)	174.7	Final Volume (cm^3)	175.9

	Weight (grams)	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Void Ratio	Saturation (%)
Initial	350.33	**25.9**	125.2	**99.4**	0.726	98.2
Final	352.28	26.6	125.0	98.7	0.739	99.2
Dry	278.19					

Beginning Date & Time	End Date & Time	Elapsed Time (sec.)	Burette Out (ml)	Burette In (ml)	Pressure Head (cm)	Gradient	H1 (cm)	H2 (cm)	Permeability (cm/s)
7/8/13 9:32 AM			24.25	1.05	-	4.4	26.6		
	7/8/13 1:32 PM	14,400	23.80	1.40	-	4.3		25.7	2.22E-07
7/8/13 1:32 PM		14,400	23.80	1.40	-	4.3	25.7		
	7/8/13 5:32 PM	14,400	23.45	1.80	-	4.1		24.8	2.15E-07
7/8/13 5:32 PM		28,800	23.45	1.80	-	4.1	24.8		
	7/9/13 7:40 AM	50,880	22.30	3.00	-	3.7		22.1	2.05E-07
7/9/13 7:40 AM		79,680	22.25	3.00	-	3.7	22.1		
	7/9/13 11:40 AM	14,400	21.95	3.30	-	3.5		21.4	2.00E-07
7/9/13 11:40 AM		94,080	21.95	3.30	-	3.5	21.4		
	7/9/13 3:40 PM	14,400	21.60	3.55	-	3.4		20.7	2.07E-07
7/9/13 3:40 PM		108,480	21.60	3.55	-	3.4	20.7		
	7/10/13 7:40 AM	57,600	20.55	4.7	-	3.0		18.2	2.05E-07
		166,080							

Average Permeability (cm/s):	**2.04E-07**
Average Permeability (in/hr):	**2.89E-04**
Permeability @ 20°C (cm/s)	1.84E-07

Notes: Insitu Soil Sample, taken from least disturbed portion of sample

Average temperature during test = 24.5°C

Tap water utlized as permeant

Tested By: M. Repking Calculated By: MR Reviewed By: MR

TABLE B-22

NOVA Services

HYDRAULIC CONDUCTIVITY TEST RESULTS (ASTM D5084)

Project Name:	Shinohara II Burn Site		
Project Number:	2013030	Cell Pressure (psi)	52
Beginning Test Date:	7/8/2013	In Pressure (psi)	50
Ending Test Date:	7/10/2013	Out Pressure (psi)	50
Sample ID:	B1-40-40.5	Burette area (cm^2)	0.872
Sample Description:	Gray sandy SILT, trace clay	Burette Correction (cm/ml)	1.147
Estimated Specific Gravity:	2.68		

	1	2	3	AVG (inches)	AVG (cm)
Initial Height (in.)	2.38	2.38	2.38	2.38	6.05
Final Height (in.)	2.39	2.39	2.39	2.39	6.07
Initial Diameter (in.)	2.41	2.42	2.41	2.41	6.13
Final Diameter (in.)	2.42	2.42	2.42	2.42	6.15
Initial Area				4.57	29.51

Initial Volume (ft^3)	0.00630	Final Volume (ft^3)	0.00636
Initial Volume (cm^3)	178.4	Final Volume (cm^3)	180.1

	Weight (grams)	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Void Ratio	Saturation (%)
Initial	373.91	**18.3**	130.8	**110.6**	0.512	95.8
Final	377.7	19.5	130.9	109.5	0.527	99.2
Dry	316.03					

Beginning Date & Time	End Date & Time	Elapsed Time (sec.)	Burette Out (ml)	Burette In (ml)	Pressure Head (cm)	Gradient	H1 (cm)	H2 (cm)	Permeability (cm/s)
7/8/13 9:34 AM			24.05	1.25	-	4.3	26.2		
	7/8/13 1:34 PM	14,400	23.05	2.10	-	4.0		24.0	5.25E-07
7/8/13 1:34 PM		14,400	23.05	2.10	-	4.0	24.0		
	7/8/13 5:34 PM	14,400	22.15	3.00	-	3.6		22.0	5.57E-07
7/8/13 5:32 PM		28,800	22.15	3.00	-	3.6	22.0		
	7/9/13 7:42 AM	51,000	19.55	5.50	-	2.7		16.1	5.42E-07
7/9/13 7:42 AM		79,800	19.55	5.50	-	2.7	16.1		
	7/9/13 11:42 AM	14,400	19.00	6.10	-	2.4		14.8	5.30E-07
7/9/13 11:42 AM		94,200	19.00	6.10	-	2.4	14.8		
	7/9/13 3:42 PM	14,400	18.45	6.60	-	2.2		13.6	5.27E-07
7/9/13 3:42 PM		108,600	18.45	6.60	-	2.2	13.6		
	7/10/13 7:42 AM	57,600	16.75	8.3	-	1.6		9.7	5.24E-07
		166,200							

Average Permeability (cm/s):	**5.26E-07**
Average Permeability (in/hr):	**7.46E-04**
Permeability @ 20°C (cm/s)	4.75E-07

Notes: Insitu Soil Sample, taken from least disturbed portion of sample

Average temperature during test = 24.4°C

Tap water utlized as permeant

Tested By: M. Repking Calculated By: MR Reviewed By: MR

TABLE B-23

NOVA Services

HYDRAULIC CONDUCTIVITY TEST RESULTS (ASTM D5084)

Project Name:	Shinohara II Burn Site		
Project Number:	2013030	Cell Pressure (psi)	52
Beginning Test Date:	7/8/2013	In Pressure (psi)	50
Ending Test Date:	7/8/2013	Out Pressure (psi)	50
Sample ID:	B2-32.5-33	Burette area (cm^2)	0.872
Sample Description:	Dark ylw brn silty SAND	Burette Correction (cm/ml)	1.147
Estimated Specific Gravity:	2.75		

	1	2	3	AVG (inches)	AVG (cm)
Initial Height (in.)	2.39	2.39	2.39	2.39	6.07
Final Height (in.)	2.36	2.38	2.37	2.37	6.02
Initial Diameter (in.)	2.42	2.42	2.42	2.42	6.15
Final Diameter (in.)	2.38	2.37	2.35	2.37	6.01
Initial Area				4.60	29.67
Initial Volume (ft^3)	0.00636	Final Volume (ft^3)		0.00603	
Initial Volume (cm^3)	180.1	Final Volume (cm^3)		170.8	

	Weight (grams)	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Void Ratio	Saturation (%)
Initial	358.02	**25.5**	124.1	**98.8**	0.736	95.3
Final	352.21	23.5	128.7	104.2	0.646	99.9
Dry	285.24					

Beginning Date & Time	End Date & Time	Elapsed Time (sec.)	Burette Out (ml)	Burette In (ml)	Pressure Head (cm)	Gradient	H1 (cm)	H2 (cm)	Permeability (cm/s)
7/2/13 9:36 AM			23.95	1.10	-	4.3	26.2		
	7/2/13 9:46 AM	600	22.90	2.05	-	3.9		23.9	1.36E-05
7/2/13 9:46 AM		600	22.90	2.05	-	3.9	23.9		
	7/2/13 9:56 AM	600	22.00	2.95	-	3.6		21.9	1.34E-05
7/2/13 9:56 AM		1,200	22.00	2.95	-	3.6	21.9		
	7/2/13 10:06 AM	600	21.20	3.75	-	3.3		20.0	1.30E-05
7/2/13 10:06 AM		1,800	21.20	3.75	-	3.3	20.0		
	7/2/13 10:16 AM	600	20.45	4.50	-	3.0		18.3	1.34E-05
7/2/13 10:16 AM		2,400	20.45	4.50	-	3.0	18.3		
	7/2/13 10:26 AM	600	19.80	5.15	-	2.8		16.8	1.26E-05
7/2/13 10:26 AM		3,000	19.80	5.15	-	2.8	16.8		
	7/2/13 10:36 AM	600	19.15	5.75	-	2.5		15.4	1.33E-05
		3,600							

Average Permeability (cm/s): **1.33E-05**
Average Permeability (in/hr): **1.88E-02**
Permeability @ 20°C (cm/s) 1.18E-05

Notes: Insitu Soil Sample, taken from middle portion of sample
Average temperature during test = 24.9°C
Tap water utlized as permeant

Tested By: M. Repking Calculated By: MR Reviewed By: MR

TABLE B-24

NOVA Services

HYDRAULIC CONDUCTIVITY TEST RESULTS (ASTM D5084)

Project Name:	Shinohara II Burn Site		
Project Number:	2013030	Cell Pressure (psi)	52
Beginning Test Date:	7/9/2013	In Pressure (psi)	50
Ending Test Date:	7/9/2013	Out Pressure (psi)	50
Sample ID:	B2-50.5-51	Burette area (cm^2)	0.872
Sample Description:	Dark gray silty SAND	Burette Correction (cm/ml)	1.147
Estimated Specific Gravity:	2.80		

	1	2	3	AVG (inches)	AVG (cm)
Initial Height (in.)	1.99	1.98	1.99	1.99	5.05
Final Height (in.)	1.99	1.98	1.99	1.99	5.05
Initial Diameter (in.)	2.38	2.37	2.36	2.37	6.02
Final Diameter (in.)	2.36	2.37	2.38	2.37	6.02
Initial Area				4.41	28.46
Initial Volume (ft^3)	0.00507	Final Volume (ft^3)		0.00507	
Initial Volume (cm^3)	143.6	Final Volume (cm^3)		143.6	

	Weight (grams)	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Void Ratio	Saturation (%)
Initial	275.5	**31.5**	119.8	**91.1**	0.919	96.0
Final	278.04	32.7	120.9	91.1	0.919	99.7
Dry	209.47					

Beginning Date & Time	End Date & Time	Elapsed Time (sec.)	Burette Out (ml)	Burette In (ml)	Pressure Head (cm)	Gradient	H1 (cm)	H2 (cm)	Permeability (cm/s)
7/9/13 4:40 PM			24.15	1.00	-	5.3	26.6		
	7/9/13 4:40 PM	15	22.00	3.20	-	4.3		21.6	1.07E-03
7/9/13 4:40 PM		15	22.00	3.20	-	4.3	21.6		
	7/9/13 4:40 PM	15	20.30	4.90	-	3.5		17.7	1.03E-03
7/9/13 4:40 PM		30	20.30	4.90	-	3.5	17.7		
	7/9/13 4:40 PM	15	18.90	6.30	-	2.9		14.5	1.03E-03
7/9/13 4:40 PM		45	18.90	6.30	-	2.9	14.5		
	7/9/13 4:41 PM	15	17.75	7.40	-	2.4		11.9	1.01E-03
7/9/13 4:41 PM		60	17.75	7.40	-	2.4	11.9		
	7/9/13 4:41 PM	15	16.80	8.40	-	1.9		9.6	1.08E-03
		75							

Average Permeability (cm/s):	**1.04E-03**
Average Permeability (in/hr):	**1.47E+00**
Permeability @ 20°C (cm/s)	9.49E-04

Notes: Insitu Soil Sample, taken from least disturbed portion of sample

Average temperature during test = 23.8°C

Tap water utlized as permeant

Tested By: M. Repking Calculated By: MR Reviewed By: MR

TABLE B-25

NOVA Services

HYDRAULIC CONDUCTIVITY TEST RESULTS (ASTM D5084)

Project Name:	Shinohara II Burn Site		
Project Number:	2013030	Cell Pressure (psi)	52
Beginning Test Date:	7/10/2013	In Pressure (psi)	50
Ending Test Date:	7/11/2013	Out Pressure (psi)	50
Sample ID:	B3-31-31.5	Burette area (cm^2)	0.872
Sample Description:	Ylw brn SM and dark gr sandy ML	Burette Correction (cm/ml)	1.147
Estimated Specific Gravity:	2.72		

	1	2	3	AVG (inches)	AVG (cm)
Initial Height (in.)	2.00	2.00	2.00	2.00	5.08
Final Height (in.)	1.99	2.00	2.00	2.00	5.07
Initial Diameter (in.)	2.36	2.36	2.36	2.36	5.99
Final Diameter (in.)	2.35	2.36	2.37	2.36	5.99
Initial Area				4.37	28.22
Initial Volume (ft^3)	0.00506	Final Volume (ft^3)		0.00505	
Initial Volume (cm^3)	143.4	Final Volume (cm^3)		143.1	

	Weight (grams)	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Void Ratio	Saturation (%)
Initial	267.01	**34.2**	116.3	**86.6**	0.959	97.0
Final	268.57	35.0	117.1	86.8	0.956	99.5
Dry	198.98					

Beginning Date & Time	End Date & Time	Elapsed Time (sec.)	Burette Out (ml)	Burette In (ml)	Pressure Head (cm)	Gradient	H1 (cm)	H2 (cm)	Permeability (cm/s)
7/10/13 1:43 PM			23.90	1.05	-	5.2	26.2		
	7/10/13 2:03 PM	1,200	23.40	1.40	-	5.0		25.2	2.48E-06
7/10/13 2:03 PM		1,200	23.40	1.40	-	5.0	25.2		
	7/10/13 2:33 PM	1,800	22.80	2.05	-	4.7		23.8	2.55E-06
7/10/13 2:33 PM		3,000	22.80	2.05	-	4.7	23.8		
	7/10/13 3:03 PM	1,800	22.30	2.55	-	4.5		22.7	2.15E-06
7/10/13 3:03 PM		4,800	22.25	2.55	-	4.4	22.6		
	7/10/13 3:33 PM	1,800	21.80	3.05	-	4.2		21.5	2.15E-06
7/10/13 3:33 PM		6,600	21.80	3.05	-	4.2	21.5		
	7/10/13 4:33 PM	3,600	20.90	3.90	-	3.8		19.5	2.14E-06
7/11/13 7:45 AM		10,200	24.00	1.10	-	5.2	26.3		
	7/11/13 8:15 AM	1,800	23.35	1.55	-	4.9		25.0	2.15E-06
		12,000							

Average Permeability (cm/s):	**2.15E-06**
Average Permeability (in/hr):	**3.04E-03**
Permeability @ 20°C (cm/s)	1.94E-06

Notes: Insitu Soil Sample, taken in transition zone (SM and ML), Top 3 inches (SM) had 2" gravel

Average temperature during test = 24.3°C

Tap water utlized as permeant

Tested By: M. Repking Calculated By: MR Reviewed By: MR

TABLE B-26

NOVA Services

HYDRAULIC CONDUCTIVITY TEST RESULTS (ASTM D5084)

Project Name:	Shinohara II Burn Site		
Project Number:	2013030	Cell Pressure (psi)	52
Beginning Test Date:	7/11/2013	In Pressure (psi)	50
Ending Test Date:	7/12/2013	Out Pressure (psi)	50
Sample ID:	B3-33-33.5	Burette area (cm^2)	0.872
Sample Description:	Dark gray sandy SILT	Burette Correction (cm/ml)	1.147
Estimated Specific Gravity:	2.79		

	1	2	3	AVG (inches)	AVG (cm)
Initial Height (in.)	1.98	1.99	2.00	1.99	5.05
Final Height (in.)	2.00	2.00	2.00	2.00	5.08
Initial Diameter (in.)	2.36	2.37	2.38	2.37	6.02
Final Diameter (in.)	2.36	2.37	2.35	2.36	5.99
Initial Area				4.41	28.46
Initial Volume (ft^3)	0.00508	Final Volume (ft^3)		0.00506	
Initial Volume (cm^3)	143.9	Final Volume (cm^3)		143.4	

	Weight (grams)	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Void Ratio	Saturation (%)
Initial	268.8	**33.7**	116.6	**87.3**	0.995	94.4
Final	272.2	35.4	118.5	87.6	0.988	99.8
Dry	201.09					

Beginning Date & Time	End Date & Time	Elapsed Time (sec.)	Burette Out (ml)	Burette In (ml)	Pressure Head (cm)	Gradient	H1 (cm)	H2 (cm)	Permeability (cm/s)
7/11/13 11:21 AM			24.00	1.10	-	5.2	26.3		
	7/11/13 12:51 PM	5,400	22.40	1.90	-	4.7		23.5	1.59E-06
7/11/13 12:51 PM		5,400	22.40	1.90	-	4.7	23.5		
	7/11/13 2:21 PM	5,400	22.15	3.80	-	4.2		21.0	1.59E-06
7/11/13 3:51 PM		10,800	20.10	4.85	-	3.5	17.5		
	7/11/13 5:21 PM	5,400	19.10	5.80	-	3.0		15.3	1.96E-06
7/12/13 8:19 AM		16,200	24.00	1.05	-	5.2	26.3		
	7/12/13 9:49 AM	5,400	22.70	2.05	-	4.7		23.7	1.51E-06
7/12/13 9:49 AM		21,600	22.70	2.10	-	4.7	23.6		
	7/12/13 11:19 AM	5,400	21.75	3.20	-	4.2		21.3	1.50E-06
		27,000							

Average Permeability (cm/s):	**1.55E-06**
Average Permeability (in/hr):	**2.19E-03**
Permeability @ 20°C (cm/s)	1.39E-06

Notes: Insitu Soil Sample, taken from bottom portion of tube

Average temperature during test = 24.7°C

Tap water utlized as permeant

Tested By: M. Repking Calculated By: MR Reviewed By: MR

TABLE B-27

NOVA Services

HYDRAULIC CONDUCTIVITY TEST RESULTS (ASTM D5084)

Project Name:	Shinohara II Burn Site
Project Number:	2013030
Beginning Test Date:	7/15/2013
Ending Test Date:	7/15/2013
Sample ID:	B3-35.5-36
Sample Description:	Dark gray Sandy SILT
Estimated Specific Gravity:	2.78

Cell Pressure (psi)	52
In Pressure (psi)	50
Out Pressure (psi)	50
Burette area (cm^2)	0.872
Burette Correction (cm/ml)	1.147

	1	2	3	AVG (inches)	AVG (cm)
Initial Height (in.)	2.07	2.06	2.06	2.06	5.24
Final Height (in.)	2.08	2.07	2.06	2.07	5.26
Initial Diameter (in.)	2.42	2.41	2.41	2.41	6.13
Final Diameter (in.)	2.41	2.41	2.41	2.41	6.12
Initial Area				4.57	29.51
Initial Volume (ft^3)	0.00546	Final Volume (ft^3)		0.00546	
Initial Volume (cm^3)	154.7	Final Volume (cm^3)		154.7	

	Weight (grams)	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Void Ratio	Saturation (%)
Initial	296.3	**32.8**	119.6	**90.1**	0.926	98.4
Final	297.45	33.3	120.0	90.0	0.927	99.9
Dry	223.13					

Beginning Date & Time	End Date & Time	Elapsed Time (sec.)	Burette Out (ml)	Burette In (ml)	Pressure Head (cm)	Gradient	H1 (cm)	H2 (cm)	Permeability (cm/s)
7/15/13 8:46 AM			24.00	1.10	-	5.0	26.3		
	7/15/13 9:16 AM	1,800	23.60	1.40	-	4.9		25.5	1.34E-06
7/15/13 9:16 AM		1,800	23.60	1.40	-	4.9	25.5		
	7/15/13 9:46 AM	1,800	23.30	1.70	-	4.7		24.8	1.18E-06
7/15/13 9:46 AM		3,600	23.30	1.70	-	4.7	24.8		
	7/15/13 10:22 AM	2,160	22.95	2.05	-	4.6		24.0	1.18E-06
7/15/13 10:22 AM		5,760	22.95	2.05	-	4.6	24.0		
	7/15/13 10:46 AM	1,440	22.70	2.25	-	4.5		23.5	1.17E-06
7/15/13 10:46 AM		7,200	22.70	2.25	-	4.5	23.5		
	7/15/13 11:16 AM	1,800	22.40	2.50	-	4.4		22.8	1.17E-06
7/15/13 11:16 AM		9,000	22.40	2.50	-	4.4	22.8		
	7/15/13 11:46 AM	1,800	22.15	2.80	-	4.2		22.2	1.21E-06
		10,800							

Average Permeability (cm/s):	**1.18E-06**
Average Permeability (in/hr):	**1.67E-03**
Permeability @ 20°C (cm/s)	1.04E-06

Notes: Insitu Soil Sample, taken from bottom portion of tube

Average temperature during test = 25.2°C

Tap water utlized as permeant

Tested By: M. Repking Calculated By: MR Reviewed By: MR

TABLE B-28

NOVA Services

HYDRAULIC CONDUCTIVITY TEST RESULTS (ASTM D5084)

Project Name:	Shinohara II Burn Site		
Project Number:	2013030	Cell Pressure (psi)	52
Beginning Test Date:	7/15/2013	In Pressure (psi)	50
Ending Test Date:	7/15/2013	Out Pressure (psi)	50
Sample ID:	B3-40.5-41	Burette area (cm^2)	0.872
Sample Description:	Dark gray silty SAND	Burette Correction (cm/ml)	1.147
Estimated Specific Gravity:	2.78		

	1	2	3	AVG (inches)	AVG (cm)
Initial Height (in.)	2.05	2.05	2.05	2.05	5.21
Final Height (in.)	2.05	2.06	2.07	2.06	5.23
Initial Diameter (in.)	2.38	2.39	2.40	2.39	6.07
Final Diameter (in.)	2.38	2.39	2.40	2.39	6.07
Initial Area				4.49	28.94

Initial Volume (ft^3)	0.00532	Final Volume (ft^3)	0.00535
Initial Volume (cm^3)	150.7	Final Volume (cm^3)	151.4

	Weight (grams)	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Void Ratio	Saturation (%)
Initial	295.47	**27.8**	122.4	**95.8**	0.811	95.3
Final	299.03	29.3	123.3	95.3	0.820	99.4
Dry	231.19					

Beginning Date & Time	End Date & Time	Elapsed Time (sec.)	Burette Out (ml)	Burette In (ml)	Pressure Head (cm)	Gradient	H1 (cm)	H2 (cm)	Permeability (cm/s)
7/15/13 9:21 AM			24.10	1.00	-	5.1	26.5		
	7/15/13 9:36 AM	950	23.50	1.55	-	4.8		25.2	4.22E-06
7/15/13 9:36 AM		950	23.50	1.55	-	4.8	25.2		
	7/15/13 9:51 AM	850	23.05	2.00	-	4.6		24.1	3.86E-06
7/15/13 9:51 AM		1,800	23.05	2.00	-	4.6	24.1		
	7/15/13 10:06 AM	900	22.60	2.45	-	4.4		23.1	3.81E-06
7/15/13 10:06 AM		2,700	22.60	2.45	-	4.4	23.1		
	7/15/13 10:21 AM	930	22.15	2.90	-	4.2		22.1	3.85E-06
7/15/13 10:21 AM		3,630	22.15	2.90	-	4.2	22.1		
	7/15/13 10:36 AM	900	21.70	3.30	-	4.1		21.1	3.94E-06
7/15/13 10:36 AM		4,530	21.70	3.30	-	4.1	21.1		
	7/15/13 10:51 AM	900	21.30	3.70	-	3.9		20.2	3.87E-06
		5,430							

Average Permeability (cm/s):	**3.85E-06**
Average Permeability (in/hr):	**5.46E-03**
Permeability @ 20°C (cm/s)	3.42E-06

Notes: Insitu Soil Sample, taken from bottom portion of tube

Average temperature during test = 25.1°C

Tap water utlized as permeant

Tested By: M. Repking Calculated By: MR Reviewed By: MR

TABLE B-29

NOVA Services

HYDRAULIC CONDUCTIVITY TEST RESULTS (ASTM D5084)

Project Name:	Shinohara II Burn Site		
Project Number:	2013030	Cell Pressure (psi)	62
Beginning Test Date:	7/16/2013	In Pressure (psi)	60
Ending Test Date:	7/16/2013	Out Pressure (psi)	60
Sample ID:	B3-50.5-51.0	Burette area (cm^2)	0.872
Sample Description:	Dark gray silty SAND	Burette Correction (cm/ml)	1.147
Estimated Specific Gravity:	2.70		

	1	2	3	AVG (inches)	AVG (cm)
Initial Height (in.)	2.05	2.05	2.05	2.05	5.21
Final Height (in.)	2.05	2.05	2.05	2.05	5.21
Initial Diameter (in.)	2.40	2.40	2.40	2.40	6.10
Final Diameter (in.)	2.40	2.40	2.40	2.40	6.10
Initial Area				4.52	29.19

Initial Volume (ft^3)	0.00537	Final Volume (ft^3)	0.00537
Initial Volume (cm^3)	152.0	Final Volume (cm^3)	152.0

	Weight (grams)	Moisture Content (%)	Wet Density (pcf)	Dry Density (pcf)	Void Ratio	Saturation (%)
Initial	323.3	**17.2**	132.8	**113.3**	0.487	95.3
Final	325.28	17.9	133.6	113.3	0.487	99.3
Dry	275.89					

Beginning Date & Time	End Date & Time	Elapsed Time (sec.)	Burette Out (ml)	Burette In (ml)	Pressure Head (cm)	Gradient	H1 (cm)	H2 (cm)	Permeability (cm/s)
7/16/13 2:16 PM			24.00	1.00	-	5.1	26.4		
	7/16/13 2:16 PM	30	22.70	2.70	-	4.4		22.9	3.62E-04
7/16/13 2:16 PM		30	22.70	2.70	-	4.4	22.9		
	7/16/13 2:17 PM	30	20.80	4.20	-	3.7		19.0	4.83E-04
7/16/13 2:17 PM		60	20.80	4.20	-	3.7	19.0		
	7/16/13 2:17 PM	30	19.60	5.40	-	3.1		16.3	[illegible]
7/16/13 2:17 PM		90	19.60	5.40	-	3.1	16.3		
	7/16/13 2:18 PM	30	18.55	6.45	-	2.7		13.9	4.15E-04
7/16/13 2:20 PM		120	24.00	1.05	-	5.1	26.3		
	7/16/13 2:20 PM	30	22.35	2.70	-	4.3		22.5	[illegible]
7/16/13 2:20 PM		150	22.35	2.70	-	4.3	22.5		
	7/16/13 2:21 PM	30	20.90	4.20	-	3.7		19.2	4.22E-04
7/16/13 2:21 PM		180	20.90	4.20	-	3.7	19.2		
	7/16/13 2:21 PM	30	19.65	5.35	-	3.2		16.4	[illegible]
7/16/13 2:21 PM		210	19.65	5.35	-	3.2	16.4		
	7/16/13 2:22 PM	30	18.60	6.35	-	2.7		14.1	[illegible]
		240							

Average Permeability (cm/s):	**4.03E-04**
Average Permeability (in/hr):	**5.71E-01**
Permeability @ 20°C (cm/s)	3.72E-04

Notes: Insitu Soil Sample, taken from bottom portion of tube

Average temperature during test = 23.3°C

Tap water utlized as permeant

Tested By: M. Repking Calculated By: MR Reviewed By: MR

TABLE B-30

APPENDIX C

TYPICAL EARTHWORK GUIDELINES

These typical earthwork guidelines present the usual and minimum recommendations for grading operations performed under the observation and testing of NOVA. Deviation from these recommendations may be allowed, where specifically superseded in this report, or in other written communication signed by the Geotechnical Engineer.

1.0 GENERAL

- The Geotechnical Engineer is the Owner's or Builder's representative on the project. For the purposes of these specifications, observation and testing by the Geotechnical Engineer includes that observation and testing performed by any person or persons employed by, and responsible to, the licensed Geotechnical Engineer signing the grading report.
- All clearing, site preparation or earthwork performed on the project shall be conducted by the Contractor under the observation of the Geotechnical Engineer.
- It is the Contractor's responsibility to prepare the ground surface to receive the fills to the satisfaction of the Geotechnical Engineer and to place, spread, mix, water and compact the fill in accordance with the specifications of the Geotechnical Engineer. The Contractor shall also remove all material considered unsatisfactory by the Geotechnical Engineer.
- It is also the Contractor's responsibility to have suitable and sufficient compaction equipment on the job site to handle the amount of fill being placed. If necessary, excavation equipment will be shut down to permit completion of compaction. Sufficient watering apparatus will also be provided by the Contractor, with due consideration for the fill material, rate of placement and time of year.
- A final report will be issued by the Geotechnical Engineer attesting to the Contractor's conformance with these specifications.

2.0 SITE PREPARATION

- All vegetation and deleterious material such as rubbish shall be disposed of off-site. The removal must be concluded prior to placing fill.
- The Civil Engineer shall locate all houses, sheds, sewage disposal systems, large trees or structures onsite, or on the grading plan to the best of his knowledge prior to ground preparation.
- Soil or rock materials determined by the Geotechnical Engineer as being unsuitable for placement in compacted fills shall be removed and wasted from the site. Any material incorporated as part of a compacted fill must be approved by the Geotechnical Engineer.
- After the ground surface to receive fill has been cleared, it shall be scarified, disced or bladed by the Contractor until it is uniform and free from ruts, hollows, hummocks or other uneven features which may prevent uniform compaction.
- The scarified ground surface shall then be brought to optimum moisture content, mixed as required, and compacted as specified. If the scarified zone is greater than twelve inches in depth, the excess shall be removed and placed in lifts restricted to six inches. Prior to placing fill, the ground surface to receive fill shall be inspected, tested and approved by the Geotechnical Engineer. In areas where it is necessary to obtain the approval of the controlling agency, prior to placing fill, it will be the Contractor's responsibility to notify the proper authorities.

- Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipe lines or others not located prior to grading are to be removed or treated in a manner prescribed by the Geotechnical Engineer and/or the controlling agency for the project.

3.0 COMPACTED FILLS

- Any material imported or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable by the Geotechnical Engineer. Roots, tree branches and other matter missed during clearing shall be removed from the fill as directed by the Geotechnical Engineer.
- Rock fragments less than four inches in the largest dimension may be utilized in the fill, provided:
  - They are not placed in concentrated pockets
  - There is a sufficient percentage of fine-grained material to surround the rocks.
  - The distribution of the rocks is observed by the Geotechnical Engineer.
- Rocks greater than six inches in the largest dimension shall be taken off-site, or placed in accordance with the recommendation of the Geotechnical Engineer in areas designated as suitable for rock disposal. Details for rock disposal such as location, moisture control, percentage of the rock placed, etc., will be referred to in the "Conclusions and Recommendations" sections of this report, if applicable.
- Material that is spongy, subject to decay, or otherwise considered unsuitable shall not be used in the compacted fill.
- Representative samples of materials to be utilized as compacted fill shall be analyzed in the laboratory by the Geotechnical Engineer to determine their physical properties. If any material other than that previously tested is encountered during grading, the appropriate analysis of this material shall be conducted by the Geotechnical Engineer as soon as possible.
- Material used in the compaction process shall be evenly spread, watered or dried, processed and compacted in this lifts not to exceed six inches in thickness to obtain a uniformly dense layer. The fill shall be placed and compacted on a horizontal plane, unless otherwise approved by the Geotechnical Engineer.
- If the moisture content or relative compaction varies from that required by the Geotechnical Engineer, the Contractor shall rework the fill until it is approved by the Geotechnical Engineer.
- Each layer shall be compacted to minimum project standards in compliance with the testing methods specified by the controlling governmental agency and in accordance with the recommendations of the Geotechnical Engineer; in general, ASTM D1557 will be used.
- All fill shall be keyed and benched through all topsoil, colluvium, alluvium or creep material, into sound bedrock or firm material where the slope receiving fill exceeds a ratio of five horizontal to one vertical, in accordance with the recommendations of the Geotechnical Engineer.
- The key for hillside fills shall be a minimum of 15 feet within bedrock or firm materials, unless otherwise specified in this report.
- Drainage terraces and subdrainage devises shall be constructed in compliance with the ordinances of the controlling governmental agency, or with the recommendation of the Geotechnical Engineer.
- The Contractor will be required to obtain the specified minimum relative compaction out to the finish slope face of fill slopes, buttresses and stabilization fills. This may be achieved by either

overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment, or by any other procedure which produces the required compaction.

- The Contractor shall prepare a written detailed description of the method or methods he will employ to obtain the required slope compaction. Such documents shall be submitted to the Geotechnical Engineer for review and comments prior to the start of grading.
- If the method other than overbuilding and cutting back to the compacted core is to be employed, slope tests will be made by the Geotechnical Engineer during construction of the slopes to determine if the required compaction is being achieved. Where failing tests occur or other field problems arise, the Contractor will be notified by the Geotechnical Engineer.
- If the method of achieving the required slope compaction selected by the Contractor fails to produce the necessary results, the Contractor shall rework or rebuild such slopes until the required degree of compaction is obtained, at no additional cost to the Owner or Geotechnical Engineer.
- All fill slopes should be planted or protected from erosion in accordance with the project specifications and/or as recommended by a landscape architect, or by means approved by the governing authorities.
- Fill-over-cut slopes shall be properly keyed through topsoil, colluvium or creep material into rock or firm materials; and the transition shall be stripped of all soil prior to placing fill.
- The cut slope should be evaluated by the Geotechnical Engineer prior to placement of fill upon the cut slope.
- Pad areas in natural ground and cut shall be approved by the Geotechnical Engineer. Finished surfaces of these pads may require scarification and recompaction.

4.0 CUT SLOPES

- The Geotechnical Engineer shall inspect all cut slopes and shall be notified by the Contractor when cut slopes are started.
- If any conditions not anticipated in this report such as perched water, seepage, lenticular or confined strata of a potentially adverse nature, unfavorably inclined bedding, joints or fault planes are encountered during grading, these conditions shall be analyzed by the Geotechnical Engineer; and recommendations shall be made to treat these problems.
- Cut slopes that face in the same direction as the prevailing drainage shall be protected from slope wash by a non-erosive interceptor swale placed at the top of the slope.
- Unless otherwise specified in this report, no cut slopes shall be excavated higher or steeper than that allowed by the ordinances of controlling governmental agencies.
- Drainage terraces shall be constructed in compliance with the ordinances of controlling governmental agencies and/or in accordance with the recommendations of the Geotechnical Engineer.
- All cut slopes should be planted or protected from erosion in accordance with the project specifications and/or as recommended by a landscape architect, or by means approved by the governing authorities.

5.0 GRADING CONTROL

- Inspection of the fill placement shall be provided by the Geotechnical Engineer and/or his representative during the progress of grading
- In general, density tests should be made at intervals not exceeding two feet of fill height or every 1000 cubic yards of fill placed. These criteria will vary depending on soil conditions and the size of the job. In any event, an adequate number of field density tests shall be made to verify that the required compaction in being achieved.
- Where sheeps-foot rollers are used, the soil may be disturbed to a depth of several inches. Density determinations shall be taken in the compacted material below the disturbed surface at a depth determined by the Geotechnical Engineer or his representative.
- Density tests should be made on the surface material to receive fill as required by the Geotechnical Engineer.
- Where tests indicate that the density of any layer of fill, or portion thereof, is below the required relative compaction or improper moisture is in evidence, the particular layer or portion shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed over an area until the last placed lift of fill has been tested and found to meet the density and moisture requirements and that lift approved by the Geotechnical Engineer.
- All cleanout, processed ground to receive fill, key excavations, subdrains and rock disposal must be inspected and approved by the Geotechnical Engineer (and often by the governing authorities) prior to placing any fill. It shall be the Contractor's responsibility to notify the Geotechnical Engineer and governing authorities when such areas are ready for inspection.
- Observation and testing by the Geotechnical Engineer shall be conducted during the filling and compacting operations in order that he will be able to state in his opinion all cut and filled areas are graded in accordance with the approved specifications.

6.0 CONSTRUCTION CONSIDERATIONS

- Erosion control measures, when necessary, shall be provided by the Contractor during grading and prior to the completion and construction of permanent drainage controls.
- During construction, the Contractor shall properly grade all surfaces to maintain good drainage and prevent ponding of water. The Contractor shall take remedial measures to control surface water and to prevent erosion of graded area until such time as permanent drainage and erosion control measures have been installed.
- Where the work is interrupted by heavy rains, fill operations shall not be resumed until field observations and tests by the Geotechnical Engineer indicate the moisture content and density of the fill are within the limits previously specified.
- Upon completion of grading and termination of observations by the Geotechnical Engineer, no further filling or excavating, including that necessary for footings, foundations, large tree wells, retaining walls, or other features shall be performed without the approval of the Geotechnical Engineer.
- Care shall be taken by the Contractor during final grading to preserve any berms, drainage terraces, interceptor swales, or other devices of a permanent nature on or adjacent to the property.